Consumers Power Company

James W Cook
Vice President - Projects, Engineering and Construction

General Offices: 1945 West Parnall Road, Jackson, MI 49201 • (517) 788-0453

January 10, 1982

Harold R Denton, Director
Office of Nuclear Reactor Regulation
Division of Licensing
US Nuclear Regulatory Commission
Washington, DC 20555

MIDLAND ENERGY CENTER PROJECT
MIDLAND DOCKET NOS 50-329, 50-330
SAFETY EVALUATION REPORT INFORMATION
FILE 0505.16 SERIAL 20427

Reference E G Adensam to J W Cook Dated December 7, 1982

Enclosures (1) Information Regarding Reactor Vessel Head Vent
(2) Information Regarding Locked Rotor Accident

The referenced letter requested additional information regarding the reactor vessel head vent and the locked rotor accident. These subjects are Outstanding Item 9 in Section 1.7 and Confirmatory Issue 31 in Section 1.8 of the Midland Plant SER (NUREG-0793). Enclosures (1) and (2) respond to the request in the referenced letter.

James W. Cook

JWC/JRW/fms

CC RJCook, Midland Resident Inspector
RHernan, US NRC
DBMiller, Midland Construction (3)
RWHuston, Washington

B001

oc1282-1486a131

CONSUMERS POWER COMPANY
Midland Units 1 and 2
Docket No 50-329, 50-330

Letter Serial 20427 Dated January 10, 1983

At the request of the Commission and pursuant to the Atomic Energy Act of 1954, and the Energy Reorganization Act of 1974, as amended and the Commission's Rules and Regulations thereunder, Consumers Power Company submits requested information regarding the reactor vessel head vent and locked rotor accident.

CONSUMERS POWER COMPANY

By _____
J W Cook, Vice President
Projects, Engineering and Construction

Sworn and subscribed before me this 10 day of January, 1983.

_____
Notary Public
Jackson County, Michigan

My Commission Expires September 8, 1984

oc1282-1486a131

INFORMATION REGARDING REACTOR VESSEL HEAD VENT

1. Provide a description of operator action and procedures for utilizing the reactor vessel head vent proposed in your letter of August 26, 1982.

   RESPONSE: The reactor vessel head vent proposed by Consumers Power Company will be located in the region of the APSR mounting flange to provide a continuous vent from the RV head to the high point vent of one hot leg.

   Since the reactor vessel head vent is a continuous venting system with no electrical or control systems involved and all valves are manually operated, there is no operator action necessary and thus no procedures required for utilization of this venting system.

2. Provide a comparison of the sensitivity of the hot leg level instrumentation relative to the amount of noncondensible gas volume which might block natural circulation.

   RESPONSE: The narrow range hot leg level measurement system at the top of the hot leg has a 120" full scale band. A level drop of 48" would result in the loss of natural circulation. Due to the expected level error of 15% full scale, a level drop of greater than 30" would be used to signal the potential loss of natural circulation.

   The hot leg level measurement system will be very sensitive to the initial collection of gas in the top of the hot leg. The initial 12" of level change which occurs in the vent line above the hot leg represents 9.5 in^3 of noncondensible gas. The sensitivity of the level measurement decreases as the level drops into the hot leg. At the loss of natural circulation, an inch of measured level is equivalent to approximately .5 ft^3.

3. For transients and accidents which could result in steam formation in the reactor vessel head, the proposed head vent design appears to allow steam to accumulate faster than if no vent were present. We require that the acceptability of the proposed vent design be confirmed with experimental data from an integral system test facility. Also, as justification for operation until experimental data are provided, provide analyses of representative small break LOCAs, and other events which could form a head bubble of steam and/or noncondensible gases which have come out of solution (ie, hydrogen) which might be vented to the hot leg.

   RESPONSE: Consumers Power Company does not anticipate problems with gas accumulation in the hot leg for the following reasons:

   a. For transients and accidents where the hot leg remains subcooled, we fully expect that steam from the reactor vessel head will condense either upon contact with the hot leg fluid or on being swept into the steam generator. The flow through the head vent is volumetrically insignificant when compared with the flow in the hot leg (less than 3%

of the natural circulation loop flow). Similarly, noncondensible gases would be swept into the coolant flow.

b. When the hot leg fluid is in a saturated state, the small addition of steam from the head vent is not expected to add significantly to the steam formation rate in the hot leg.

c. The time to loss of natural circulation remains unchanged with or without the reactor vessel head vent since the head vent terminates at only one hot leg. The response of the other reactor coolant loop to transients or accidents remains unchanged.

The acceptability of the vent design will be confirmed during preoperational testing (refer to Question 8). Experimental data from an integral system test facility would merely corroborate this.

4. If a hot leg vent is ultimately relied upon to relieve steam from the head for transients and accidents, justify that the hot leg vent is safety grade for that purpose or justify why it need not be.

RESPONSE: Refer to Question 5.

5. If operator action is required to operate hot leg vents to vent steam, provide an evaluation of the information available to the operator to open the vents, to close the vents, and the time available for these actions.

RESPONSE: The Midland hot leg vents were not installed to operate as steam vents, but were provided to prevent the accumulation of non-condensable gases in the event of inadequate core cooling where the core becomes uncovered.

The B&W Abnormal Transient Operating Guideliens (ATOG) discusses several methods of heat removal if heat transfer by the steam generators are lost. One method is by HPI cooling and the other is core boiling/SG condensing. The second method discusses steam voids, their formation and the methods of removing the voids to restore natural or forced circulation. None of these discussions deal with the use of hot leg vents since they are not necessary to restore normal circulation and/or maintain core cooling.

In the event that inadequate core cooling does occur, the B&W ATOG presents a discussion of this condition and provides guidance on the use and operation of the hot leg vents. The ATOG guidance will be used by Consumers Power Company to develop emergency operating procedures for use and operation of hot leg vents under conditions of inadequate core cooling.

6. Provide the seismic and environmental standards which will be met by the reactor vessel head vent.

RESPONSE: The reactor vessel head vent including all piping components and supports is designed according to ASME Code Section III Class 1 and Seismic Category I. The design of such components is discussed in Section

3.9 of the Midland FSAR. Vent piping and valving will be designed for 2500 psig and 670 F and qualified to the maximum LOCA or main steam line break environmental conditions. There are no active components in the reactor vessel head vent.

7. Provide the piping areas and the maximum venting rates for steam and hydrogen for the proposed head vent design.

   RESPONSE: The requested information in the form of four figures is attached to this enclosure. The maximum venting rates through the reactor vessel head vent are based on venting to atmosphere through the hot leg vents.

8. Regarding your request for an exemption to the requirements of 10 CFR 50.44 until the first refueling outage, provide an evaluation of the radiation dose which would be received by plant personnel in installing the vent at that time. Provide appropriate justification for the calculated doses relative to a more timely installation.

   RESPONSE: Based on current progress, the installation of the head vent will be complete prior to fuel loading, therefore, our request for an exemption is withdrawn.

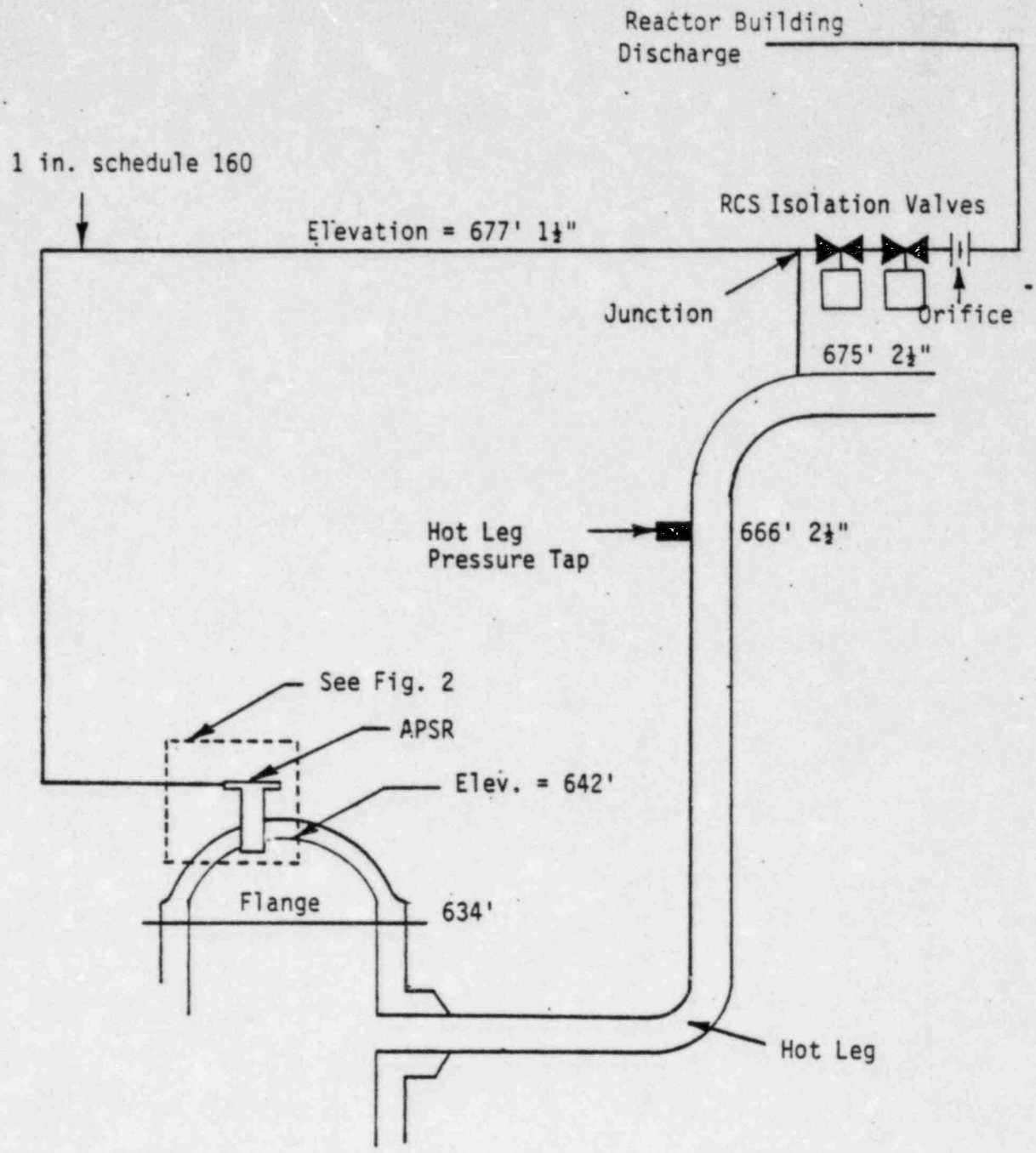

FIGURE 1: High Point Vent System for Loop A

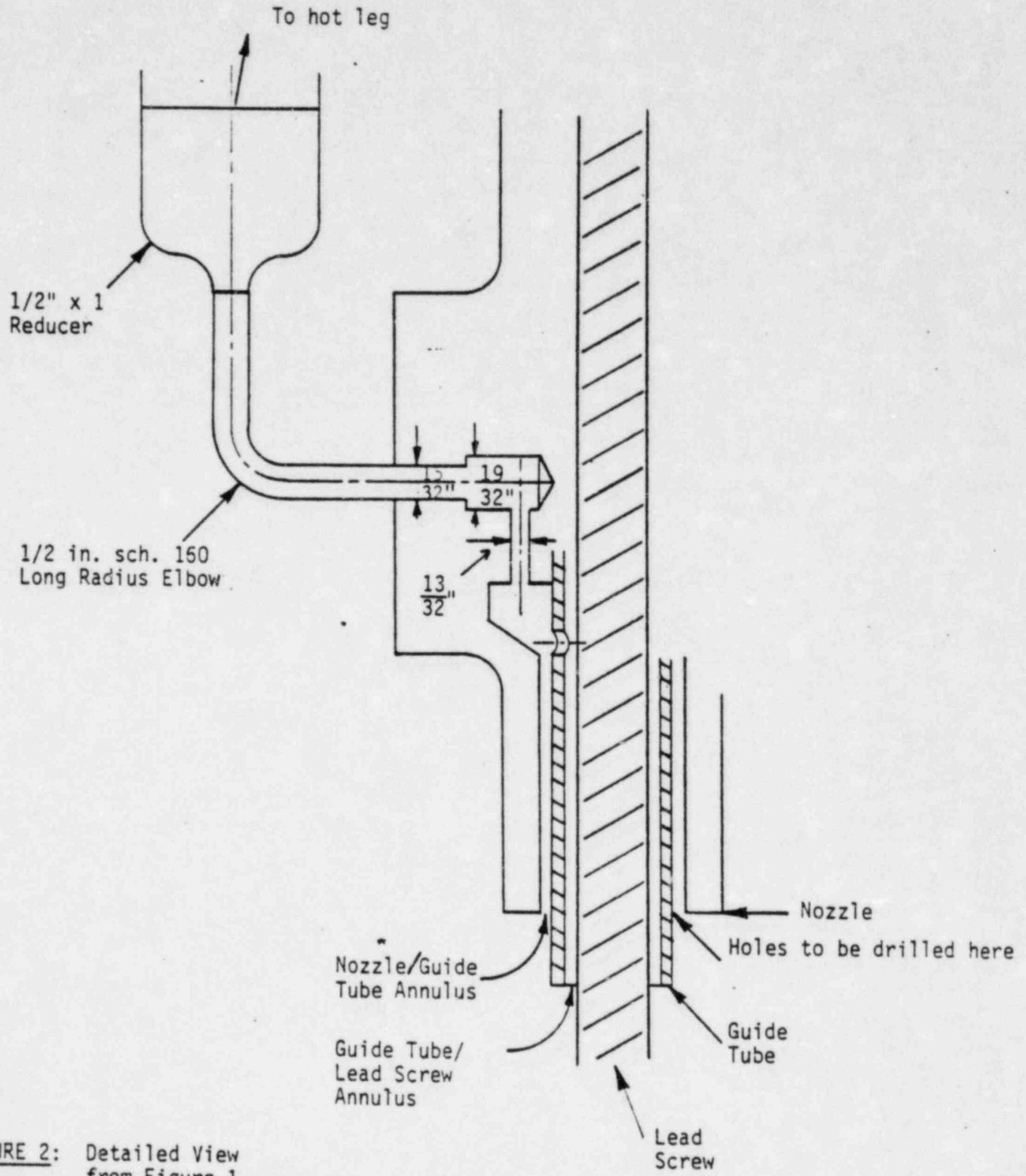

FIGURE 2: Detailed View from Figure 1

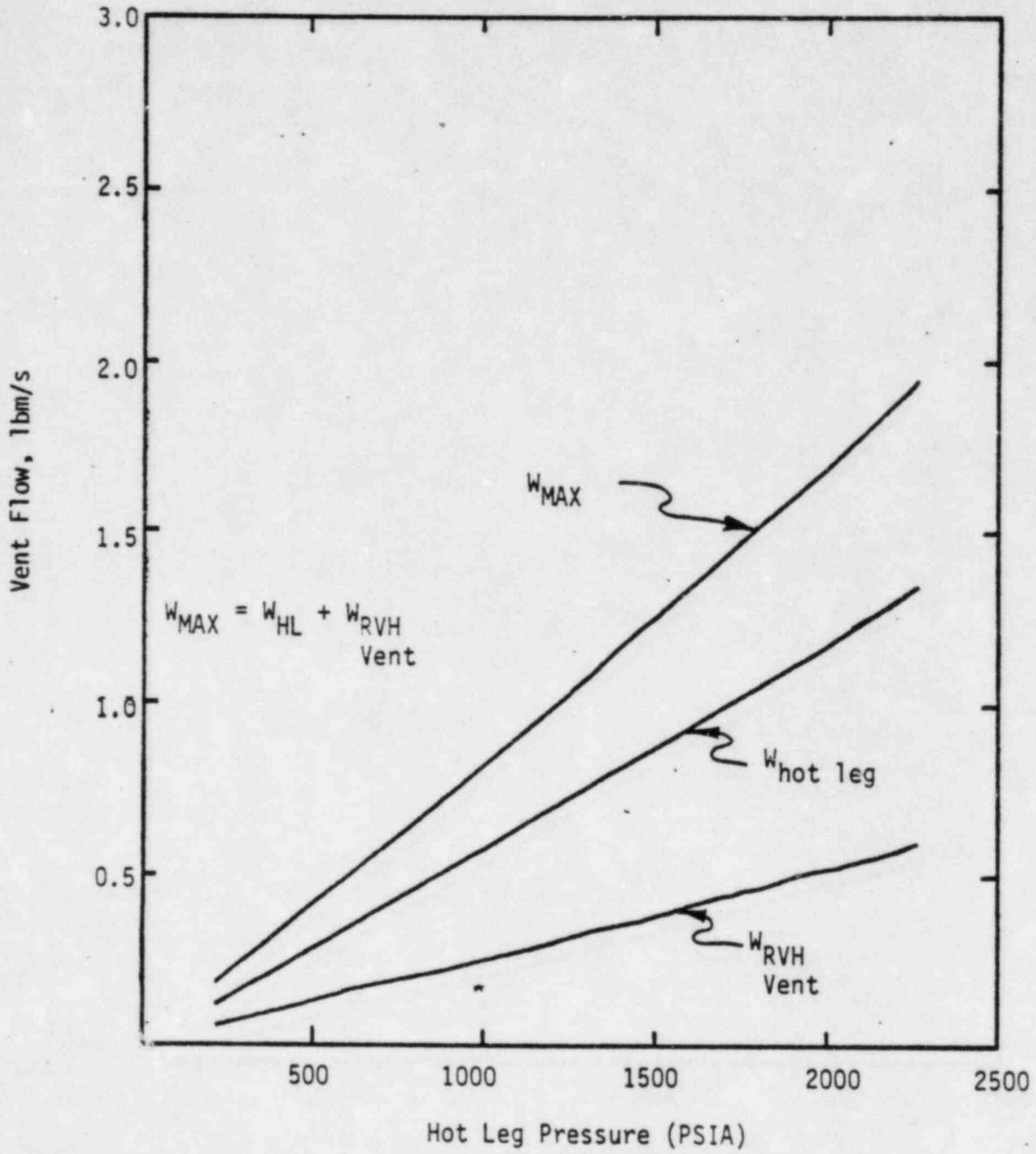

FIGURE 12: Vent Flow Rates for Steam-Steam Case

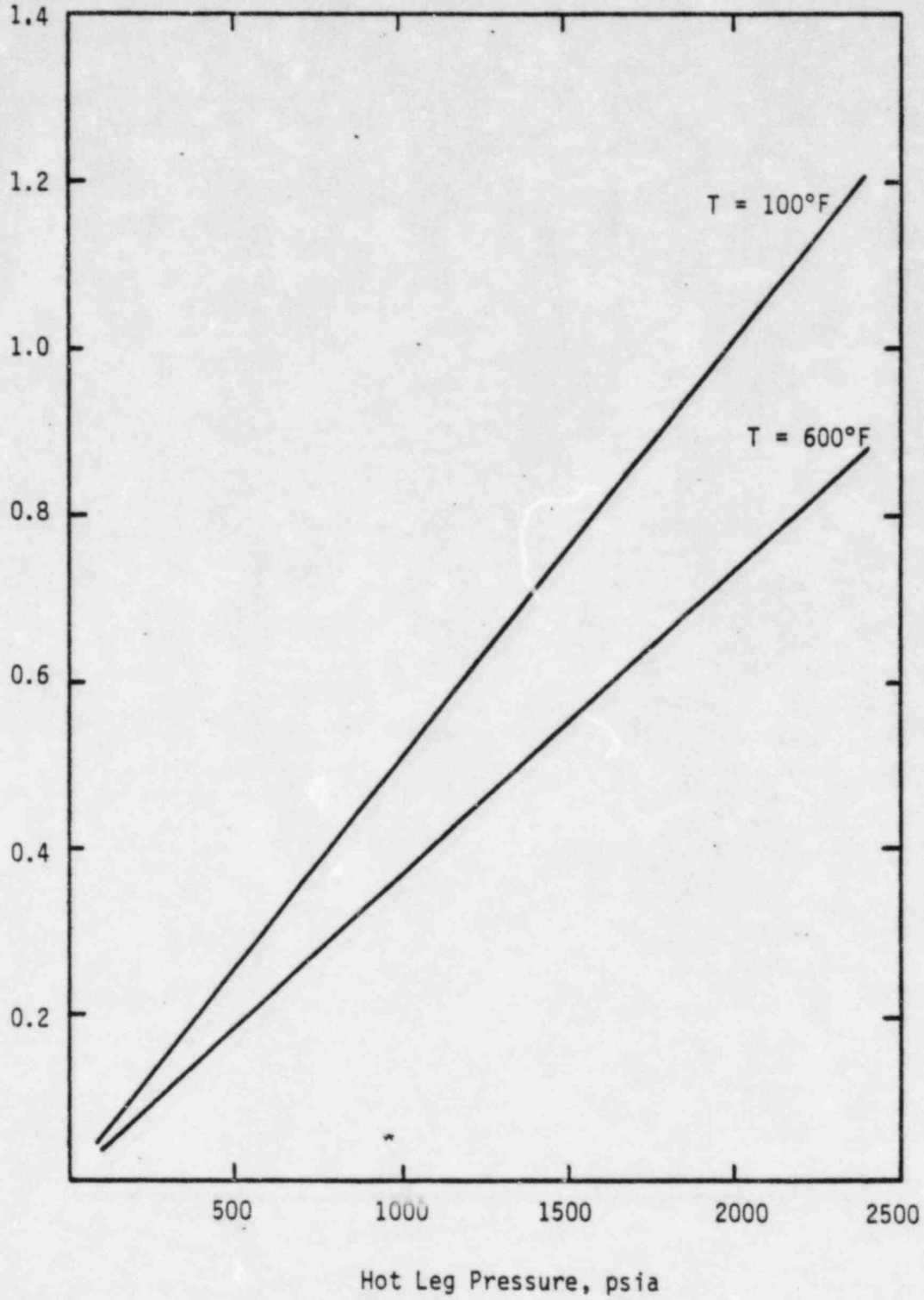

FIGURE 17: Vent Flow of Hydrogen from Both RV Head and Hot Leg

INFORMATION REGARDING LOCKED ROTOR ACCIDENT

The analysis of a reactor coolant pump locked rotor accident, presented in your letter of September 1, 1982, for initial two pump operation is not in accordance with the requirements of Standard Review Plan (SRP) 15.3.3 since no loss of offsite power or single failure was assumed. Provide an analysis of the percent of fuel rods which might experience DNBR below 1.3 as a result of loss of offsite power to the undamaged reactor coolant pump. Appropriate delay times may be assumed for loss of offsite power if suitably justified. Initial 4, 3 and 2 reactor coolant pump operation should be considered. As discussed in our letter of June 25, 1982, you may justify that those fuel rods which experience DNBR below 1.3 do not release fission products or provide offsite dose calculations assuming that the rods fail. In accordance with SRP 15.3.3, offsite dose calculations should assume maximum technical specification primary to secondary leakage and an additional single failure (eg, stuck open secondary relief valve). Operator action to isolate stuck open valves may be assumed if suitably justified.

RESPONSE: With the methodology employed, the loss of offsite power assumption will not affect the percent of fuel rods which might experience DNB. The percent of fuel rods in DNB is predicated on core conditions at the time that the DNBR drops below the acceptance criterion (1.3). Since the loss of offsite power assumption does not affect the core conditions at the time of DNB, no change in percent of fuel rods in DNB is predicted. For example, the July 28, 1978 letter from J H Taylor to G M Mazetis presented the effect of the loss of offsite power assumption on the locked rotor accident. While an increase in peak cladding temperature occurred when the loss of offsite power was assumed at turbine trip, the percent of fuel rods which might experience DNBR below 1.3 was calculated to be 4 percent; with or without the loss of offsite power assumption.

Our letter Serial 19390 dated November 1, 1982, justifies the position that, based on calculated peak cladding temperature, the fuel rods which experience a DNBR below 1.3 do not fail. The requested offsite dose calculation is moot.