ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8810140192 DOC.DATE: 88/10/03 NOTARIZED: YES DOCKET.#
FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
AUTH.NAME AUTHOR AFFILIATION
KARNER,D.B. Arizona Nuclear Power Project (formerly Arizona Public Serv
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to NRC Bulletin 88-008 re thermal stresses in piping connected to RCS.

DISTRIBUTION CODE: IE16D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 7
TITLE: Bulletin Response 88-08 - Thermal Stress in Piping to RCS.

NOTES:Standardized plant. 05000528
Standardized plant. 05000529
Standardized plant. 05000530

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD5 LA	1	0	PD5 PD	1	1
	CHAN,T	1	1	DAVIS,M	1	1
	LICITRA,E	1	1			
INTERNAL:	AEOD/DOA	1	1	AEOD/DSP	1	1
	AEOD/DSP/TPAB	1	1	NRR HARTZMAN,M	1	1
	NRR HUM,M	1	1	NRR REEVES,E.A.	1	1
	NRR RIVENBARK,G	1	1	NRR/DEST/ADE 8H	1	1
	NRR/DEST/ADS 7E	1	1	NRR/DEST/MEB 9H	1	1
	NRR/DOEA/EAB 11	1	1	NRR/DOEA/GCB 11	1	1
	NRR/DREP/EPB 10	1	1	NRR/PMAS/ILRB12	1	1
	NUDOCS-ABSTRACT	1	1	REG FILE 02	1	1
	RES/DSIR/EIB	1	1	RGN5 FILE 01	1	1
EXTERNAL:	LPDR	1	1	NRC PDR	1	1
	NSIC	1	1			
NOTES:		1	1			

TOTAL NUMBER OF COPIES REQUIRED: LTTR 27 ENCL 26

R I D S / A D D S

Arizona Nuclear Power Project
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

161-01356-DBK/BJA
October 3, 1988

Docket Nos. STN 50-528/529/530

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Reference: Letter from Charles E. Rossi, NRC, to All Holders of Operating Licenses or Construction Permits for Light-Water-Cooled Nuclear Power Reactors, dated June 22, 1988. Subject: NRC Bulletin No. 88-08, Thermal Stresses in Piping Connected to Reactor Coolant Systems.

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Response to NRC Bulletin No. 88-08
File: 88-A-056-026; 88-055-026

By the above reference, the NRC issued Bulletin 88-08. The bulletin is concerned with unisolable piping connected to the Reactor Coolant System (RCS). Specifically, unisolable piping could be subjected to thermal stresses that could lead to RCS leakage. The NRC requested that all licensees review their plants to determine if unisolable piping systems connected to the RCS were being subjected to unacceptable thermal stresses. ANPP has completed the review. A summary of the review is provided in the attachment to this letter.

If you have any additional questions on this matter, please contact Mr. A. C. Rogers at (602) 371-4041.

Very truly yours,

D. B. Karner
Executive Vice President

DBK/BJA/pvk
Attachment

cc: G. W. Knighton (all w/a)
M. J. Davis
J. B. Martin
T. J. Polich
A. C. Gehr

IE16
1/1

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Donald B. Karner, represent that I am Executive Vice President of Arizona Nuclear Power Project, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Donald B. Karner

Sworn to before me this 3 day of October, 1988.

Notary Public

My Commission Expires:

My Commission Expires April 6, 1991.

ATTACHMENT - RESULTS OF REVIEW

ANPP has reviewed all non-isolable sections of piping connnected to the Reactor Coolant System (RCS) at PVNGS for susceptibility to high cycle thermal fatigue. A simplified diagram of the RCS is shown in Figure 1. The RCS interfaces with the Chemical and Volume Control System (CVCS), Safety Injection System (SIS), Shutdown Cooling System (SDCS), Sampling System, and various instrument lines. The CVCS provides continuous makeup to the RCS via the charging pumps. Continuous letdown and drain connections are also provided by the CVCS. The SIS provides one injection line to each RCS cold leg and hot leg. Suction lines for the SDCS are located at each RCS hot leg.

During the review, the following three criteria were used to evaluate the interfacing system connections to the RCS. The piping connections that satisfy all three criteria are potentially susceptible to high cycle thermal fatigue.

1) Is the upstream pressure higher than RCS pressure?

2) Is the upstream temperature colder than RCS temperature?

3) Is the valve between the interfacing system and the RCS normally closed?

ANPP has identified two interfacing systems that satisfy the three criteria. These systems are described below along with the future actions planned for each system.

1) The Auxiliary Pressurizer Spray System (APSS) is potentially susceptable to high cycle thermal fatigue. The APSS is shown in Figure 2. The two parallel APSS valves (CH-203 and CH-205) are normally closed. The pressure on the upstream side of the valves is maintained higher than RCS pressure by the charging pumps. The charging fluid recovers heat from letdown at the regenerative heat exchanger. This brings the charging temperature closer to RCS temperature. However, charging temperature is cooler than RCS temperature and the temperature of the water in the stagnant section of pipe behind the APSS valves is colder than RCS temperature.

   During the next refueling outage, for each of the PVNGS units, ANPP will perform a Non-Destructive Examination (NDE) of welds, heat affected zones and high stress locations for the APSS piping. The scope of the inspection will be between the APSS check valve (V431) and the tee connection with the main spray line. There are two welds (and associated heat affected zones) to inspect on the straight run of piping between the check valve and the tee connection. The first weld is on the downstream side of check valve V431 and the second weld is where the APSS line joins the tee connection.

   ANPP is currently developing the long-term corrective action plan for the APSS piping. Some of the options being considered at this time include:

a. Perform additional analyses of the APSS piping to determine the piping fatigue life.

b. Replacement of the existing APSS valves with modulating valves. The new valves would reduce the number of thermal cycles to the piping by allowing for control of the APSS flowrate to match a target RCS depressurization rate.

c. Perform additional temperature monitoring of the APSS line. This would allow ANPP to track the actual cumulative usage factor and to define temperature profiles for analysis.

d. Additional design modifications to reduce the possibility of leakage past the normally closed APSS valves and/or to reduce the consequences of cyclical thermal stresses on the APSS piping.

ANPP expects to finalize the long-term plan prior to the next refueling outage (Spring, 1989). The need for system design modifications is contingent upon the results of the inspection at the next refueling outage and further analyses of the piping system. Any necessary corrective actions will be implemented in subsequent refueling outages.

2) The SIS also satisfies the three criteria of the piping system review. However, ANPP does not believe that the SIS injection lines are susceptible to high cycle thermal fatigue. The SIS pumps (HPSI, LPSI, and CS) are not capable of developing sufficient head to inject water into the RCS when the RCS is at normal operating pressure. However, the PVNGS design includes a cross-tie line between the CVCS and the SIS. The cross-tie allows for the diversion of charging pump discharge to the SIS hot and cold leg injection lines. This design provision is included to allow testing of the injection line check valves. The piping system arrangement is shown in Figure 3. As shown in the figure, the charging fluid would have to leak past three normally closed isolation valves before reaching the injection line check valves.

Based on the piping system arrangement and the low probability of the charging fluid reaching the injection line check valves, ANPP does not believe that the SIS injection lines are susceptible to high cycle thermal fatigue. Therefore, the existing inservice inspection plan is adequate to detect any problems with the injection lines and no special examinations or long-term corrective actions are necessary in this area.

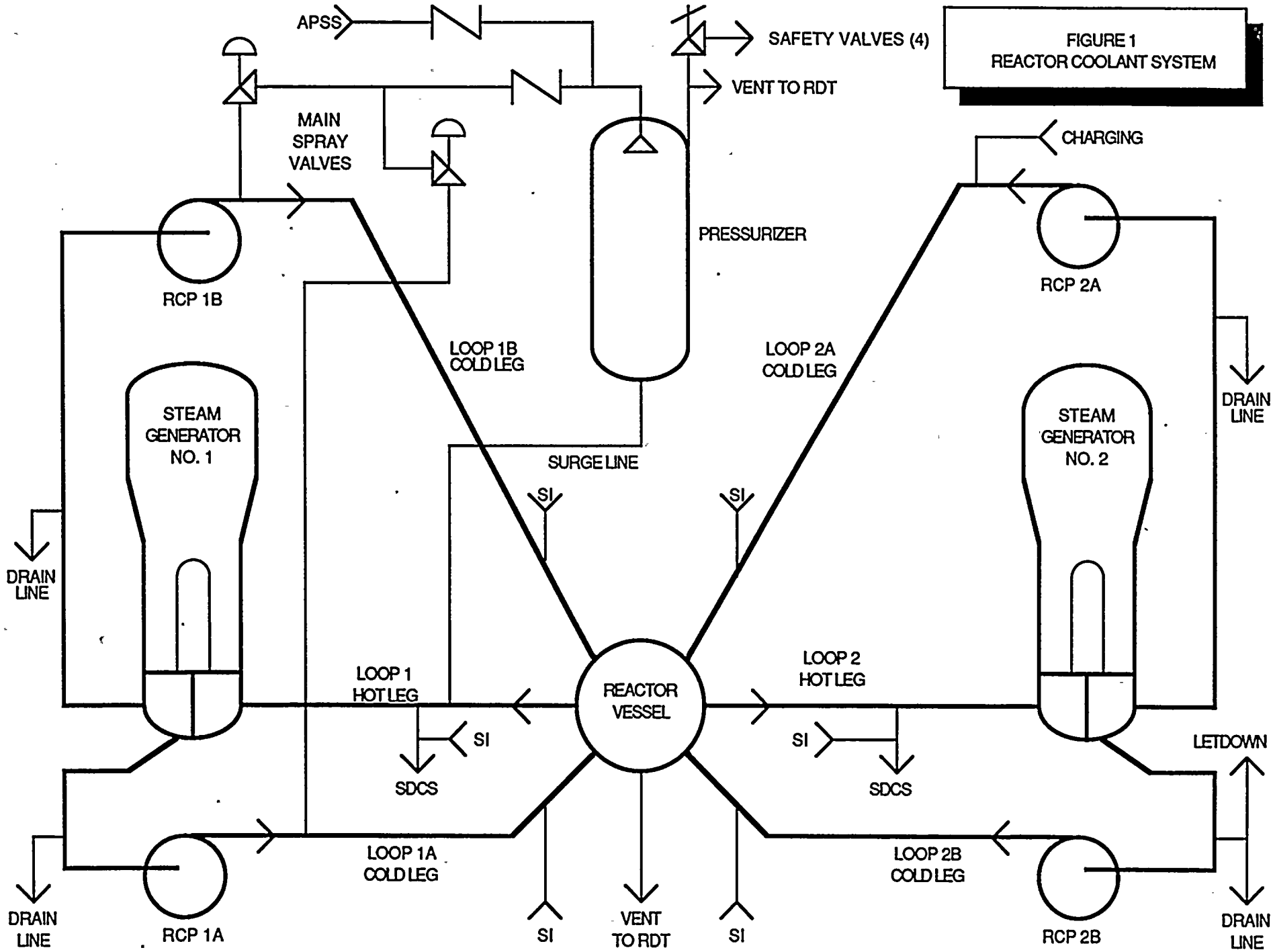
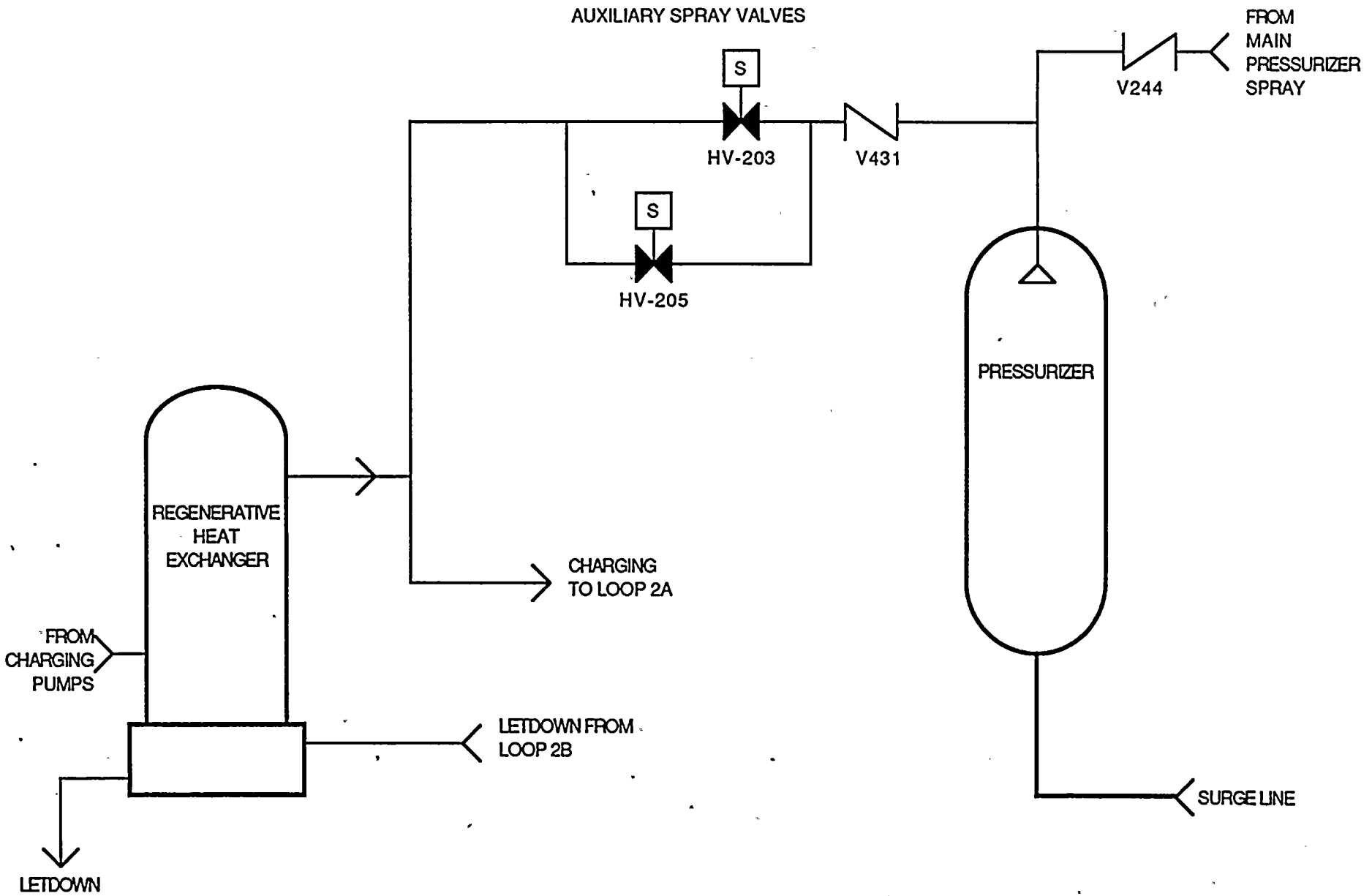


FIGURE 1
REACTOR COOLANT SYSTEM

FIGURE 2
AUXILIARY PRESSURIZER SPRAY



NOTE--INTERNALS OF VALVE V244 HAVE BEEN REMOVED

FIGURE 3
CVCS TO SIS CROSS-TIE