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Mr. James G. Keppler	1-signed	22		XXX	XXXX

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Ltr re their 6-30-75 ltr ....trans the following:

ENCLOSURES:

Appendix C to DAEC Startup Test Results

.....

ACKNOWLEDGED
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PLANT NAME: Duane Arnold

FOR ACTION/INFORMATION 11-11-75 JGB

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IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office
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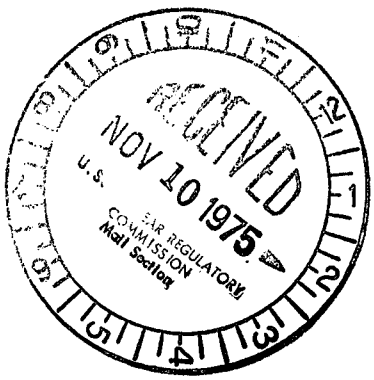
DUANE ARNOLD ENERGY CENTER
PALO, IOWA
October 29, 1975
DAEC-75-400



50-331

Mr. James G. Keppler
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

SUBJECT: DAEC Startup Testing Report

REFERENCES: 1) Letter from G. G. Hunt to J. G. Keppler dated 12-23-74

2) Letter from E. L. Hammond to J. G. Keppler dated 6-30-75 (DAEC-75-256).

Dear Mr. Keppler:

In accord with Technical Specification 6.11.1, please find enclosed one (1) copy of Appendix C to the DAEC Startup Testing Report. This appendix is submitted to report testing completed between 7-1-75 and 9-30-75. An additional 39 copies are being mailed under separate cover.

Sincerely,

G. G. Hunt ELH
G. G. Hunt
Chief Engineer

GGH:ah
File: A-118-g
cc: J. A. Wallace
E. L. Hammond
D. A. Moen
B. R. York
J. H. Gebert
R. R. Rinderman
D. L. Wilson
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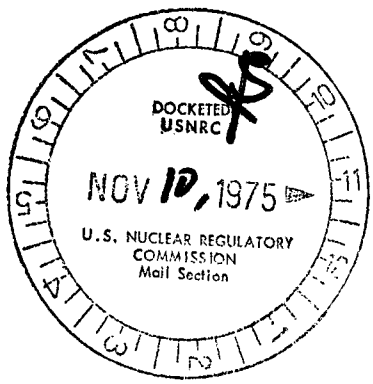

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APPENDIX C TO DAEC

STARTUP TEST RESULTS

DUANE ARNOLD ENERGY CENTER

UNIT 1

10-22-75

Prepared by: [signature] Date: 10-24-75

Approved by: [signature] Date: 10-24-75
Reactor & Plant Performance Engineer

Approved by: [signature] Date: 10-29-75
Assistant Chief Engineer

Approved by: [signature] Date: 10-29-75
Chief Engineer

1.0 Introduction

This appendix supplements the Startup Testing Report submitted to the USAEC on December 23, 1974 by summarizing testing completed between 7-1-75 and 9-30-75. In accord with DAEC letter 75-256 (dated 6-30-75) from E. L. Hammond to J. G. Keppler, the present report describes testing performed in conjunction with the restart following plugging of the core bypass flow holes as well as progress made toward completion of the original startup testing program.

In addition to the testing summarized by this appendix, additional testing relative to the HPCI and RCIC steamline elbow tap PDIS setpoints has been performed. Reporting of results of this testing, however, is being deferred pending completion of internal review and submission of proposed Technical Specification revisions.

2.0 Summary Of Test Results Relative To Original Startup Testing Program

2.4.1 STI-1 Chemistry and Radiochemistry

As reported on December 31, 1975, STI-1 requires collection of certain data at core exposures $\geq$ 1000 MWD/ST. The required data have now been collected and analyzed.

These data involve a reactor water activity balance and special radiation measurements subsequent to accumulating $\geq$ 1000 MWD/ST core exposure. The purpose is to provide a baseline from which to reference future activity measurements. As such, there are no specific acceptance criteria that apply. No unusual or unexpected conditions were found.

2.4.20 STI-20 Steam Production

Although the testing and data analysis required by STI-20 have been completed for sometime, the approval of the STI-20 final report is still outstanding pending final contract settlement. Since this approval is not expected in the time frame of expected completion of Start Up Test Program Reporting, and since the test only checks steam production capacity with no safety significance, no further reporting will be made relative to STI-20.

3.0 Summary of Testing Relevant to Core Bypass Flow Hole Plugging

3.1 Pursuant to Technical Specification requirements of Section 6.11.A.1 under the catagory of a modification that "significantly altered the nuclear, thermal, or hydraulic performance of the facility", the following report is submitted.

3.2 ABSTRACT:

During the June 1975 outage at the Duane Arnold Energy Center all (49) of the core plate bypass holes for instrument tube cooling were successfully plugged. Data collected during the subsequent power ascension testing revealed that instrument tube vibration was reduced to the limits of detection capability. No evidence of channel impacting has been observed.

3.3 PLUGGING OPERATION:

The core plate plugs were installed using Fuel and Reactor Component Handling Procedure #3 (FRCHP #3). Two of the four plugs around LPRM string 08-25 were later removed by using Appendix A to FRCHP #14. This removal was necessitated in the replacement of Control Rod Guide Tube 10-27. The two plugs were reinstalled under the directions of Appendix C to FRCHP #14. The plugging process was recorded on video tape with the underwater TV camera. No significant difficulties were encountered during plugging operations.

3.4 PROCESS COMPUTER MODIFICATION:

The process computer software had an additional subroutine installed to account for increased boiling in the instrument string bypass region. This subroutine was installed and checked out per Reactor Engineering Procedure #15. The check out involved comparison to the General Electric "Back Up Core Limits Evaluation" (BUCLE) time-share program.

3.5 POST PLUGGING TESTING:

The vibration testing subsequent to the core bypass hole plugging was divided into four phases; the Power Ascension, the Initial Operation, Void Coefficient Testing and the Long Term Monitoring phases.

The Power Ascension phase testing involved taking Transverse In-Core Probe (TIP) traces, LPRM signal time traces, recording LPRM time signals for Power Spectral Density (PSD) analysis, and recording time signals from accelerometers mounted on the LPRM inner tubes. A total of 8 accelerometers were installed on 8 different LPRM locations. Table I summarizes the Power Ascension phase testing.

TABLE I

POWER ASCENSION TESTING

Operating Condition	Power	PSD Data	Tip Traces	LPRM Time Traces	Accelerometer Data
50% Flow/100% Load Line	60%	28 Locations	Full Set	10 Locations	All operable
60% Flow/100% Load Line	66%	28 Locations	Full Set	10 Locations	All operable
70% Flow/100% Load Line	70%	28 Locations	Full Set	10 Locations	All operable
80% Flow/100% Load Line	80%	28 Locations	Full Set	10 Locations	All operable
87% Flow/100% Load Line	84%	All Operable LPRM's	Full Set	20 Locations	All operable
100% Flow/76% Load Line	76%	All Operable LPRM's	Full Set	20 Locations	All operable

The limiting power condition was 85.5% power at 87% flow where the Minimum Critical Power Ratio (MCPR) approached the limiting value of 1.34.

The Initial Operations phase data consisted of daily TIP traces from all LPRM string locations. This data was taken for approximately one week subsequent to the Power Ascension phase testing.

Void Coefficient testing consists of recording several plant parameters during small induced pressure transients. This testing was performed prior to the plugging outage and at two operating conditions after plugging. The data from this testing will be analyzed and compared by General Electric Company.

The Long Term Monitoring phase of data collection consists of full TIP traces twice monthly and recordings of all operable accelerometers monthly. This phase of the testing will continue throughout the balance of cycle one.

3.6 TEST RESULTS SUMMARY:

Due to their nature the TIP traces and LPRM time traces are difficult to quantify, and any numbers assigned to their noise content are somewhat subjective. An attempt was made to quantify this data for comparison to pre-plugging data; the results of this quantification and comparison are shown in Table II below where high frequency noise >1Hz over a 12 inch segment has been considered.

TABLE II

LPRM TIME TRACE AND TIP DATA SUMMARY

Flow at Data Collection Point	Tip Data				LPRM Trace Data	
	P-P%		P-P Division		%	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
50	0.230	0.113	0.093	0.052	7.66	0.61
60	0.230	0.122	0.120	0.073	7.37	0.73
70	0.243	0.109	0.132	0.064	8.51	1.21
80	0.435	0.382	0.200	0.126	11.44	1.54
87	0.650	0.547	0.393	0.307	11.68	1.04
100	0.970	0.557	0.523	0.344	10.10	1.45
99% Unplugged	2.74	1.714	1.788	1.212	17.17	2.12

Plugged - Unplugged Comparison of Means

	Plugged % of Unplugged
P-P%	35.4
P-P devisions	29.3
Time Trace %	58.8

The LPRM signals recorded by General Electric were analyzed using Power Spectral Density (PSD) techniques. Comparison of the before and after PSD's shows significant reductions of noise in the 2.5 Hz nominal range.

The signals from the accelerometers were analyzed by General Electric and determined to show no evidence of channel impacting.

All of the Power Ascention phase data indicates that LPRM string vibrations were greatly reduced by the bypass hole plugs, and no evidence of channel impacting was observed.

The TIP traces collected during the Initial Operation and Long Term Monitoring Phases to the Power Ascension TIP traces; no increase in noise above 1Hz was observed. Iowa Electric Light and Power Co. is committed to notify the Nuclear Regulatory Commission if the 2.5Hz (nominal) peak-to-peak continious noise over a 12 inch segment increases by 3% over the value observed for maximum power operation for the balance of cycle one.

The accelerometer data collected during the Long Term Monitoring program will be analyzed by General Electric Company for any indication of channel impacting.