

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): Davis-Besse Unit 1 DOCKET NUMBER (2): 05000346 PAGE (3): 1 OF 06

TITLE (4): Monthly Test of ARTS and SFAS Used Some Inactive Logic Gates

EVENT DATE (5)			LER NUMBER (6)		REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES
07	26	88	88	020	000	09	16	88	
								DOCKET NUMBER (10)	
								050000	
								050000	

OPERATING MODE (9): 6 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(a)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 73.71(a)
<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.38(a)(1)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(a)
<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.38(a)(2)	<input type="checkbox"/> 50.73(a)(2)(v)	OTHER (Specify in Abstract Below and in Text, NRC Form 366A)
<input type="checkbox"/> 20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(vi)(A)	
<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(vi)(B)	
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(v)	

LICENSEE CONTACT FOR THIS LER (12):

NAME: Jan Stotz, Associate Nuclear Engineer TELEPHONE NUMBER: 419 2491 4510

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES (if you complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15): MONTH 09 DAY 16 YEAR 88

ABSTRACT (Limit to 1400 words, i.e. approximately fifteen single-space typewritten lines) (16)

On July 26, 1988, it was discovered that the actual wiring of the Anticipatory Reactor Trip System (ARTS) did not match the design drawings. Subsequently, on August 18, 1988, the valuation of the significance of the nonconformance concluded that although the ARTS function was not affected, the ability of the monthly functional testing to detect a failure was affected. A review of other systems that use similar logic configuration determined that some parts of the Safety Features Actuation System (SFAS) logic for incident levels 1, 3, and 4 had the same test related deficiency. Since the monthly functional testing did not completely meet the Surveillance Requirements of 4.3.2.3. and 4.3.2.1.1, this is a condition prohibited by Technical Specifications and reportable pursuant to 10CFR50.73(a)(2)(1)(B). The cause for the condition in both systems is that the review of vendor drawings apparently did not recognize the fact that the test buttons provided in accordance with the vendor drawings did not permit testing of a coincidence logic circuit that receives a real input signal during actual demands on the system. Both the SFAS and ARTS logic wiring will be corrected to conform to original design drawings prior to restart from the present refueling outage.

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APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

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TEXT (if more space is required, use additional NRC Form 365A's) (17)

DESCRIPTION OF OCCURRENCE:

On July 26, 1988, during the resolution of field installation concerns with one of the input system modifications, engineering personnel discovered that the actual wiring of the Anticipatory Reactor Trip System (ARTS) did not match the design specification drawings. The plant was in a defueled condition and had been in a refueling/modification/maintenance outage since March, 1988. The nonconformance was documented using a Potential Condition Adverse to Quality Report (PCAQR 88-0569). An evaluation of the nonconformance was commenced. Subsequently, on August 18, 1988, the evaluation of the significance determined that the wiring nonconformance did not affect the system functionality, but did affect the ability of the existing Monthly Channel Functional Test to verify the operability of an AND gate which performs a safety function during an actual demand for this system.

ARTS has four channels. Each channel has an input from three different types of trip inputs. If a trip condition is sensed on 2 out of the 4 sensing channels for a given input to a channel, a channel trip is created, opening one of four Control Rod Drive, CRD, (AA), Breakers. At least one breaker in each of the two power supplies to the CRDM must open to release the control rods.

Monthly channel functional testing using the design drawing configuration (Figure 1) completes the logic circuit with the use of AND gate 5. AND gate 5 could also actuate during an actual demand for this system, and is therefore an active gate. Testing using the as-built configuration (Figure 2) completes the logic circuit with the use of AND gate 8. AND gate 8 is only actuated during testing since one half of its required two inputs is the 1/5 Test Button.

On August 18, 1988, Toledo Edison (TE) concluded the condition was reportable when it was determined that the ARTS monthly functional testing had not completely met the intent of Surveillance Requirement 4.3.2.3 since system installation in 1980. This is a condition prohibited by Technical Specifications and is being reported under 10CFR50.73(a)(2)(i)(B).

On August 18, 1988, a review of drawings for other systems using similar logic configuration determined that some parts of the Safety Features Actuation System (SFAS) (IEEE-JE), appeared to have the same test related condition. This was documented in PCAQR 88-0646. The initial field wiring check confirmed that the condition did exist in some parts of the logic circuits. The condition does not affect the incident Levels 2 and 5 actuation logic but does affect parts of levels 1, 3, and 4.

Therefore, the monthly SFAS functional testing has also not completely met Surveillance Requirement 4.3.2.1.1 for certain portions of SFAS. This condition is prohibited by Technical Specifications and is being reported under 10CFR50.73(a)(2)(i)(3).

DESIGNATION OF APPARENT CAUSE OF OCCURRENCE:

The ARTS monthly functional testing did not meet the intent of the surveillance requirement because the field wiring did not match the design specification drawings. During the 1985/1986 System Review and Test Program, it was reported in LER 85-021 that some of the coincidence logic gates for SFAS were not being tested. An inter-channel logic test which verifies functionality of each coincidence logic was recommended to be performed periodically.

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during refueling outages. This review mainly focused on the fact that some coincidence logics were not being tested. However it was not readily recognized that the portion of the logic that was being tested monthly would be inactive during actual challenges to the system.

The vendor drawings for ARTS and SFAS meet the functional requirements of the design specification. However, the testing provisions provided in the vendor drawings did not facilitate monthly testing of those portions of a coincidence logic circuit that receive actual demand.

This condition was not recognized during the review of vendor drawings. The wiring nonconformance for testing went undetected during testing due to the fact that regardless of the way the logic was wired (Figure 1 or Figure 2), the test indications are the same.

ANALYSIS OF OCCURRENCE:

The portion of the logic circuits for ARTS and SFAS which have not been exercised in the past during monthly testing are part of an integrated circuit. Since a portion of the integrated circuit is being tested, a gross failure would have been detected. Past experience has shown that these components are highly reliable. Multiple failures in redundant components are required to prevent the system from tripping during actual demands for system actuation. In no case was the capability of manually tripping the module compromised.

All of the ARTS gates were tested in February, 1986, using TP 850.83 as part of the System Review and Test Program that verified operability during the 1985/1986 outage. Since restart in January of 1987, there have been system actuations during plant transients in which the system performed as intended.

The SFAS gates that are not tested in the monthly channel functional testing have been tested in the 18 month integrated SFAS testing. Therefore, even though not tested monthly, all gates have been tested at least on an 18 month test interval. Based on past experience with the reliability of these systems, it is concluded that plant safety was not compromised.

CORRECTIVE ACTION:

Under Maintenance Work Order (MWO) 7-88-0569-01 a test plan was conducted for the ARTS logic not affected by ongoing modifications to one of its inputs. It verified the operability of the untested ARTS gates. The SFAS Inter-Channel Logic Test, ST 5031.08, was performed in June 1988 (since shutdown for the current refueling outage) which verified the operability of the SFAS logic gates in question.

Both the SFAS and ARTS logic wiring will be corrected to allow testing of an active gate, per the original design intent, under MODS 88-0193 and 88-0194, respectively. Corrections will be completed prior to restart from the present refueling outage.

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Other systems, the Steam and Feedwater Rupture Control System (SFRCS), and the Reactor Protection System (RPS), have been reviewed to verify that the monthly functional testing is adequate.

FAILURE DATA:

Previously, LER 85-021 reported inadequate testing involving SFAS. The inadequacy reported was that the surveillance tests written to assure continued operability overlooked certain input logic gates on the output modules. As corrective action, the test procedure, TP 850.19, was modified and performed which confirmed that those previously untested gates were operable. The integrated SFAS Test, ST 5031.07, was modified to include the additional gates for testing on an 18 month interval.

REPORT NO: NP-33-88-23

PCAO NO(S): 88-0569, 88-0646

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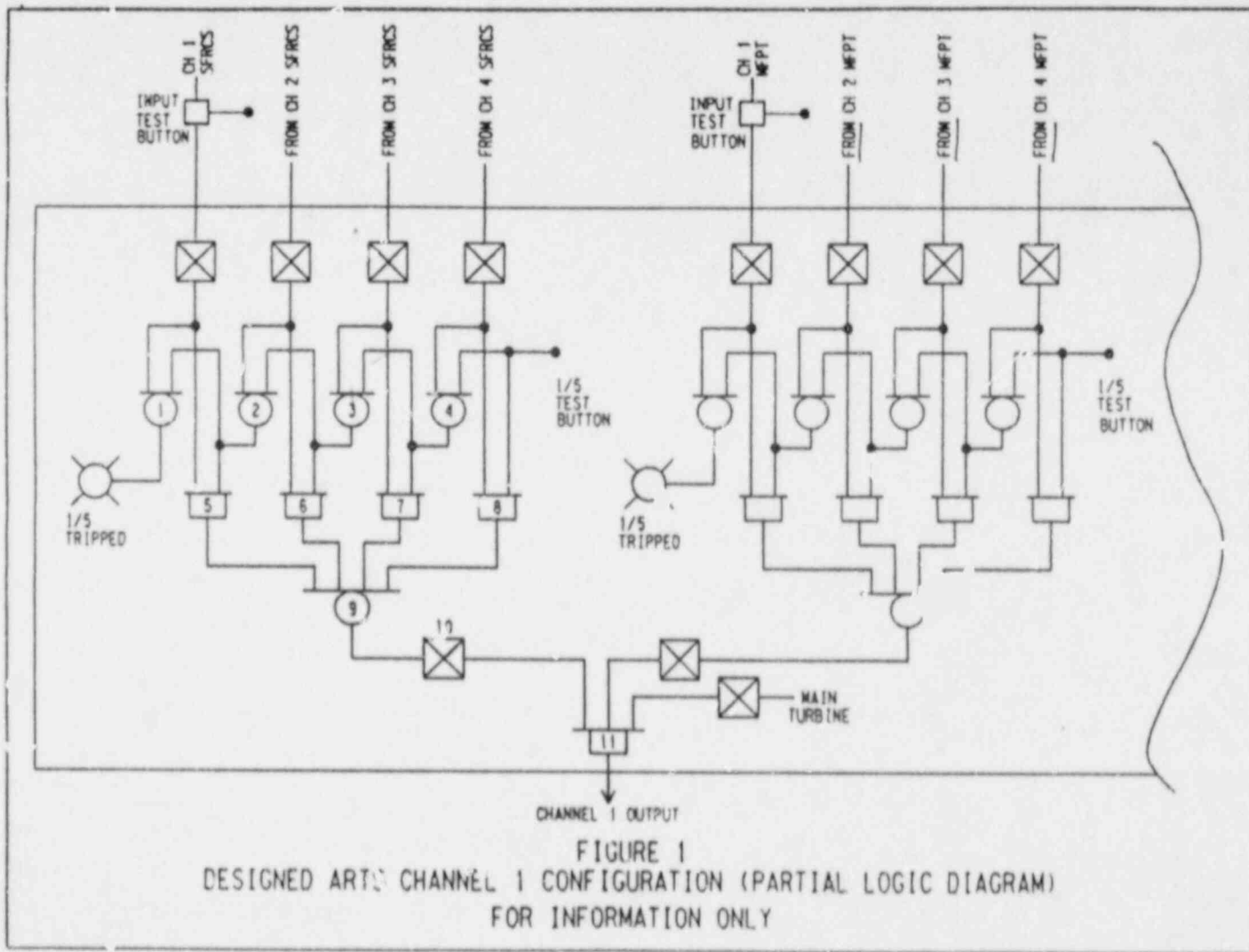
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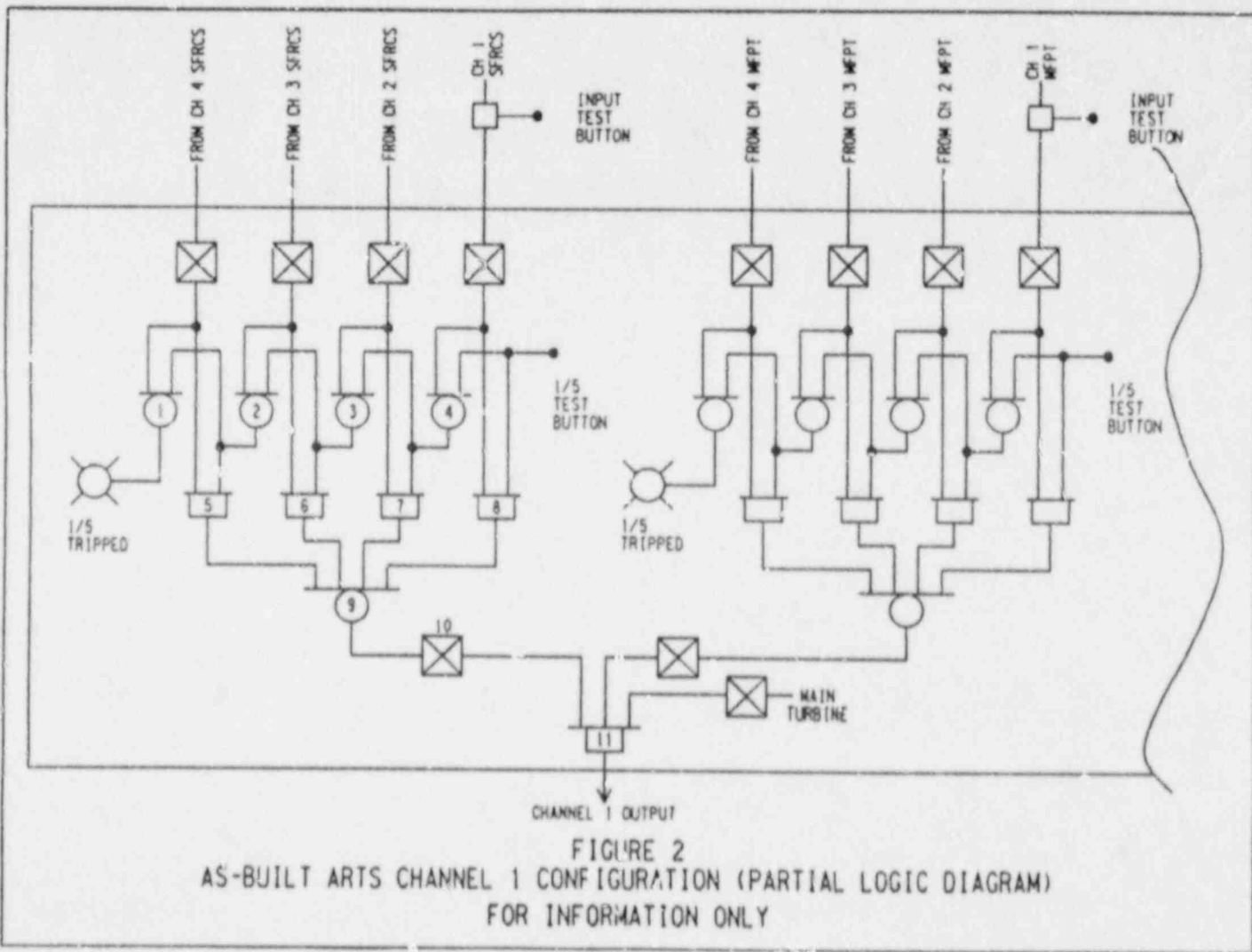


FIGURE 2
AS-BUILT ARTS CHANNEL 1 CONFIGURATION (PARTIAL LOGIC DIAGRAM)
FOR INFORMATION ONLY



September 16, 1988

Log No: KA88-0289
NP-33-88-23

Docket No. 50-346
License No. NPF-3

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Gentlemen:

LER No. 88-020
Davis-Besse Nuclear Power Station Unit No. 1
Date of Occurrence July 26, 1988

Enclosed is Licensee Event Report 88-020, which is being submitted in accordance with 10CFR50.73 to provide 30 day written notification of the subject occurrence.

Yours truly,

A handwritten signature in cursive script, appearing to read 'Louis F. Storz'.

Louis F. Storz
Plant Manager
Davis-Besse Nuclear Power Station

LFS/cjz

cc: Mr. A. Bert Davis
Regional Administrator
USNRC Region III

Mr. Paul Byron
DB-1 NRC Resident Inspector

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