

ILLINOIS POWER COMPANY



1606-L
U-10091

CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

September 19, 1983

Docket No. 50-461

Mr. James G. Keppler
Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Subject: 10CFR PART 21 DEFECT
ADS DIGITAL SIGNAL CONDITIONER CARD FUSE FAILURES

Dear Mr. Keppler:

On July 21, 1983 Illinois Power Quality Assurance (IPQA) received a Potential Defect or Noncompliance (10CFR21) Referral from Nuclear Station Engineering Department (NSED) concerning the failure of automatic depressurization system (ADS) initiation due to blown fuses. Based on an evaluation, Illinois Power is providing the following information to the Commission in accordance with the requirements of 10CFR Part 21.21 (b) (3).

- (i) D. P. Hall, Vice President of Illinois Power Company, by means of this report, hereby informs the Commission of a 10CFR Part 21 defect.
- (ii) The basic components involved are digital signal conditioner (DSC) printed circuit cards used in the Nuclear System Protection System (NSPS). A list of the NSPS printed circuit cards by parts list (PL) number, title, and abbreviation is included with this report as Attachment "A".
- (iii) The NSPS printed circuit cards were manufactured and supplied by:

General Electric Company
Nuclear Power Systems Division
175 Curtner Avenue
San Jose, CA 95125
- (iv) During construction and initial operation (C&IO) testing, the ADS logic failed to actuate the safety relief valves in response to automatic or manual signals. The failure was attributable to a blown fuse (F3) on the DSC card. When fuse F3 blows, a card-out-of-file signal is annunciated in the main

SEP 22 1983

IE19
41

control room, and the power-on-initialization logic is prevented from initiating the ADS function in that division.

The ADS is an engineered safety feature subsystem of the emergency core cooling system. ADS provides pressure relief during a loss of coolant accident in which the high pressure core spray fails to provide a sufficient volume of water to the reactor, and allows the low pressure core spray system to successfully cool the reactor vessel. The blown fuse on the DSC card would result in a deficiency in the function of the ADS and could, under operating conditions or an operating transient, contribute to the exceeding of a safety limit. In consideration of an independent single failure, a blown fuse on the ADS card could result in loss of a safety function necessary to mitigate the consequences of an accident.

- (v) NSED informed IPQA, by means of the Potential Defect or Noncompliance (10CFR21) Referral on July 21, 1983, of a potentially reportable defect in the ADS initiation logic.
- (vi) A list, showing the number and location of each type of NSPS printed circuit card at Clinton Power Station, is included with this report as Attachment "B".
- (vii) Investigation has revealed the cause of the fuse failures to be attributable to GE's assignment of pins in the card edge connector. Card edge connector (P2) pin (P2-21, u) provides a fault path to the card out-of-file interlock signal present at pin (P2-22, v).

When the card edge connector (P2) is either connected to, or disconnected from the card, pins (P2-21, u and P2-22, v) momentarily short and the subsequent fault current is sufficient to open the fuse on the DSC card.


The NSPS printed circuit cards have been returned to GE in San Jose, CA. GE will implement FDDR No. LH1-777 to replace fuse F3 on each DSC circuit card with a 2.2 Kohm resistor to limit the power bus load to 5.5 mA. This work is expected to be completed by September 23, 1983. A subsequent test of each card by the Terradyne card tester is expected to be completed by GE by February 1, 1984.

All other printed circuit cards in the NSPS panels will be reviewed (schematically) by Illinois Power (NSED) for edge connector pin assignments for all fused signal paths. Completion of this action is expected by December 1, 1983.

- (viii) Not applicable

Our evaluation of this reportable defect is available for your review at our offices. I trust that this letter provides sufficient information for your review and analysis of the problem and solution.

Sincerely yours,


D. P. Hall
Vice President

KFH/jf

Attachments

cc: U.S. NRC Resident Office
Illinois Department of Nuclear Safety
Director of Inspection and Enforcement (3 copies)
INPO Records Center

Attachment A

LIST OF NSPS PRINTED CIRCUIT CARDS

PARTS LIST ITEM NO.	TITLE	ABBRE- VIATION	PARTS LIST ITEM NO.	TITLE	ABBRE- VIATION
600	CARD SELECT DCDR	CSD	634	RESID HEAT REMOVAL SYS 4	RHR-4
601	DATA ACQ/DSPL CONT	DADC	635	RESID HFAT REMOVAL SYS 5	RHR-5
602	DISPLAY AND CONTROL	DCP	636	RESID HEAT REMOVAL SYS 6	RHR-6
603	ANLG TRIP MDL	ATM	637	RESID HEAT REMOVAL SYS 7	RHR-7
604	DGTL SIG CONDITIONER (24VDC IN)	DSC	638	REAC CORE ISLN CLG SYS 1	RCIC-1
605	DGTL SIG CONDITIONER (120VAC IN)	DSC	639	REAC CORE ISLN CLG SYS 2	RCIC-2
605A	DGTL SIG CONDITIONER (120VAC IN)	DSC	640	REAC CORE ISLN CLG SYS 3	RCIC-3
606	2/4 LOGIC	2/4LOGIC	641	REAC CORE ISLN CLG SYS 4	RCIC-4
607	REAC PROTECTION SYS 1	RPS-1	642	REAC CORE ISLN CLG SYS 5	RCIC-5
608	REAC PROTECTION SYS 2	RPS-2	643	REAC CORE ISLN CLG SYS 6	RCIC-6
609	REAC PROTECTION SYS 3	RPS-3	645	1-999 SEC TD	TD1-999
610	REAC PROTECTION SYS 4	RPS-4	648	ISOLATED LAMP DRVR	ILD
611	REAC PROTECTION SYS 5	RPS-5	650	TWO WAY BUFFER	2WB
612	REAC PROTECTION SYS 6	RPS-6	668	CARD SELECT MON	CSM
613	REAC PROTECTION SYS 7	RPS-7	671	STC-CPU MEMORY	CPU MEM
614	NUC ST SPLY SHUTOFF SYS 1	NS4-1	672	SELF TEST CONT UNIV I/O	UNIV I/O
615	NUC ST SPLY SHUTOFF SYS 2	NS4-2	673	SER I/O MEMORY	SER I/O
616	NUC ST SPLY SHUTOFF SYS 3	NS4-3	679	PWR SPLY MON	PWRM
617	NUC ST SPLY SHUTOFF SYS 4	NS4-4	682	NUC ST SPLY SHUTOFF SYS 8	NS4-8
618	NUC ST SPLY SHUTOFF SYS 5	NS4-5	684	AUTO DEPRESSURIZATION SYS 5	ADS-5
619	NUC ST SPLY SHUTOFF SYS 6	NS4-6	685	AUTO DEPRESSURIZATION SYS 6	ADS-6
620	NUC ST SPLY SHUTOFF SYS 7	NS4-7	687	2 WAY SIG SEPARATION	2WSS
621	AUTO DEPRESSURIZATION SYS 1	ADS-1	688	SELF TEST CONT. MOTHER	STCMTH
622	AUTO DEPRESSURIZATION SYS 2	ADS-2	695	LOAD DRIVER	LD
623	AUTO DEPRESSURIZATION SYS 3	ADS-3	951	ANALOG INP ISOLATOR	AII
624	AUTO DEPRESSURIZATION SYS 4	ADS-4	952	ANALOG ISOL POWER SUP	AIPS
625	LOW PRESS CORE SPRAY SYS 1	LPCS-1	954	FIELD CONTACT ISOLATOR	FCII
626	LOW PRESS CORE SPRAY SYS 2	LPCS-2	955	HI SPEED INP ISOLATOR	HSII
627	LOW PRESS CORE SPRAY SYS 3	LPCS-3	958	12V LOGIC INP ISOLATOR	LII
628	HIGH PRESS CORE SPRAY SYS 1	HPCS-1	960	ANALOG OUT ISOLATOR	AOI
629	HIGH PRESS CORE SPRAY SYS 2	HPCS-2	962	HIGH LEVEL OUT ISOLATOR	HLOI
630	HIGH PRESS CORE SPRAY SYS 3	HPCS-3	963	FLOATING LOW LEVEL OUT ISOLA.	FLLOI
631	RESID HEAT REMOVAL SYS 1	RHR-1	964	12V LOGIC OUT ISOLATOR	LOI
632	RESID HEAT REMOVAL SYS 2	RHR-2	965	HIGH SPEED OUT ISOLATOR	HSOI
633	RESID HEAT REMOVAL SYS 3	RHR-3	986	INVERTING HIGH LEVEL ISOLA.	IHLOI

NUMBER AND LOCATION OF NSPS PRINTED CIRCUIT CARDS, BY TYPE

<u>P.L. ITEM NO.</u>	<u>ASSEMBLY</u>	<u>CARD TYPE</u>	<u>P661</u>	<u>P662</u>	<u>PANEL P663</u>	<u>P664</u>	<u>TOTAL</u>	
600	147D8456	G002	Card Select Decoder	8	7	4	3	22
601	147D8454	G001	Data Acq/Dspl Cont.	1	1	1	1	4
603	147D8505	G001	ATM	64	52	26	17	159
604	147D8461	G001	Digital Signal Conditi	22	20	8	7	57
605	147D8461	G002	Digital Signal Conditi	15	14	3	2	34
605A	147D8461	C003	Digital Signal Conditi	4	3	1	1	9
606	147D8503	G001	2/4 Logic	6	6	6	6	24
607	147D8463	G001	RPS #1	1	1	1	1	4
608	147D8464	G001	RPS #2±	1	1	1	1	4
609	147D8465	G001	RPS #3	1	1	1	1	4
610	147D8466	G001	RPS #4	1	1	1	1	4
611	147D8467	G001	RPS #5	1	1	1	1	4
612	147D8468	G001	RPS #6	1	1	1	1	4
613	147D8469	G001	RPS #7	1	1	1	1	4
614	147D8470	G001	NS4 #1	1	1	1	1	4
615	147D8471	G001	NS4 #2	1	1	1	1	4
616	147D8472	G001	NS4 #3	1	1	1	1	4
617	147D8473	G001	NS4 #4	4	4	0	0	8
618	147D8474	G001	NS4 #5	1	1	0	0	2
619	147D8475	G001	NS4 #6	1	1	0	0	2
620	147D8476	G001	NS4 #7	1	1	1	1	4
621	147D8478	G001	ADS #1	1	1	0	0	2
622	147D8479	G001	ADS #2	2	2	0	0	4
623	147D8480	G001	ADS #3	2	2	0	0	4
624	147D8481	G001	ADS #4	1	1	0	0	2
625	147D8484	G001	LPCS #1	1	0	0	0	1
626	147D8485	G001	LPCS #2	1	0	0	0	1
627	147D8486	G001	LPCS #3	1	0	0	0	1
628	147D8500	G001	HPCS #1	0	0	1	0	1

NUMBER AND LOCATION OF NSPS PRINTED CIRCUIT CARDS, BY TYPE

<u>P.L. ITEM NO.</u>	<u>ASSEMBLY</u>	<u>CARD TYPE</u>	<u>P661</u>	<u>P662</u>	<u>PANEL P663</u>	<u>P664</u>	<u>TOTAL</u>	
629	147D8501	G001	HPCS #2	0	0	1	0	1
630	147D8502	G001	HPCS #3	0	0	1	1	2
631	147D8487	G001	RHR #1	1	1	0	0	2
632	147D8488	G001	RHR #2	1	1	0	0	2
633	147D8489	G001	RHR #3	1	1	0	0	2
634	147D8490	G001	RHR #4	1	1	0	0	2
635	147D8491	G001	RHR #5	1	1	0	0	2
636	147D8492	G001	RHR #6	0	1	0	0	1
637	147D8493	G001	RHR #7	1	1	0	0	2
638	147D8494	G001	RCIC #1	1	0	0	0	1
639	147D8495	G001	RCIC #2	1	0	0	0	1
640	147D8496	G001	RCIC #3	1	0	0	0	1
641	147D8497	G001	RCIC #4	1	0	0	0	1
642	147D8498	G001	RCIC #5	0	1	0	0	1
643	147D8499	G001	RCIC #6	2	1	0	0	3
645	147D8504	G001	1-999 Sec Time Delay	9	10	2	2	23
648	219B5378	G001	Isolated Lamp Driver	9	9	3	2	23
650	167B2820	G001	Two Way Buffer	13	9	6	5	33
668	147D8453	G001	Card Select Mon (CSM)	1	1	1	1	4
668A	147D8453	G002	Card Select Mon (CSM)	1	1	1	1	4
668B	147D8453	G003	Card Select Mon (CSM)	1	1	1	1	4
668C	147D8453	G004	Card Select Mon (CSM)	1	1	1	1	4
668D	147D8453	G005	Card Select Mon (CSM)	1	1	1	1	4
668E	147D8453	G006	Card Select Mon (CSM)	1	1	1	1	4
668F	147D8453	G007	Card Select Mon (CSM)	1	1	1	1	4
668G	147D8453	G008	Card Select Mon (CSM)	1	0	0	0	1
668H	147D8453	G009	Card Select Mon (CSM)	1	1	0	0	2
668J	147D8453	G010	Card Select Mon (CSM)	1	1	0	0	2

NUMBER AND LOCATION OF NSPS PRINTED CIRCUIT CARDS, BY TYPE

<u>P.L. ITEM NO.</u>	<u>ASSEMBLY</u>	<u>CARD TYPE</u>	<u>P661</u>	<u>P662</u>	<u>PANEL P663</u>	<u>P664</u>	<u>TOTAL</u>	
668K	147D8453	G011	Card Select Mon (CSM)	1	1	0	0	2
668L	147D8453	G012	Card Select Mon (CSM)	1	1	0	0	2
668M	147D8453	G013	Card Select Mon (CSM)	1	1	0	0	2
668N	147D8453	G014	Card Select Mon (CSM)	1	1	0	0	2
668P	147D8453	G015	Card Select Mon (CSM)	1	1	0	0	2
668S	147D8561	G001	Card Select Mon (CSM)	1	1	1	1	4
668T	147D8561	G002	Card Select Mon (CSM)	1	1	1	1	4
668U	147D8561	G003	Card Select Mon (CSM)	1	0	1	1	3
668V	147D8561	G004	Card Select Mon (CSM)	1	1	1	0	3
668W	147D8561	G005	Card Select Mon (CSM)	1	1	0	0	2
668X	147D8561	G006	Card Select Mon (CSM)	1	1	0	0	2
668Y	147D8561	G007	Card Select Mon (CSM)	1	1	0	0	2
668Z	147D8561	G008	Card Select Mon (CSM)	1	1	0	0	2
671	147D8507	G001	CPU Memory	1	0	0	0	1
671A	147D8507	G002	CPU Memory	0	1	0	0	1
671B	147D8507	G003	CPU Memory	0	0	1	0	1
671C	147D8507	G004	CPU Memory	0	0	0	1	1
672	147D8452	G001	Self Test Cont Univ I/O	1	1	1	1	4
672A	147D8452	G002	Self Test Cont Univ I/O	1	1	1	1	4
672B	147D8452	G003	Self Test Cont Univ I/O	1	1	1	1	4
672C	147D8452	G004	Self Test Cont Univ I/O	1	1	1	1	4
672D	147D8452	G005	Self Test Cont Univ I/O	1	1	1	1	4
672E	147D8452	G006	Self Test Cont Univ I/O	1	1	1	1	4
673	219B5376	G001	SER I/O Memory	1	0	0	0	1
673A	219B5376	G002	SER I/O Memory	0	1	0	0	1
673B	219B5376	G003	SER I/O Memory	0	0	1	0	1
673C	219B5376	G004	SER I/O Memory	0	0	0	1	1
679	147D8450	G001	Power Monitor	2	2	2	2	8

NUMBER AND LOCATION OF NSFS PRINTED CIRCUIT CARDS, BY TYPE

<u>P.L. ITEM NO.</u>	<u>ASSEMBLY</u>	<u>CARD TYPE</u>	<u>P661</u>	<u>P662</u>	<u>PANEL P663</u>	<u>P664</u>	<u>TOTAL</u>	
682	147D8477	G001	NS4 #8	1	i	0	0	2
684	147D8482	G001	ADS #5	1	1	0	0	2
685	147D8483	G001	ADS #6	1	1	0	0	2
687	147D8460	G001	2 Way Signal Sep	5	5	2	1	13
695	147D8455	G001	Load Driver	45	40	11	6	102
951	204B6208AA	G003	Analog Input Isol	7	5	2	0	14
952	198B6203AA	G004	Isolator Power Supply	12	10	4	0	26
954	204B6186AA	G004	Field Contact Input Isol	15	13	7	4	39
955	204B6198AA	G002	High Speed Input Isol	4	4	6	6	20
958	147D8458	G001	12V Logic Input Isol	42	43	37	38	160
960	204B6220AA	G002	Analog Output Isol	7	5	2	0	14
962	204B6188AA	G002	High Level Output Isol	27	21	14	11	73
963	198B6241AA	G004	Floating Low Lvl Out Isol	14	12	6	5	37
964	147D8459	G001	12V Logic Output Isol	10	17	21	23	71
965	204B6196AA	G002	High Speed Output isol	4	4	6	6	20
986	147D8457	G001	Inv H/Lvl Isolator	6	6	3	3	18
	147D8506	G001	Display and Control	1	1	1	1	4
				<u>424</u>	<u>383</u>	<u>217</u>	<u>182</u>	<u>1206</u>