Duquesne Light
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October 18, 1979

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Attn: A. Schwencer, Chief
Operating Reactors Branch No. 1
Division of Operating Reactors
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334
Additional Information Related To Technical Specification
Change Request No. 35

Gentlemen:

Enclosed are three (3) signed originals and thirty-seven (37) copies of additional information concerning the proposed new steam break protection system for Beaver Valley Unit No. 1 which was transmitted to you as part of Technical Specification Change Request No. 35.

This additional information was requested by members of your staff at a meeting held in Bethesda, Maryland, on October 9, 1979.

We have also enclosed a proposed technical specification relating to maintenance of the required Shut Down Margin associated with the new steam break protection system.

In addition, we are providing a revision to the technical specification on Reactivity Control Systems which was provided as part of Technical Specification Change Request No. 35. The purpose of this revision is to provide consistency with other proposed technical specifications submitted with the NPSH modifications in September, 1979.

Very truly yours,

C. N. Dunn

C. N. Dunn
Vice President, Operations

Enclosures

1196 181

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(CORPORATE SEAL)

Attest:

H. W. Staas
Secretary

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 19TH day of OCTOBER, 1979, before me, DONALD W. SHANNON, a Notary Public in and for said Commonwealth and County, personally appeared C. N. Dunn, who being duly sworn, deposed, and said that (1) he is Vice President of Duquesne Light, (2) he is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge, information and belief.

DONALD W. SHANNON, NOTARY PUBLIC
PITTSBURGH, ALLEGHENY COUNTY
MY COMMISSION EXPIRES JUNE 7, 1983
Member, Pennsylvania Association of Notaries

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DUQUESNE LIGHT COMPANY
Beaver Valley Power Station, Unit No. 1
Docket No. 50-334

ADDITIONAL INFORMATION CONCERNING THE
PROPOSED NEW STEAM BREAK PROTECTION SYSTEM

As discussed at the October 9, 1979, meeting in Bethesda, Maryland, we have performed an analysis of the results of a steam line break outside containment of a size sufficiently small so as not to cause an actuation of steam line isolation with a coincident failure of the charging system.

The initial conditions of the reactor coolant system were chosen to be 980 psig and 532°F with the Safety Injection Accumulator isolated from the Reactor Coolant System.

The results of the analysis indicate that, with no operator action, the reactor coolant system would approach to within 10° of saturated conditions in 18.6 minutes.

The results of this analysis are highly conservative for the following reasons:

1. The mass inventory of the reactor coolant system is such that the reactor core will remain covered even in the event of a cooldown to cold shutdown temperatures without the addition of mass to the system.

2. In the absence of normal charging and letdown, the reactor coolant system is a constant mass system, and subcooling conditions are quickly reestablished by initiating charging flow.

3. The initial temperature utilized in the analysis is 150° above the normal cooldown temperature for the corresponding pressure used in the analysis.

4. The loss of charging flow which is assumed to occur at the time of the event is accompanied by the following audible and visible annunications in the control room:

   a. Charging Pump Discharge Pressure Low.

   b. Charging Pump Discharge Flow Low.

   These alarms occur immediately upon the loss of the charging pump or failure of the level controller.

   c. Pressurizer Control Level Deviation.

   d. Pressurizer Control Level Low.

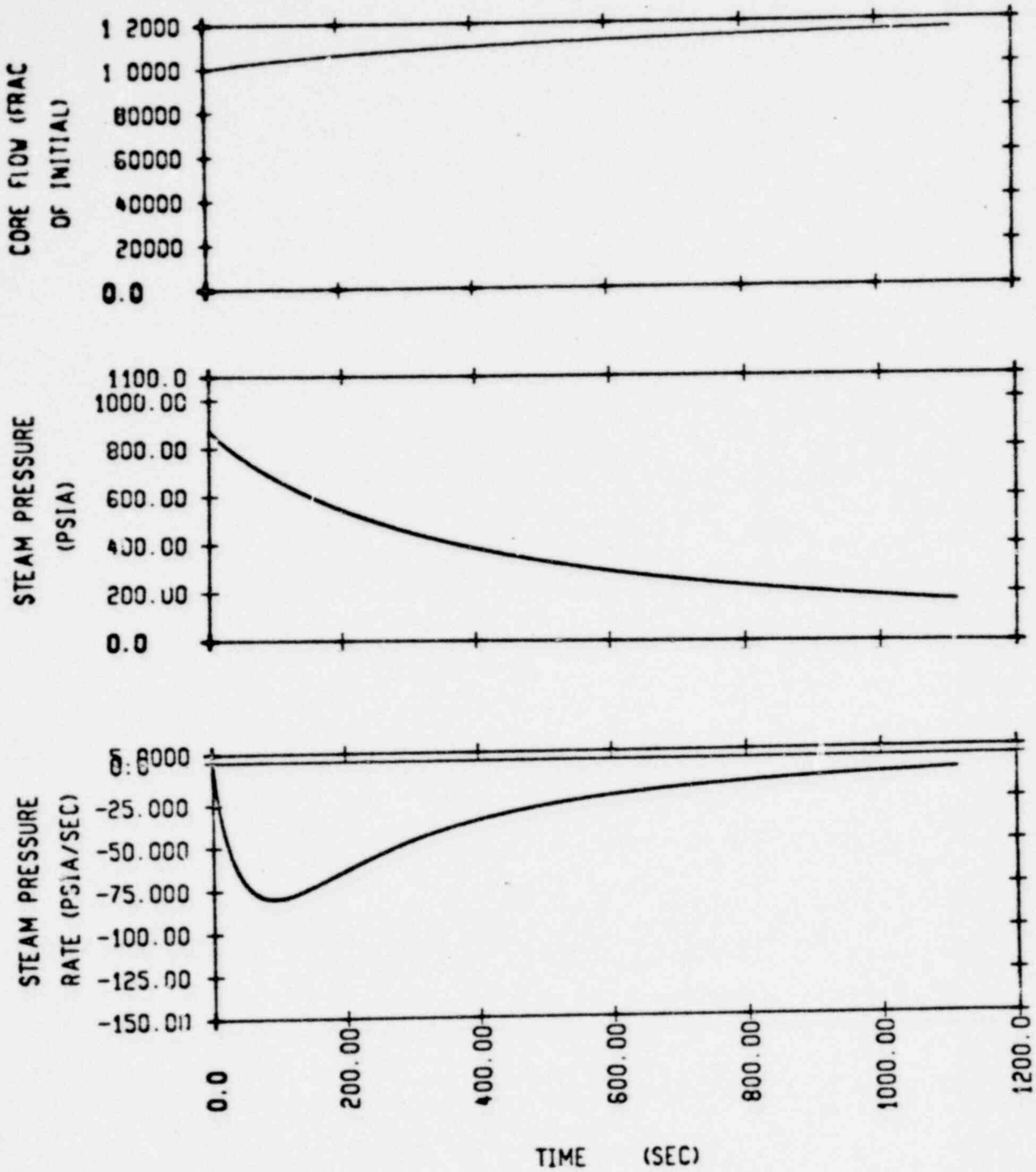
   e. Pressurizer Control Heater Group Automatic Trip.

The analysis indicates that all of the mentioned alarms will have actuated within the first forty-two (42) seconds of the anlayzed transient.

These alarms are accompanied by abnormal valve position and breaker position indicating lights on the control console which serve to aid the plant operator in making a rapid determination that a loss of charging function has occurred.

The occurrence of the analyzed event would require an immediate operator action to assure compliance action with Limiting Conditions for Operation with respect to Pressurizer Operability and Maximum Permissible Cooldown Rate.

In light of the fact that station heat ups and cooldowns are accomplished with constant operator attention to reactor coolant system conditions to maintain compliance with the Technical Specifications and the numerous audible and visible alarms and indicating lights which occur as a result of a loss of charging function, we believe that the eighteen (18) minute period available for operator action to restore the desired degree of subcooling subsequent to the actuation of the alarm conditions is reasonably conservative.



Initial Pressure 1000 psia
No Charging Assumed
Accumulators Blocked
Break Size 0.12 Sq. Ft. Per Loop

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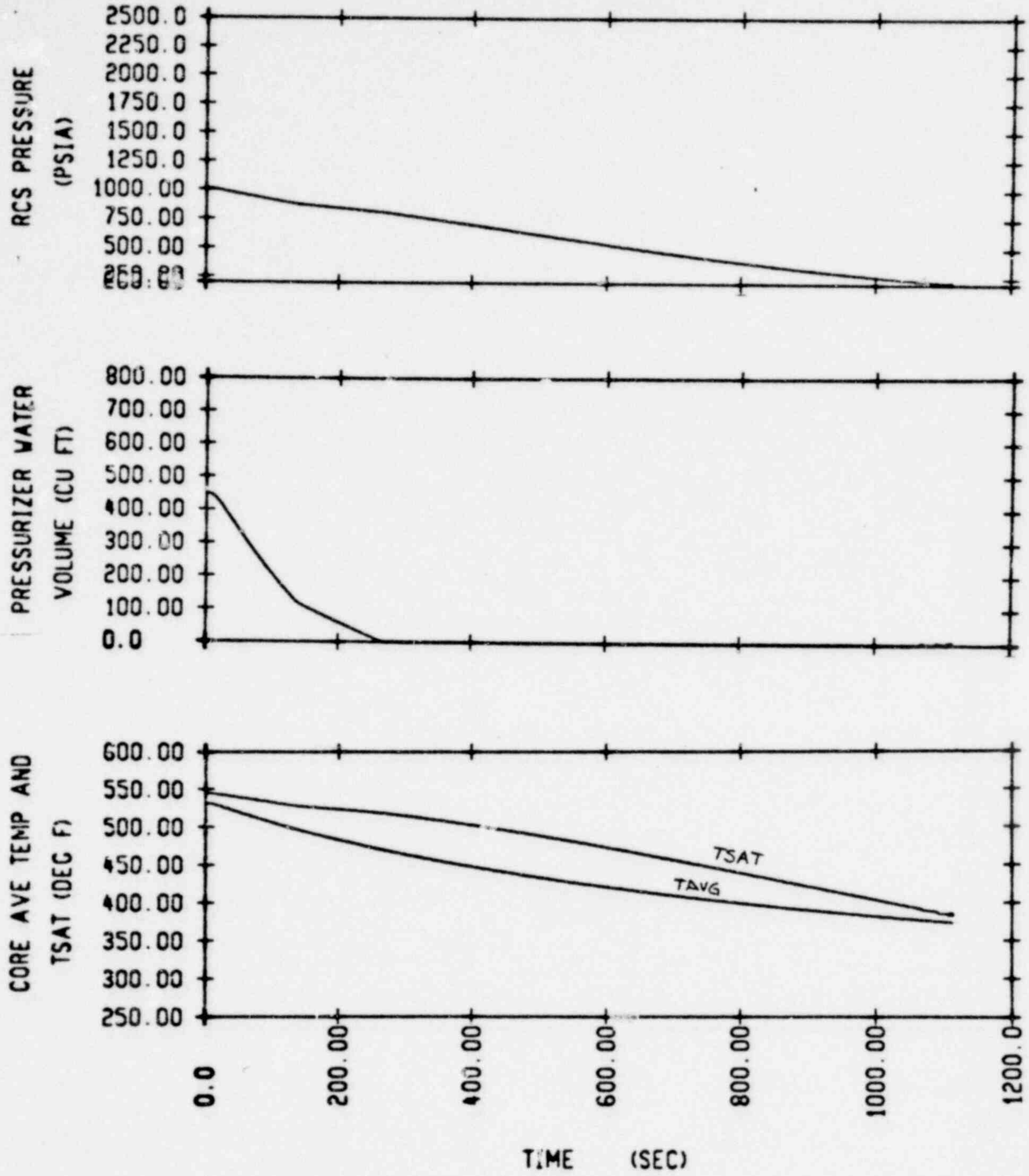
Ref. R4



Initial Pressure 1000 psia
No Charging Assumed
Accumulators Blocked
Break Size 0.12 Sq. Ft. Per Loop

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Ref. R4

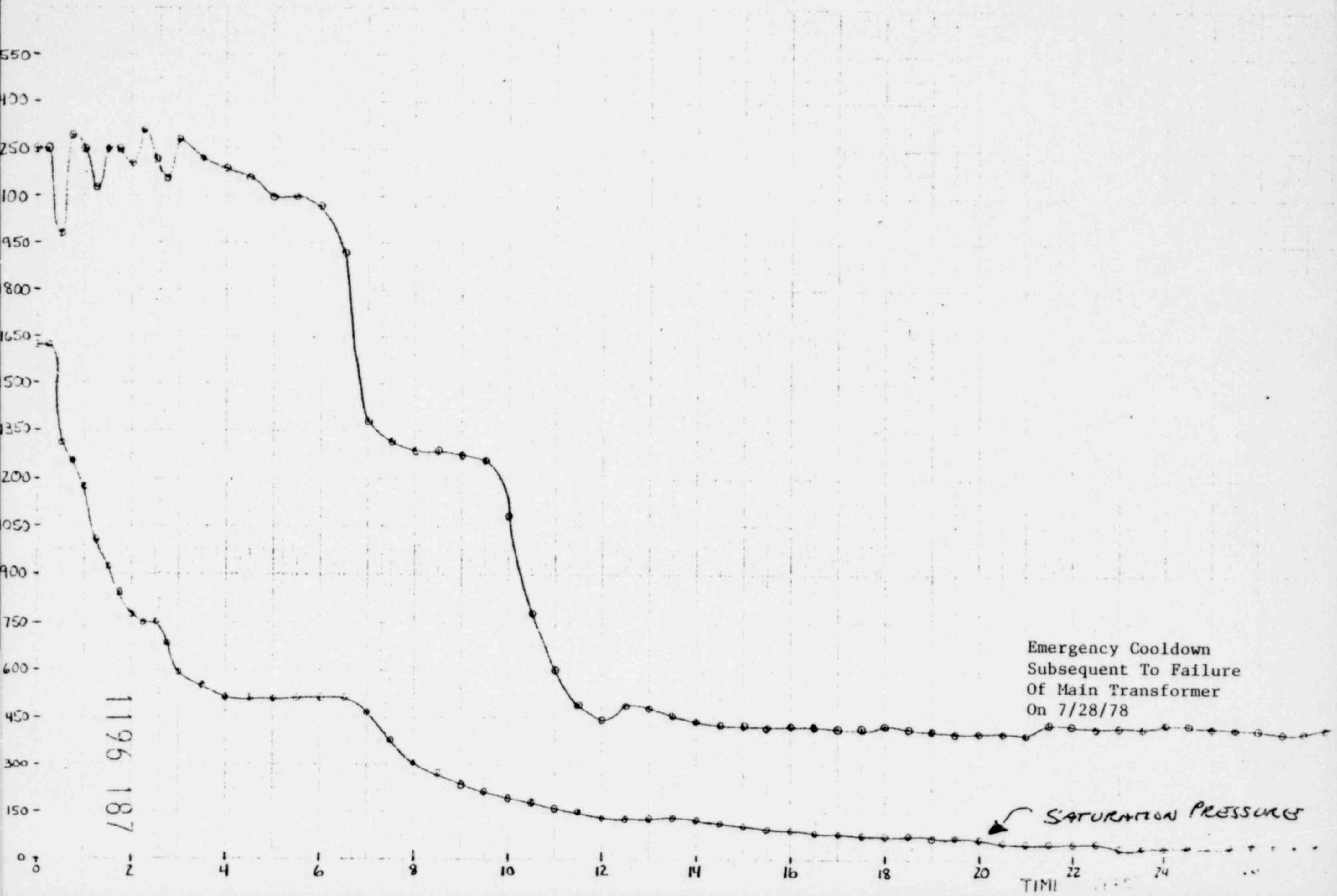
Beaver Valley Power Station

Figure 3

SUBJECT COOLDOWN PRESSURE vs. TIME

NOTE TIME 0 IS 1700 ON 7/28/78

COOLANT PRESSURE - BLACK
SATURATION PRESSURE - RED



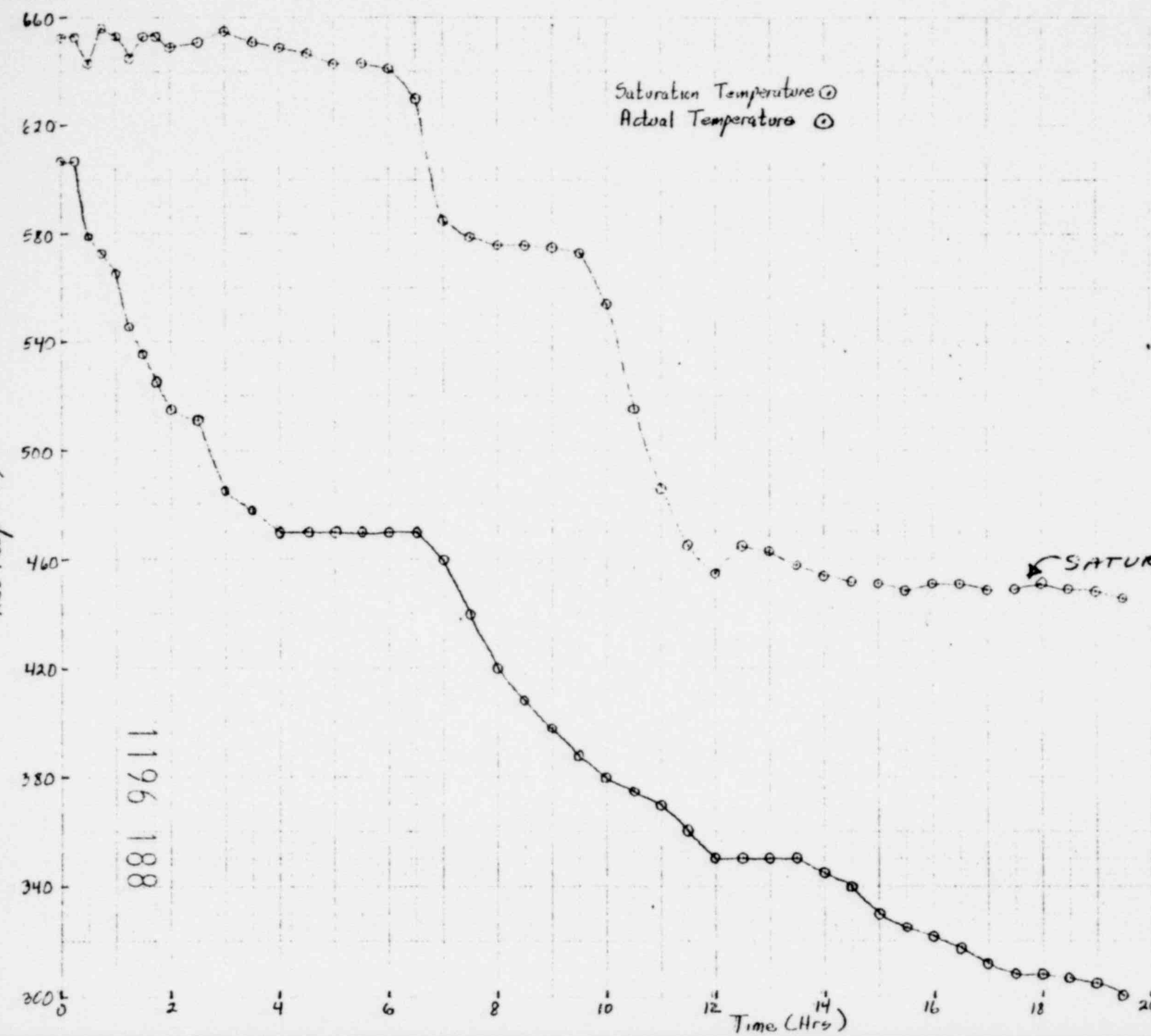
Beaver Valley Power Station

Figure 4

COMPANY | SUBJECT Cooldown 7/28/78 → 7/30/78
0 Hrs = 1700

DEPARTMENT

DIVISION | COMPILED BY | CHECKED BY | DATE



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Emergency Cooldown
Subsequent To Failure
Of Main Transformer
On 7/28/78

SURVEILLANCE REQUIREMENTS (Continued)

e. When in MODES 3 or 4, at least once per 24 hours by consideration of the following factors:

   1. Reactor coolant system boron concentration,

   2. Control rod position,

   3. Reactor coolant system average temperature,

   4. Fuel burnup based on gross thermal energy generation,

   5. Xenon concentration, and

   6. Samarium concentration.

f. The Reactor Coolant System shall be borated to at least the cold shutdown boron concentration prior to manually blocking the Low Pressurizer Pressure Safety Injection Signal and shall remain at this boron concentration or greater at all times during which this signal is blocked. Rev.

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within $\pm$ 1% $\Delta k/k$ at least once per 31 Effective Full Power Days (EFPD). This comparision shall consider at least those factors stated in Specification 4.1.1.1.1.e, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 Effective Full Power Days after each fuel loading.

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BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 As a minimum, the following borated water source(s) shall be OPERABLE as required by Specification 3.1.2.2: G

a. A boric acid storage system with:

1. A minimum contained volume of 13,800 gallons, C

2. Between 7000 and 7700 ppm of boron, and

3. A minimum solution temperature of 65°F.

b. The refueling water storage tank with:

1. A minimum contained volume of 439,050 gallons of water, Rev.

2. A minimum boron concentration of 2000 ppm, and

3. A minimum solution temperature of 43°F.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With the boric acid storage system inoperable, restore the storage system to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to at least 1% $\Delta k/k$ at 200°F within the next 6 hours; restore the boric acid storage system to OPERABLE STATUS within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the refueling water storage tank inoperable, restore the tank to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each borated water source shall be demonstrated OPERABLE:

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3/4.1 REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.77% $\Delta k/k$ is initially required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR accident analysis assumptions. With T_{avg} <200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal and a 1% $\Delta k/k$ shutdown margin provides adequate protection.

The purpose of borating to the cold shutdown boron concentration prior to blocking safety injection is to preclude a return to criticality should a steam line break occur during plant heat up or cooldown. Rev.

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 3000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 3000 GPM will circulate an equivalent Reactor Coolant System volume of 9370 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron reductions will therefore be within the capability for operator recognition and control.

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC)

The limitations on MTC are provided to ensure that the assumptions used in the accident and transient analyses remain valid through each

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3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC) (Continued)

fuel cycle. The surveillance requirement for measurement of the MTC at the beginning and near the end of each fuel cycle is adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup.

3/4.1.1.5 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 541°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the pressurizer is capable of being in an OPERABLE status with a steam bubble, 3) the reactor pressure vessel is above its minimum NDTT temperature and 4) the protective instrumentation is within its normal operating range.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid transfer pumps, 5) associated heat tracing systems, and 6) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The required volume of water in the refueling water storage tank for reactivity considerations while operating is 424,000 gallons. The associated technical specification limit on the refueling water storage tank has been established at a somewhat greater volume to be consistent with the NPSH requirements of the ECCS system. Rev.