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April 4, 1997  
NG-97-0574

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Station P1-37  
Washington, D.C. 20555-0001

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License No: DPR-49  
Plant-Referenced Simulator Certification Report  
Reference: Letter, IES Utilities to NRC dated November 7, 1996, NG-96-2344  
File A-102

Dear Sir:

This letter regards a change to the content of the above referenced letter. This letter is provided as a follow-up to a telephone conversation between Mr. Frank Collins of your staff and Mr. Phillip Meek (IES Utilities) on January 15, 1997.

Upon further review of Regulatory Guide 1.149, Revision 1, ANS/ANSI-3.5-1985, and NUREG 1262, it has been determined that there are additional requirements for simulator certification testing, not contemplated by the revision to the Duane Arnold Energy Center (DAEC) testing program stated in Nuclear Regulatory Commission Form 474 dated November 6, 1996 and detailed in attachments to the above referenced letter.

Changes were necessary to the information provided in the above reference. The changes to Attachment 1 are under the section heading "Major Changes to the Testing Schedule." That section is included as Attachment 1 to this letter. Attachment 2 has been completely revised and is included as Attachment 2 to this letter.

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April 4, 1997

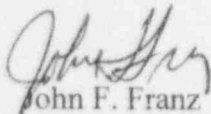
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These attachments describe changes to the DAEC Plant-Referenced Simulator Certification Testing Program. These changes represent a commitment to testing in accordance with Regulatory Guide 1.149, Revision 1, and ANS/ANSI-3.5-1985.

If you have any questions, please call Keith Young, Manager, Nuclear Training, at (319)-851-7229.

Sincerely,



John F. Franz

Vice President, Nuclear

Attachments: 1) Major Changes to the Testing Schedule  
2) Performance Test Schedule for 1996-1999

cc: R. Murrell  
L. Root  
G. Kelly (NRC-NRR)  
A. B. Beach (Region III)  
NRC Resident Office  
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## MAJOR CHANGES TO THE TESTING SCHEDULE

Attachment 2 describes the malfunctions to be tested for the period from 1996 to 1999. This is a reduction in the number of malfunctions to be tested and will meet or exceed the General Requirements of ANS/ANSI-3.5-1985, Section 3.1.2, Malfunctions.

Remote Function Testing will no longer be performed as part of the performance tests but will be utilized as necessary to validate modifications.

Surveillance Test Procedures (STPs) which are performed on Safety Systems by plant control room operators and which require action be taken on equipment which is located in the simulator control room will be tested on the Duane Arnold Energy Center (DAEC) simulator at the rate of 25% of the available STPs each year for the 4-year certification cycle. (NUREG 1262, Q. 195).

A physical fidelity audit was performed each year in the past to ensure that the simulator environment matches the reference plant main control room and remote shutdown panels as closely as is reasonable and practical. This audit will no longer be performed. However, physical fidelity will be maintained through the simulator modification process.

ANS/ANSI-3.5-1985 Section 3.1.1, Normal Plant Evolutions, will be performed as follows:

- ☐ Items 1, 2, 3, 5, 6, 7, and 8 will be performed once every four years. These items concern plant startup, shutdown, operations at hot standby, load changes, operation with less than full reactor coolant flow and plant shutdown. It is acceptable to perform these tests any time within the four year period, rather than attempting to schedule them on a 25% per year basis.
- ☐ Item 4, "Reactor trip followed by recovery to rated power," has never been performed as a plant evolution at the DAEC. It is administratively prohibited at the DAEC and therefore will not be tested on the simulator.
- ☐ Item 9, "Core performance testing such as plant heat balance, determination of shutdown margin, and measurement of reactivity coefficients and control rod worth using permanently installed instrumentation," will not be specifically tested on the simulator. This information is provided by Reactor Engineers utilizing computer code and is not determined by operators. The plant process computer (PPC) displays are used to provide information to the operators

related to those items. Related data is gathered during the performance of transients malfunction testing, as well as some of the STPs. Therefore, this data gathering is sufficient to provide information necessary to determine if the simulation and PPC computers at the simulator are within required accuracy for Item 9.

- ☐ Item 10, "Operator conducted surveillance testing on safety-related equipment or systems," will be tested as discussed above.

## PERFORMANCE TEST SCHEDULE FOR 1996-1999

### 1996 MALFUNCTION PERFORMANCE TESTS

Section 3.1.2 - 10 - Loss of all feedwater (normal and emergency), includes the following DAEC malfunctions:

FW02-A/B:	Condensate Pump Trip
HP02:	HPCI Turbine Trip
RC02:	RCIC Turbine Trip
STCS01:	Core Spray Injection Valve Fails to Open - MO-2117
STCS02:	Core Spray Injection Valve Fails to Open - MO-2137
STRH01:	LPCI Inject Valve MO2003 Fails to Auto-Open
STRH02:	LPCI Inject Valve MO1903 Fails to Auto-Open

Section 3.1.2 - 13 - Inability to drive control rods, includes the following DAEC malfunction:

RD11-A/B:	CRD Hydraulic Pump Trip
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Section 3.1.2 - 20 - Main steam line as well as main feed line break (both inside and outside containment), includes the following DAEC malfunctions:

FW18-A:	Main Feedwater Line Break Outside Primary Containment
FW20-B:	Feedwater Break Inside Containment - Isolable
MS03-A:	MSL Rupture Inside Primary Containment
MS04-A:	MSL Rupture Outside Primary Containment

Section 3.1.2 - 23 - Passive malfunctions in systems, such as engineered safety systems, emergency feedwater systems, includes the following DAEC malfunctions:

CS04-A:	Core Spray Thermal Overload Valve(s) Fail(s) to Operate
MS28-A:	Group 5 Isolation Valve(s) Fail(s) to Close

Section 3.1.2 - 24 - Failure of the automatic reactor trip system, includes the following DAEC malfunction:

RP05-A/B/C/D/E/F:	RPS Scram Circuit Failure (ATWS)
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Section 3.1.2 - 25 - Reactor pressure control system failure including turbine bypass failure, includes the following DAEC malfunction:

TC07-A/B:	EHC Pressure Transmitter Failure
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**1997 MALFUNCTION PERFORMANCE TESTS**

Section 3.1.2 - 1 - Loss of coolant, includes the following DAEC malfunctions:

CU10:	Coolant Leakage Outside the Primary Containment
RR15-A/B:	Recirculation Loop Rupture (Design Basis LOCA)
RR30:	Coolant Leakage Inside Primary Containment
AD01-A&D:	Reactor Pressure Relief or Safety Valve Leakage - PSV4400 & PSV4403

Section 3.1.2 - 5 - Loss of condenser vacuum including loss of condenser level control, includes the following DAEC malfunctions:

FW01-A:	Condenser Hotwell Level Controller Failure
MC04:	Main Condenser Air Inleakage

Section 3.1.2 - 6 - Loss of service water or cooling to individual components, includes the following DAEC malfunctions:

MC01-A/B:	Main Circulating Water Pump Trip
SW19-A/B/C/D:	River Water Supply Pump Trip
SW22-A:	Drywell Cooling Units Well Water Flow Blockage
SW29-A:	Loss of Cooling to Generator H2 Coolers
SW34-A/C:	RHR Service Water Pump Trips

Section 3.1.2 - 7 - Loss of shutdown cooling, includes the following DAEC malfunction:

MS25:	Spurious Group 4 Isolation
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Section 3.1.2 - 8 - Loss of component cooling system or cooling to individual components, includes the following DAEC malfunctions:

EG12:	Loss of Stator Water Cooling Water Flow
MS23-A:	Spurious Group 3 Isolation
SW08:	RBCCW HX GSW Flow Blockage
SW10-A/B/C:	RBCCW Pump Trip
SW33:	RWCU Non-Regenerative Heat Exchanger RBCCW Flow Blockage

Section 3.1.2 - 9 - Loss of normal feedwater or normal feedwater system failure, includes the following DAEC malfunctions:

FW09-A/B:	Reactor Feedwater Pump Trip
FW12-C:	FW Reg Valve Controller Failure (Auto)
FW16-A/B:	FW Reg Valve Lockup

**1998 MALFUNCTION PERFORMANCE TESTS**

Section 3.1.2 - 3 - Loss or degraded electrical power to the station, includes the following DAEC malfunctions:

DG01-A/B:	Diesel Generator Fails to Start
ED01-A/B/C/D/E/F:	Loss of Offsite Power Sources
ED05-A/B:	Any Transformer Cooling Loss
ED08-A/B/C/D/E/F/G/H/I/J/K/L/M/N:	4.16KV/480V Bus Fault
ED09 - A/B/C/D/E/F/G/H/I/J/K/L/M/N /O/P/Q/R/S/T/U/V/W/X/Y/Z/ AA/AB/AC/AD/AE/AF:	480 VAC Motor Control Center Fault
ED10-A/B/C:	120 VAC Instrument Bus Fault
ED11:	120 VAC Uninterruptible Bus Fault
ED12-A/B/C:	250 VDC Distribution Panel Fault
ED13-A/B/C/D/E:	125 VDC Distribution Panel Fault
ED14-A/B:	+/- 24 VDC Distribution Panel Fault
ED18:	Total Loss of 125 VDC System 1
ED19:	Total Loss of 125 VDC System 2
FW11-A/B:	Feedwater Inverter Fails
HP07:	HPCI Inverter Trouble
RC05:	RCIC Inverter Trouble
RP02-A/B:	RPS EPA Breaker Trip

Section 3.1.2 - 4 - Loss of forced core coolant flow due to single or multiple pump failure, includes the following DAEC malfunction:

RR06-A/B: Recirc M-G Drive Motor Breaker Trip

Section 3.1.2 - 11 - Loss of protective system channel, includes the following DAEC malfunction:

AD07-A: ADS Logic Power Failure

Section 3.1.2 - 14 - Fuel cladding failure, includes the following DAEC malfunction:

RX01: Fuel Cladding Failure

Section 3.1.2 - 16 - Generator trip, includes the following DAEC malfunction:

EG01-A: Main Generator Trip - Primary Lockout (286/P)

Section 3.1.2 - 19 - Reactor trip, includes the following DAEC malfunction:

RP03: Spurious Scram

**1999 MALFUNCTION PERFORMANCE TESTS**

Section 3.1.2 - 2 - Loss of instrument air, includes the following DAEC malfunction:

IA01: Loss of Instrument Air

Section 3.1.2 - 12 - Control rod failure, includes the following DAEC malfunctions:

RD01: Control Rod Drifts Out  
RD02: Control Rod Blade Stuck  
RD03: Control Rod Uncoupled  
RD06: Control Rod Drives In  
RD08: Control Rod Scrams  
RX02: Control Rod Worth Change, Any Control Rod

Section 3.1.2 - 15 - Turbine trip, includes the following DAEC malfunction:

TC01: Main Turbine Trip

Section 3.1.2 - 17 - Failure in automatic control system(s) that affect reactivity and core heat removal, includes the following DAEC malfunction:

RR17-A: Recirc M-G Flow Controller Fails, Auto/Man Modes

Section 3.1.2 - 21 - Nuclear instrumentation failure(s), includes the following DAEC malfunctions:

NM02-A: SRM Channel Fails, Inoperable  
NM05-B: IRM Channel Fails, Inoperable  
NM07: LPRM Channel Fails  
NM08-B: APRM Channel Fails

Section 3.1.2 - 22 - Process instrumentation, alarms, and control system failures, includes the following DAEC malfunctions:

RR20: Narrow Range Level Transmitter Failure (GEMAC)  
RR24A: RPV Pressure Transmitter Failure  
RR32-A1/A2: Lo-Lo-Lo Level Switch Failure Open/Closed



**COMMON PERFORMANCE TESTS FOR 1996 THROUGH 1999**

Appendix B Steady State, Stability, and Transient Tests will be performed annually.

Section 3.1.1, Normal Plant Evolutions listed in Attachment 1 will be performed once every four year certification cycle, with the exception of Surveillance Test Procedures as noted below.

Section 3.1.1 - 10, Surveillance Test Procedures will be tested at the rate of 25% of the available STPs each year for the four year certification cycle.