LICENSEE EVENT REPORT (LER)	- 4	· ·
FACILITY NAME (1) DO	CKET NUMBER (2	2) PAGE (3)
Palo Verde Unit 1	500	0 5 2 8 1 OF 12
Safety Injection Discharge Check Valve Reverse Flow Causes Condition	n Outside	Design Basis
EVENT DATE (5) LER NUMBER (6) REPORT DATE (7) OT	HER FACILITIES	INVOLVED (8)
MONTH DAY YEAR YEAR SEQUENTIAL REVISION MONTH DAY YEAR FACILITY NAME NUMBER NUMBER		DOCKET NUMBERS
Palo Verde	Unit 2	0 5 0 0 0 5 2 9
		0 5 0 0 0 5 3 0
MODE (9) 1 20.402(b) 20.405(c) 50.73(a)(2)(h)		73.71(b)
POWER 20.405(a)(1)(1) 50.36(c)(1) 50.73(a)(2)(v)	F	73.71(c)
LEVEL(10) 1 0 0 20.405(a)(1)(ii) 50.36(c)(2) X 50.73(a)(2)(vii) [OTHER (Specify in Abstract
20.405(a)(1)(iii) X 50.73(a)(2)(i) 50.73(a)(2)(vi)	i)(A)	below and in Text, NRC Form
20.405(a)(1)(M) X 50.73(a)(2)(a) 50.73(a)(2)(a)(2)(a) 50.73(a)(2)(I)(B)	366A)
LICENSEE CONTACT FOR THIS LER (12)		
NAME	TELEPHONE NU	IMBER
Daniel G. Marks, Section Leader, Regulatory Affairs	AREA CODE	
	602	3 9 3 - 6 4 9 2
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPO	RT (13)	
CAUSE SYSTEM COMPONENT MANUFAC- REPORTABLE TO NPRDS CAUSE SYSTEM COMPONENT	MANUFAC- TURER	REPORTABLE TO NPRDS
A B Q V B 3 5 0		
	1 1 1 1	
SUPPLEMENTAL REPORT EXPECTED (14)	EXPECTED	MONTH DAY YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE) X No	SUBMISSION DATE (15)	
ABSTRACT (Limit to 1400 spaces, i.e., approximately fateen single-space typewritten lines) (16)		
On May 7, 1998, Paio verde Units 1, 2 and 3 were in Mode 1	ing pers	OPERATION),
determined there was sufficient evidence to conclude the U	nit 1 "A	" train High
Pressure Safety Injection pump discharge check valve would	not have	e performed
its closure function from October 17, 1996, until April 11	, 1998.	Engineering
personnel believed, at that time, that the repair complete	d during	the Unit 1
seventh refueling outage had corrected the condition. Howe	ver, on l	May 13,
1998, it was determined that current valve internal compon	ent align	nment was
combined with a HPST nump failure, reverse flow through th	eveared a	valve was
sufficient to cause less than minimum design injection flo	w from tl	he redundant
train "B" HPSI system. After testing the check valve it w	as disas	sembled,
examined, reassembled, and tested whereupon it met accepta	nce crite	eria. Based
on evaluation of "as left" alignment data and surveillance	test rea	sults from
the remaining HPSI check valves, the Unit 2 "B" train chec	k valve v	was tested
on may 14, 1990. This valve also demonstrated excessive re reworked and tested successfully. Further engineering eva	mination	revealed no
other HPSI check valves were inoperable due to the conditi	on.	
No previous similar events have been reported pursuant to last three years.	10CFR50.	73 in the
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FACILITY	NAME	······································	DOCKET NUMBER		LER NUMBER	PAGE						
	, Palo	Verde Unit 1		YEAR	SEQUENTIAL REVISIO NUMBER NUMBER							
			0500528	98	- 0 0 6 - 0 1	0 2 of 0 12						
TEXT	1.	REPORTING REQUIREMENT:										
		This LER 528/98-006-01 is 50.73 criteria. In addit criteria used during rela 34227 and 34246 (made pur	LER 528/98-006-01 is being submitted pursuant to the following 10 CFR criteria. In addition, a RETRACTION of one of the reporting ria used during related Emergency Notification System (ENS) reports and 34246 (made pursuant to 10 CFR 50.72) is included.									
		10 CFR 50.73(a)(2)(10 CFR 50.73(a)(2)(ii)(A and B)									
		Due to disc misalig Pressure Safety Inj valves (V), the des during certain desi the corresponding H train could not pro through the opposit Units were outside condition:	nment of the Unit 1 ' ection (HPSI)(ECCS)(E sign basis minimum flo gn basis events (DBE) IPSI pump is assumed to duce required minimum te train's check valve of the design basis a	A" and 3Q) pure bw may that that that a flow by a control and in	d Unit 2 "B" tra mp discharge che not have been m require HPSI fl 1, the redundant due to reverse ondition where t an unanalyzed	hin High eck Net Now. If HPSI flow the						
		10 CFR 50.73(a)(2)(i)(B)									
	ĸ	The discs in the Un discharge check val 1993, respectively. check valve was ide April 1994. This r Condition for Opera exceeded resulting plant's Technical S	tit 1 "A" train, and U ves were misaligned s In addition, Unit 3 entified to be cocked resulted in a condition tion (LCO) Allowed Ou in operation or condi specifications (TS).	Init 2 ince i "A" t from (on whe atage ' .tion)	"B" train HPSI May 1992 and Apr rain HPSI discha October 1992 unt re the Limiting Times (AOT) were prohibited by th	cil Arge Cil Se Ne						
		10 CFR 50.73(a)(2)(vii)(B and D)									
		The failure mechani Unit 2 "B" train an was vertical misali between the disc an failure mechanism w assembling the valv manual and work ins multiple failures i mitigate accidents.	sm (immediate cause) ad Unit 3 "A" train HH gnment of the disc wh ad valve seat and inco vas attributed to a co ves, which was a resul structions. Therefore an systems designed to	of th SI di nich r omplet ommon- Lt of e, the o remo	e Unit 1 "A" tra scharge check va esulted in inter e valve closure. cause error in inadequate vendo assembly error ve residual heat	ain, and alves ference The or led to and						
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FACILITY NAME	DOCKET NUMBER	LER NUMBER						PAGE		
, Palo Verde Unit 1	,	YEAR	AR SEQUENTIAL REVISION NUMBER NUMBER				REVISION NUMBER	2		
	0 5 0 0 0 5 2 8	9 8	-	00	6	-	0 1	0 3	of	0 12
TEXT ENG 34227 and 34246										

ENS 34227 and 34246

On May 14 and 15, 1998, PVNGS reported that the Unit 1 "A" train and Unit 2 "B" train HPSI pump discharge check valves had back-leakage in excess of acceptance criteria, which indicated design basis minimum flow might not be met (ENS 34227 and 34246 respectively). The condition was reported as being outside the design basis for an extended period time, and the system did not have suitable redundancy (50.72(b)(1)(ii)(B)). In addition, since the check valves could potentially divert flow from the redundant ECCS system, a condition that could have prevented the fulfillment of a safety function, the condition was also reported under 50.72(b)(2)(iii)(D). Subsequent review of NUREG 1022, Revision 1, has revealed that it is not necessary to assume an additional random single failure in systems reported under 50.72(b)(2)(iii)(D) and therefore, this portion of the ENS report is hereby RETRACTED.

2. EVENT DESCRIPTION:

On March 12, 1998, just prior to the beginning of Unit 1's seventh refueling outage, the surveillance test procedure for the HPSI pump discharge check valves was revised to include new acceptance criteria for reverse flow testing. The Unit 1 check valves were the first to be tested using the new acceptance criteria and on April 9, 1998, the Unit 1 "A" train check valve failed to meet the acceptance criteria. Upon disassembly, engineering personnel (other utility personnel) concluded that the valve disc was vertically misaligned high.

Engineering and Maintenance (other utility personnel) personnel believed, at that time, that the vertical misalignment had been corrected during repair of the valve on April 11, 1998, because the valve had been repaired and post maintenance testing demonstrated acceptable reverse direction flow. A significant condition investigation was initiated to determine the root cause of the surveillance test failure. At this time, engineering personnel evaluated other HPSI pump discharge check valve surveillance test records and determined that adequate HPSI flow delivery was available, based on the test results.

On May 7, 1998, Palo Verde Units 1, 2 and 3 were in Mode 1 (POWER OPERATION), operating at approximately 100 percent power when engineering personnel determined there was sufficient evidence to conclude the Unit 1 "A" train check valve would not have performed its closure function from October 17, 1996, until April 11, 1998, when the valve was repaired.

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LICENSEE EVENT	REPORT (LER) TEXT	CONTIN	NUATION		•		
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Palo Verde Unit 1			4				
		918 -		- 011	014	of	0 11:
					0 4	01	011
Engineering concluded, ba data, that the Unit 1 "B" for certain design basis HPSI pump is assumed to f not meet design basis min train check valve.	sed on a review of th train HPSI delivery events. If, during a ail, the redundant "h imum flow due to reve	he Unit flow w these e B" trai erse fl	1 "A" tr ould not vents, th n HPSI sy ow throug	ain tes have be e "A" f stem wo h the '	st een m crain ould `A"	et	
As the root cause investi engineering personnel sus valve, that the Unit 1 "A assembled correctly on Ap personnel were also conce low in the valve body it upper edge of the disk co seat causing the disk to described in Information	gation was proceeding pected, based on meas " HPSI discharge cheo- ril 11, 1998, as pre- rned that if the val- could result in a con- uld get caught under "cock" open. This con- Notice 89-62.	g, on M suremen ck valve viously ve disc ndition the in ondition	ay 13, 19 ts taken e may not thought. was posi where th side uppe n.is simi	98, from a have h Engin tioned e outsi r edge lar to	spar been too. ide of t even	e ng he ts	
Engineering personnel inf personnel) of their conce condition. Operations pe on the "A" train HPSI che inoperable, in preparatio The Unit 1 "A" HPSI syste entered, due to maintenan condition. At 1545 MST th HPSI train in preparation	ormed Unit 1 Operation rns regarding the chor rsonnel decided to per- ck valve and the "A" n for the testing, on m was already inopera- ce activities unrelate e "A" train HPSI pump for testing of the "	ons man eck val erform : train : n May 1: able, an ted to o was i: "A" tra	agement (ve's pote surveilla HPSI was 3, 1998, nd TS 3.5 the check solated f in HPSI c	other w ntial nce tes declare at 1432 .2.(a) valve rom the heck va	itili sting ed 2 MST e "B" alve.	ty	
On May 14, 1998, at 0615 valve was tested using a reverse direction flow ac 34227) of the test failur inspect the valve, which the valve disc. The caus measurement error that oc the valve. The valve was condition and when tested leakage. Operations pers and exited the TS LCO 3.5	MST, the Unit 1 "A" (new test procedure and ceptance criteria. e. Work began immed: confirmed the suspect e of the misalignment curred during the App re-assembled, correct met the acceptance of onnel returned the va .2(a) at 1756 MST.	train H nd the The NRC iately ted ver t was a ril 9, cting t criteri alve to	PSI disch valve fai was noti to disass tical mis ttributed 1998, dis he misali a, with n an opera	arge ch led to fied (1 emble a alignma to a assemb gned d gned d o obse ble sta	neck meet ENS and ent o ly of isc rvabl atus	f	·
Based on the dimensional "A" train valve, engineer checks on the remaining H	data from the spare of ing personnel initian PSI pump discharge c	check v ted ext heck va	alve and ernal dim lves.	the Un: ension:	it 1 [°] al	<u> </u>	

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION									
FACILITY NAW	(E	DOCKET NUMBER	LER NUMBER	PAGE					
F	Palo Verde Unit 1		YEAR SEQUENTIAL REVISION NUMBER						
				0 5 of 0 12					
TEXT									
	Dimensional data, maintenan were used to create a matr misaligned and susceptible established a testing seque matrix.	nce work history and ix which identified to "cocking". Eng: ence for the remain:	d surveillance test red valves potentially ineering personnel ing valves based upon t	cords chis					
	Data indicated the Unit 2 surveillance testing requi- direction flow. In addition disc might be misaligned. Operations management that reverse flow tested based of condition. Operations mana- the "B" train HPSI out of a MST.	"B" train check value rements, but had ext on, external measure Engineering persons the Unit 2 value be on their suspicions agement decided to a service for the test	ve had previously passe nibited elevated reverse ements indicated that the nel recommended to Unit e declared inoperable a regarding the check va retest the valve and pl c on May 14, 1998, at 2	ed se :he : 2 and alve's Laced 2155					
	On May 15, 1998, at 1322 M meet the reverse flow acception 34246) of the test failure disc condition corrected, a with no observable leakage operable status and exited	ST, the Unit 2 "B" a ptance criteria. Th . The valve was dis and when tested met . Operations person the TS LCO at 0915	rain check valve faile ne NRC was notified (EN sassembled, the mis-ali the acceptance criteri nnel returned the valve MST, on May 16, 1998.	ed to NS Lgned La, > to an					
	On May 16, 1998, as a conse- made in Unit 1 based on the impacted the "B" train HPS maintenance activities. In request (CRDR) was initiated required and to evaluate for management has determined the time in question (1432) was available to demonstrate reasonable assurance that license basis (i.e., SIA-V- reverse flow leakage).	ervative measure a 2 e test results for 3 I system, and the un n addition, a condit ed to determine if 4 or reportability. S that entry into LCO MST on May 13), a v te operability of S the system continued 404 met its design a he TS 3.0.3 was retained	late entry into TS 3.0. SIA-V404, which potention related "A" HPSI train tion report/disposition the TS 3.0.3 entry was ince then Operations 3.0.3 was not required valid surveillance test IA-V404 and there was d to conform to the cur function to prevent exc racted on July 31, 1998	3 was ally 1 1 1. At : (ST) crent cess 3.					
	A late entry into TS 3.0.3 entry was based on the test train HPSI system, and the preparation for testing SI that entry into LCO 3.0.3 (2155 MST on May 15), suff determination that SIB-V40 flow data which provided re	was also made on Ma t results for SIB-V de-energization of B-V405. Operations was not required be icient evidence exis 5 was OPERABLE based easonable assurance	ay 16, 1998 for Unit 2 405, which impacted the the "B" train HPSI val management has determ cause at the time in qu sted in an OPERABILITY d on a review of previous that SIB-V405 was capa	. This ≥ "A" Lves in ined uestion ous able of					
	flow data which provided r	easonable assurance	that SIB-V405 was cap	able of					

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Palo Verde Unit 1 DOCKET NUMBER Palo Verde Unit 1 0 [5 [0 [0 [0 5]] TEXT performing its design function of prevent leakage. The TS 3.0.3 was retracted on Ju To provide additional assurance that the check valves (Unit 3 "B" train, Unit 1 "B Unit 3 "A" train) were operable, each was by engineering. By May 17, 1998, each valve had been tes acceptable performance in accordance with criteria. However, the Unit 1 HPSI "B" t train valves had dimensional.values which susceptible to the disc cocking condition reworked to optimize valve alignment and service on May 27, 1998 and the Unit 3 va 3. ASSESSMENT OF THE SAFETY CONSEQUENCES AND The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis mi maintained due to the reverse flow throug valve, a condition where the Units were o an unanalyzed condition. The safety significance of the failed HPS reviewing possible failure modes. The lii determined to be degraded HPSI flow deliv result of reverse flow through the opposi A determination was made that several ev to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steat the UFSAR Chapter 6 ECCS Performance Anal explored for worker 6 ECC	Y									
 Palo Verde Unit 1 Infext performing its design function of prevent leakage. The TS 3.0.3 was retracted on Ju To provide additional assurance that the check valves (Unit 3 "B" train, Unit 1 "B Unit 3 "A" train) were operable, each was by engineering. By May 17, 1998, each valve had been test acceptable performance in accordance with criteria. However, the Unit 1 HPSI "B" train valves had dimensional values which susceptible to the disc cocking condition reworked to optimize valve alignment and service on May 27, 1998 and the Unit 3 va ASSESSMENT OF THE SAFETY CONSEQUENCES AND The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis mi maintained due to the reverse flow throug valve, a condition. The safety significance of the failed HPS reviewing possible failure modes. The lid determined to be degraded HPSI flow deliv result of reverse flow through the opposi A determination was made that several ev to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steat the UFSAR Chapter 6 ECCS Performance Anal annuvered for Durondiv B, (that are impact 	111	EAD		RI		BER	REVISIO	N	PAG	E
 IEXT performing its design function of prevent leakage. The TS 3.0.3 was retracted on Ju To provide additional assurance that the check valves (Unit 3 "B" train, Unit 1 "B Unit 3 "A" train) were operable, each was by engineering. By May 17, 1998, each valve had been tes acceptable performance in accordance with criteria. However, the Unit 1 HPSI "B" t train valves had dimensional values which susceptible to the disc cocking condition reworked to optimize valve alignment and service on May 27, 1998 and the Unit 3 va ASSESSMENT OF THE SAFETY CONSEQUENCES AND The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis mim maintained due to the reverse flow throug valve, a condition. The safety significance of the failed HPS reviewing possible failure modes. The lid determined to be degraded HPSI flow deliv result of reverse flow through the opposi A determination was made that several ev to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steat the UFSAR Chapter 6 ECCS Performance Anal annuated for Drondiv B, (that are impact 	_			·NU	JMBER	_	NUMBE	Ř		
 EXT performing its design function of prevent leakage. The TS 3.0.3 was retracted on Ju To provide additional assurance that the check valves (Unit 3 "B" train, Unit 1 "B Unit 3 "A" train) were operable, each was by engineering. By May 17, 1998, each valve had been test acceptable performance in accordance with criteria. However, the Unit 1 HPSI "B" t train valves had dimensional values which susceptible to the disc cocking condition reworked to optimize valve alignment and service on May 27, 1998 and the Unit 3 va 3. ASSESSMENT OF THE SAFETY CONSEQUENCES AND The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis mimaintained due to the reverse flow throug valve, a condition. The safety significance of the failed HPS reviewing possible failure modes. The lind determined to be degraded HPSI flow deliv result of reverse flow through the opposi A determination was made that several ev to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steam combusted for homeody B (that are impact due combusted for homeody B (that are impact) and steam combusted for homeody B (that are impact) and the unit of the combusted for homeody B (that are impact) 	2 8 9	8	- (0	0 6	3 -	0 1	06	of	0 1
 To provide additional assurance that the check valves (Unit 3 "B" train, Unit 1 "B Unit 3 "A" train) were operable, each was by engineering. By May 17, 1998, each valve had been test acceptable performance in accordance with criteria. However, the Unit 1 HPSI "B" train valves had dimensional values which susceptible to the disc cocking condition reworked to optimize valve alignment and service on May 27, 1998 and the Unit 3 va 3. ASSESSMENT OF THE SAFETY CONSEQUENCES AND The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis mimaintained due to the reverse flow throug valve, a condition. The safety significance of the failed HPS reviewing possible failure modes. The lind determined to be degraded HPSI flow deliv result of reverse flow through the opposi A determination was made that several ev to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steat the UFSAR Chapter 6 ECCS Performance Anal computed for Anordy and the uppediw B (that are impact 	.ng ex« .y 31,	ces 19	sive 98.	3	ceve	erse	flow	v	ı	2
 By May 17, 1998, each valve had been tess acceptable performance in accordance with criteria. However, the Unit 1 HPSI "B" train valves had dimensional values which susceptible to the disc cocking condition reworked to optimize valve alignment and service on May 27, 1998 and the Unit 3 va 3. ASSESSMENT OF THE SAFETY CONSEQUENCES AND The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis mix maintained due to the reverse flow throug valve, a condition where the Units were o an unanalyzed condition. The safety significance of the failed HPS reviewing possible failure modes. The lin determined to be degraded HPSI flow deliv result of reverse flow through the opposi A determination was made that several ev to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steat the UFSAR Chapter 6 ECCS Performance Anal and the	To provide additional assurance that the remaining HPSI pump discharge check valves (Unit 3 "B" train, Unit 1 "B" train, Unit 2 "A" train and Unit 3 "A" train) were operable, each was tested in the order prescribed by engineering.									
3. ASSESSMENT OF THE SAFETY CONSEQUENCES AND The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis min maintained due to the reverse flow throug valve, a condition where the Units were of an unanalyzed condition. The safety significance of the failed HPS reviewing possible failure modes. The lin determined to be degraded HPSI flow delive result of reverse flow through the opposi A determination was made that several events to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steam the UFSAR Chapter 6 ECCS Performance Anal and the UFSAR Chapter 6 ECCS Performance Anal	ed and the su cain an sugges in the the Un the On	d h urv nd ste e f it Ma	ad d eill the d th utur 1 va y 20	den Lar Ur iej ce.	nons nce nit y ma . Th ve w 199	tes 3 H ay b ae v as 98.	ted t acc PSI ' e alves retu	cepta 'B" s wer rned	nce e to	
The degraded HPSI flow condition did not fission product barriers or result in any there were no actual adverse safety conse However, it is known that design basis min maintained due to the reverse flow throug valve, a condition where the Units were of an unanalyzed condition. The safety significance of the failed HPS reviewing possible failure modes. The lin determined to be degraded HPSI flow delive result of reverse flow through the opposi A determination was made that several ev to assess the potential safety impact due Final Safety Analysis Report (UFSAR) Chap for Main Steam Line Break (MSLB) and Steat the UFSAR Chapter 6 ECCS Performance Anal	IMPLIC	CAT	IONS	6 (OF I	HIS	EVEN	1T:		
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condition) all required further evaluatio were determined to not be adversely impac results of the analysis demonstrated that been provided to mitigate each event/cond	ents ro to dec er 15 a Gene: ysis, a ed by a h. All ced by suffic suffic	equ gra nat and the th cie	ired ded sign or T fir deg ther is c nt H	i i HI Tui Ce gra c (Co HPS	furt PSI Base be F Pro adec Chap ndit SI f	ther flo es E Aupt oteo d HE oter cior	e eval w. Svent: sure stion PSI 15 1 1. Th w would	luati Upda s (DB (STGR even DBEs he ld ha	on ted E)), ts ve	v

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FACILITY NAME Palo Verde Unit 1	DOCKET NUMBER LER NUMBER PAGE YEAR SEQUENTIAL REVISION NUMBER NUMBER NUMBER 0 5 0 0 0 5 2 8 9 8 - 0 0 6 - 0 1 0 7 of 0 12							
TEXT Main Steam Line Break (MSL A reanalysis was performed the limiting MSLB cases fo (SLBFP) and hot zero power were reanalyzed with degra The analysis of record (AO that uses bounding values physics data. The reanalys physics assumptions that b degraded HPSI flow. The results of the MSLB re for the SLBFP case, and th acceptable despite the deg margin to return to power bounded by the MSLB boundi currently reported in the Steam Generator Tube Ruptu An evaluation was performe would have on the departur acceptable fuel design lim integrated leak for the SG for the SGTRLOP documents initiates, thus the degrad An evaluation of the effec time and integrated leak w conditions, no injection o The delay in HPSI injectio the RCS, with less subcool in controlled SG steaming additional voiding of the sufficient water mass to s	<pre>0 5 0 0 0 5 2 8 9 8 - 0 0 6 - 0 1 0 7 of 0 12 B): A to assess the effect of degraded HPSI flow on or return to power. The limiting hot full power (SLBZP) cases, both with loss of off-site power ded HPSI flow. DR) for a MSLB is a cycle independent analysis for moderator temperature coefficient (MTC) and bis was performed based on the AOR using MTC and bound current and past operating cycles, plus the eanalysis showed that no HPSI flow is required hat reactivity control for the SLBZP case is rraded HPSI flow. Further, based on a greater conditions, the results of the reanalysis are ing analysis and 3876 MWt power uprate analyses UFSAR. Hre (STGR): d on the effect that the degraded HPSI flow te from nucleate boiling ratio (DNBR) specified tit (SAFDL), the leak rate vs. time, and the TR with a loss-of-offsite-power (LOP). The AOR that the minimum DNBR occurs before HPSI flow ted HPSI flow does not affect the minimum DNBR. et of degraded HPSI flow on the leak rate vs. tas also performed. Under degraded HPSI flow is a also performed. Under degraded HPSI flow is a also performed. They below 1350 psia. in results in a more rapid depressurization of ing, and with a corresponding, slight increase to maintain subcooling. This would result in RCS upper head, however the upper head contains upport additional depressurization until an RCS achieved at which time the degraded HPSI flow is provided at which time the degraded at provide the to flow and the provide the to flow the prove the upper head contains in provide at which time the degraded the provide the provide the to flow the provide the to flow the to the provide the provide the to flow and the to the prove the upper head contains in the definitional depressurization until an RCS achieved at which time the degraded the provide the provide</pre>							
equals or exceeds the leak flow is a more rapid depre early part of the transien integrated leak. This has consequences.	a rate. The overall effect of the degraded HPSI assurization with less subcooling during the at, resulting in a reduced leak rate and the effect of reducing the corresponding dose							

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хт	The overall effect of	the degraded HPSI flow	for th	he S	SGTR an	d SGT	RLC)P		نسل	
	events is very similar	r, resulting in a reduce	ed inte	egra	ated le	ak an	d	_			
	correspondingly lower dose consequences.										
	Small Break Loss of C	oolant Accident (SBLOCA)	:								
	To access this event	three reactor coolant r	ן) כישנוי	RCP) disch	arge	ler	, `			
	breaks were reanalyze	d; 0.05_ft2, 0.03 ft2 ar	id 0.0	1 ft	2 brea	ks. T	he	RCE	?		
	discharge leg is the limiting break location because it maximizes the										
	amount of spillage from the HPSI pump. The 0.05 ft2 break is the limiting break for the PVNGS SBLOCA spectrum in the AOR presented in the UFSAR.										
	DIEAK IOI CHE FVNGS SBBOCH SPECTIUM IN THE MOK PLESENCED IN THE OFSAK.										
	The reanalysis was performed using the input data and initial conditions from the SBLOCE analysis of record. The ACE had originally been performed										
	for 4070MWT stretch p	ower (plus 2% power unce	rtain	tyii ty)	rather	than	th	e.	lieu		
	3876MWT actually implo	emented The revised of	lecay l	heat	model	,					
•	corresponding to core	power of 3876 MWt (plus	: 2% pc	ower L	c uncer	taint	y),				
	as compared to using 3	120% of the 1971 ANS dec	ay hea	at s	standar	d tha	ert t i	.a.ı. .s	icy,		
	required by Appendix K to 10CFR50.										
	The initial core power was maintained at the conservatively high AOR value										
	to avoid reinitializin	ng the code at a new set	of in	niti	ial ope	ratin	g				
	conditions.										
	In addition, the hot rod heat-up portion of the analysis was performed										
	with ABB/CE's SBLOCA	with ABB/CE's SBLOCA Realistic Evaluation Model (REM). The REM improved									
	swelling and rupture a	are consistent with the	lates	t NF	RC appr	oved	ver	sic	on n		
	of ABB/CE's SBLOCA eva	aluation model.									
	The limiting SBLOCA b	reak size for the reanal	vsis,	whi	ich res	ulted	ir	n th	ne		
	highest peak cladding	temperature, was determ	ined t	to ł	be the	0.03	ft2			•	
	break. The results of	the reanalysis were a p	eak c.	lad	temper	ature	of	17	742 11 na	,	
	oxidation of <0.733%,	and a coolable geometry	maint	tair	ned. T	hese	va]	.ues	31119		
	meet the corresponding	g acceptance criteria in	Appei	ndis	к К.	•					
	In addition, several	best estimate simulatior	s of t	the	SBLOCA	were					
	performed in the PVNG	S simulator to assess th	e eff	ecti	iveness	of t	he				
	emergency operating p.	rocedures and operator a	no te	s fo rm /	or deal	ing w	itł	n tł	ne		
	errect or the degrade	T WEDT LION ON DEDOCH IC	my ce.		COLLING	•					
	These simulations dem	onstrated that the emerge	gency of	opei	rating	proce	dui	:e	. 1. 3		
	(EOP) guidance contai	nea in the functional re	cover	נס ע	rocedur	e wou	тq	ena	apte		

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·	LICENSEE EVENT R	EPORT (LER) TE	кт со	NTIN	NUATIO	N		· _			
FACILITY NAME		DOCKET NUMBER			LER NUMBE	R		PAC	ЭE		
Р	alo Verde Unit 1		YE	AR	NUMBER	NUM	ION				
	•	0 5 0 0 0 5 2	89	8 -	006	- 0	1 0	9 of	0 12		
TEXT	the operators to successfu condition.	lly cool the RCS	despi	te t	he degra	aded HI	SI.				
	These results demonstrate found condition, the degra HPSI delivery to the RCS to 10CFR50.46 for SBLOCA.	that, based on a ded HPSI flow wo o meet the ECCS a	reali ild ha accept	stic ve r ance	assessn esulted criteri	nent of in su la of	f th ffic	e as- ient			
	Fire Protection Events:						•				
	For Appendix R Fire Events make-up to satisfy the RCS some of the events the HPS Basis Fire Events for RCS ing pump system. All the au flow, safe shutdown could	, the charging p Inventory Contro I System has been make-up in lieu o malysis indicated have been achieve	imp synchic safe of credition of a d that ed and	stem ety ited supp wit mai	is util functior to miti lemental h the de ntained.	Lized a n. How Igate I L to the egraded	for veve Desi ne c i HP	RCS r, in gn harg- SI			
•	The following six fire sce injection and subsequent s determined to be potential.	narios, when com eal failure resu ly impacted by th	bined Lting he deg	with in a rade	a loss SBLOCA, d HPSI 1	of RCI were low co	? se ondi	al tion:			
	 Excess Steam Demand due to spurious opening of an atmospheric dump valve. Spurious exercises of the upenificed PCS are wort line. 										
	 RCS Depressurization du valve. 	 spurious opening of the unorificed RCS gas vent line. RCS Depressurization due to spurious opening of pressurizer spray valve. 									
۹ ر	 Steam Generator (SG) Over remaining at 100% open a Total Loss of Feedwater 	erfilling due to after reactor tr:	main : ipped.	feed	lwater co	ontrol	val	ve			
	• RCS Overpressurization	due to loss of p	cessur.	izer	heater	contro) .				
	To evaluate these scenario the plant specific simulat determine the limiting mul- fire event area that would the safe shutdown criteria that were not evaluated in	s, two simulator or. The simulator tiple failures in be representation . A separate and the simulator se	session session the ve of alysis ession	ons ions most a fi was s.	were cor were us limitir re event conduct	nducted sed to ng des: c and d ced for	l us Ign chal c ev	ing basis lenge ents	• •		
	The results from the simul spurious event that will c the degraded HPSI flow con Fire Protection Events:	ator sessions ind ause RCS depress dition.	dicate urizat	d th ion	at any f would he	fire in elp mit	nduc iga	ed te			
	Subcooling margin was main included multiple fire spu	tained in both th rious events occ	ne sim urring	ulat at	or sess differe	ioņs, n nt ⁻ tim	whic es d	h luring	ſ		

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•	LICENSEE EVEN	T REPORT (LER) TEXT	CONTINUATION						
ACILITY NAME Pal	lo Verde Unit 1	DOCKET NUMBER		PAGE					
		0 5 0 0 0 5 2 8	9 8 - 0 0 6 - 0 1	0 10 of 0 1					
EXT	the simulator runs. The the simulator sessions RCS overpressurization	analysis conducted for also verified that for events, subcooling mar	or the events not evalua total loss of feedwate gin was maintained.	ted in r and					
	All the analysis indica could have been achieve	ted that with the degr d and maintained.	aded HPSI flow, safe sh	utdown					
	The Probabilistic Safety Assessment:								
	The Probabilistic Risk performed an assessment analysis was performed in core damage and does analysis discussed above	Assessment (PRA) group of the degraded HPSI assuming the degraded not consider the resu e.	o (other utility personn flow condition. This HPSI flow would have re lts of the deterministi	el) sulted c					
	Initiating events that were impacted were identified and a review of operator responses was conducted. PRA's review revealed that current plant procedures and training cover operator response to this event.								
	Emergency procedures 400 9E009, "Functional Reco flow condition and the Safety Function. Adequat to identify the degraded	EP-9E003, "Loss of Coo very" address identifi required actions to re te instrumentation exi d HPSI flow condition.	lant Accident" and 40EP cation of the degraded cover the Inventory Con sts for the operating s	- HPSI trol taff					
	HPSI pump reliability, a significance of this con reviewing the history of Maintenance Rule, from a pump or motor failures of current estimated failu	which is also used by ndition, has historica f failure and demands the period 1994 to pre in approximately 614 d re probability of 6.73	PRA in determining the lly been very good. In being tracked for the sent, there have been n emands. This supports E-4 for the HPSI pump.	safety o HPSI the					
	PRA analysis of the rist assuming this condition frequency increase of 3 baseline value. This in due to maintenance perfo deterministic analyses of in core damage frequency negligible.	k associated with the leads to core damage, .3 E-05/yr, approximat ncludes the best estim ormed on the pump. How discussed above are co y related to the degra	degraded HPSI flow cond resulted in a core dam ely a 100% increase in late HPSI pump unavailab rever, the results of th onsidered, then the incr ded HPSI flow condition	ition, age the ility e ease is					
4.	STRUCTURES, SYSTEMS, OR	COMPONENTS INFORMATIC	N:						
¢	The valves affected by Warner and are ASME Clas	the described conditions 2, 4 inch, 1500 pou	on are manufactured by B and, bonnet pressure sea	org- 1, two					

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			EPORT (LER) TEXT	CONTI	NUATION			
FACILITY	NAME ,		DOCKET NUMBER	1	LER NUMBER		PAG	E
ja ja	Palo	Verde Unit 1		YEAR	SEQUENTIAL R NUMBER N	EVISION		
TOVE			0 5 0 0 0 5 2 8	98-	006-0	0 1	0 11 of	0 12
		piece welded body swing ch the underside of the valve	eck valves. The di: bonnet.	sc asse	embly is súsp	pende	d from	
	5.	CAUSE OF THE EVENTS:						· ·
		The Unit 1 Train "A" and Un failed because the valve di seat, preventing full close open is due to vertical mis maintenance instructions. maintenance instructions wa On April 9, 1998, when the found measurements were ind vertical disc misalignment 1998 This was attributed	nit 2 train "B" HPS iscs became "cocked" ure. The cause for salignment, which wa The primary contrib as incomplete vendor Unit 1 "A" train HI correctly recorded w when the valve was	I pump " under the va as attr putor t r techn PSI was which l reasse	discharge ch the top of lve discs be ibuted to in to the inaded dical information disassemble ed to additional	heck the eing nadeq quate ation ed the ional ril 1:	valves valve cocked uate e as-	
>		Additional contributors and included: 1) Surveillance (were seating, 2) lessons le experience reports were not testing procedures, and 3) impact excessive reverse f on the HPSI delivery capability	d missed opportuniti test procedures did earned from in-house t effectively incorp engineering person low through the HPSJ ility.	ies to not co e and i porated nel had [disch	identify the onfirm the vandustry open into mainte not recogni arge check w	e conc alve c rating enance ized t valve	dition discs g e and the had	
	6.	CORRECTIVE ACTIONS TO PREVI	ENT RECURRENCE:					
		Immediate corrective action valves to an operable cond have been determined to be	ns were implemented ition. All HPSI dis assembled correctly	to res scharge 7•	tore the aff check valve	fected es dis	d scs	
		The maintenance instruction revised on November 7, 1994 perform the activity. How were enhanced to include ma drawings.	ns in use for check 4 and are currently wever, the check val ore detailed install	valve consid Lve mai Lation	assembly had dered adequat ntenance ins instructions	d been te to struct s and	n tions	
· ·		Engineering has completed to bonnet hung pressure seal of misalignment caused by reta that the STs for the other	transportability rev check valves suscept aining ring position valves were adequat	views f tible t n. Thi te to i	for other Bon o vertical o s review det dentify valu	rg-Wa disc termin ve coo	rner ned cking.	
*		In addition, other valves a likely to be susceptible to	are one piece (non-v o the "disc cocking'	velded) ′failu	design and re.	are i	not as	

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LICENSEE EVER	NT REPORT (LER) TEXT	CONTINUATION	
FACILITY NAME	DOCKET NUMBER	LER NUMBER PAGE	
Palo Verde Unit 1	:	YEAR SEQUENTIAL REVISION NUMBER NUMBER	
	. 0 5 0 0 0 5 2 8	9 8 - 0 0 6 - 0 1 0 12 of	0 12
TEXT Engineering has evalua (IST) program check va vertical misalignment other types of check v	ted transportability to lves with closure funct leading to "disc cocking alves.	other Inservice Testing ions and determined that the g" is not transportable to	
Surveillance Test proc functions were reviewe appropriate. This revi criteria were appropri closure function with AFA-V015 in each unit. (980862) and retested and acceptance criteri	edures for IST program of d to confirm that the ac ew confirmed the testing ate for all check values the exception of an Aux This value was evaluat satisfactorily in all th a for testing were also	check valves with closure cceptance criteria is g methodology and acceptance s with a safety related iliary Feedwater (BA) valve ted under a separate CRDR hree units. The test method revised for these valves.	
An evaluation will be experience information incorporated. This act action was reported in The change in the date and the Region IV Palo	conducted to determine is on complex component as ion will be completed by LER 528/98-006-00 as be was discussed with the Verde Project Branch Ch	if other industry operating ssemblies has been properly y September 11, 1998. This eing due on August 31, 1998. Senior Resident Inspector hief on August 28, 1998.	•
Engineering Support Pe quarterly industry eve December 31, 1998.	rsonnel will be briefed nts training This acti -	on this event during ion will be completed by	
7. PREVIOUS SIMILAR EVENT	s:		
No other previous even the last three years.	ts have been reported pu	ursuant to 10 CFR 50.73 in	
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