NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL
(TEMPORARY FORM)

CONTROL NO: 11942

FILE: INCIDENT REPORT FILE

FROM:	DATE OF DOC	DATE REC'D	LTR	TWX	RPT	OTHER
Iowa Elec. Light & Power Co Palo, Iowa G.G. Hunt	10-6-75	10-15-75	XX			

TO:	ORIG	CC	OTHER	
Mr. J. Keppler	1 signed			SENT AEC PDR XX SENT LOCAL PDR XX

CLASS	UNCLASS	PROP INFO	INPUT	NO CYS REC'D	DOCKET NO:
	XXX			1	50-331

DESCRIPTION: Ltr trans the following:

ENCLOSURES: Abnormal Occurrence AO-50-331/75-31A(Suppl Info) on 6-10-75 re inadvertent droppdng of a fuel bundle during fuel movemen

(1 cy encl rec'd)

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ACKNOWLEDGED

PLANT NAME: Duane Arnold Plant

FOR ACTION/INFORMATION DHL 10-16-75

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DENISE	J. COLLINS	REGAN	S. TEETS (L)	KLECKER
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FILE & REGION (2)	BENAROYA		V. WILSON (L)	WIGGINTON
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AO-4

Iowa Electric Light and Power Company

General Office

Cedar Rapids, Iowa

DUANE ARNOLD ENERGY CENTER
PALO, IOWA
OCTOBER 6, 1975
DAEC - 75 - 372

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

Subject: Abnormal Occurrence No. AO 50-331/75-31A, Supplemental Report

File: A-110, A-118a

Dear Mr. Keppler:

In accordance with Appendix A to Operating License DPR-49, Technical Specifications and Bases for Duane Arnold Energy Center, please find enclosed a written supplemental report on the subject abnormal occurrence. A preliminary report on the occurrence was transmitted to your office on June 26, 1975.

Very truly yours,

G. G. Hunt
Chief Engineer
Duane Arnold Energy Center

DLW/GGH/mg

cc: B. C. Rusche
D. Arnold
J. A. Wallace
L. Liu
H. W. Rehrauer - Chairman Safety Committee
J. R. Newman
E. L. Hammond

IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office

CEDAR RAPIDS, IOWA

10-6-75

Subject:	Abnormal Occurrence (Supplemental Report)
Report Number:	AO-50-331/75-31A
Report Date:	September 30, 1975
Occurrence Date:	June 10, 1975
Facility:	Duane Arnold Energy Center

Identification of Occurrence

Inadvertent dropping of a fuel bundle during fuel movement operations, reportable in accordance with Appendix A to Operating License DPR-49, Specification 1.0.4.e.

Conditions Prior to Occurrence

On June 6, 1975 the plant was shutdown for an inspection to determine if any fuel channels had sustained wear damage as the result of vibrating in-core neutron monitoring instrument tubes. The inspection involved the removal of fuel assemblies around SRM, IRM and LPRM detector tubes. The 25th bundle of the outage was in the process of being removed from the reactor core and transferred to the spent fuel pool at the time of the occurrence.

Description of Occurrence

The following items summarize the sequence of events during and following the occurrence:

June 10, 1975

1806 hours — During a scheduled fuel transfer from core location 09-38 to the fuel storage pool, fuel assembly AR 156 dropped from the refueling bridge fuel grapple into the core. The dropped bundle impacted directly on core location 09-28 containing fuel assembly AR 356. At the time of the drop, the fuel grapple was in the full up position, resulting in a free fall drop of approximately 30 feet. Following impact, the lower end of fuel bundle AR 156 came to rest on the top of fuel bundle 356 while the top of fuel bundle 156 came to rest against the reactor vessel wall at approximately a 70° angle. The Shift Supervising Engineer in charge of the fuel movement operation ordered an immediate evacuation of the refuel floor. The access door to the refuel floor was also locked.

1815 hours As a precautionary measure, the Shift Supervising Engineer on-duty in the control room directed that all plant personnel report to the Access Control Point for a head count. All personnel were accounted for.

1845 hours Radiation Protection personnel secured low and high volume air samples of refuel floor and next floor below. No abnormal airborne radioactivity was detected.

1910 hours After confirming there was no significant airborne contamination, the Shift Supervising Engineer authorized access to the reactor building. The access door to the refuel floor remained locked.

2230 hours In order to prevent further movement, dropped fuel bundle AR 156 was secured using nylon ropes and stainless steel hooks.

June 11, 1975

0025 hours Chemistry analysis confirmed no evidence of increased reactor water iodine or fission product activity.

2030 hours A detailed visual inspection of fuel bundle AR 156 using underwater TV cameras was completed. The purpose of the inspection was to verify the structural integrity of the bundle.

June 12, 1975

0100 hours Preparations for removal of AR 156 using the jet pump grapple were completed.

0305 hours AR 156 was removed from the core area and placed in a control rod blade storage can. No increase in airborne contamination or change in reactor chemistry was detected during the operation. Following the removal of AR 156 from the core area, a visual inspection of bundle AR 356 and adjacent bundles AR 065, 174, 258, 272, 305 and 149 was performed with the use of an underwater TV camera. (The results of the inspection are summarized in the "Analysis of Occurrence" section of this report.)

NOTE: While plans and procedures were being formulated for the removal of bundle AR 356, the originally planned removal and inspection of fuel channels around in-core instrument tubes continued.

June 15, 1975

2100 hours Grappling and removal of bundle AR 356 from the reactor commenced.

June 16, 1975

0320 hours Removal of the bundle was successfully completed. During the lift from the core and movement to the spent fuel pool, bubbles were observed to be coming from AR 356. At the same time, a continuous air monitor alarm on the refuel floor alarmed. Non-essential personnel were removed from the refuel floor and radiation protection personnel immediately performed dose rate and airborne radiation surveys. The surveys indicated no abnormal activity levels on the refuel floor or the access floor immediately below.

Designation of Apparent Cause of Occurrence

The apparent cause of the occurrence was a design deficiency. The as-built design of the fuel grapple did not provide an adequate method for positive verification of proper grapple - fuel bundle engagement during fuel movement operations. A feature provided by the as-built design to assist in verification of proper grapple - fuel bundle engagement is the slack cable indication. The intent of this feature is to indicate proper capture of the fuel bundle bail (handle) prior to actuation and engagement of the grapple hook. The slack cable feature was functioning at the time of the occurrence and provided no indication of abnormal bail capture.

A requirement for visual verification of complete hook closure using binoculars was in affect at the time of the occurrence. However, the bundle being removed (AR 156) was a peripheral bundle and visibility was poor due to the proximity of the grapple to the reactor vessel wall.

Analysis of Occurrence

An investigation and evaluation of the occurrence has determined that it did not present a hazard to the health and safety of the public. A like occurrence involving the dropping of a fuel bundle over the core area is thoroughly analyzed in Sections 14.1 and 14.6.4 of the Duane Arnold Energy Center Final Safety Analysis Report. Although continuous air monitors indicated momentary airborne activity on the reactor building floor during removal of AR 356, airborne and dose rate surveys conducted by Radiation Protection personnel were within allowable limits.

As stated earlier in this report, a detailed visual inspection was performed on the dropped fuel bundle and the bundles in the area of impact. Following is a summary of the result of the visual inspection indicating the damage sustained by the fuel bundles:

AR 156 (dropped bundle) - deformation of lower tie plate cage upwards toward tie plate.

AR 356 (sustained direct impact)

1. Bail (handle) deformed nearly horizontal.
2. Channel was driven down with its lower edge flairing over the shoulder of the lower tie plate.

NOTE: Although a visual inspection of the fuel rods in AR 356 could not be performed, the rods apparently sustained some form of damage since a momentary increase in airborne activity was noted when a tensile lifting force was placed on the fuel rods during the movement of the bundle.

AR 174 (adjacent to 356) - 1/4 inch x 1 inch dent in top edge of channel box.

AR 149 (adjacent to 356) - 1/8 inch x 1/4 inch dent in top edge of channel box.

AR 065 (adjacent to 356) - no damage

AR 258 (adjacent to 356) - no damage

AR 305 (adjacent to 356) - no damage

In addition to the visual inspection of the fuel bundles involved in the occurrence, an analysis was performed to determine the stress loads received by the control rod guide tube and stub tube region in cell 10-27. (AR 356 was located in cell 10-27). Independent analyses were performed by both the nuclear steam supply system vendor and an independent engineering consultant. The analyses concluded that the stub tube region did not sustain plastic deformation. However, the analyses were inconclusive as to whether the control rod guide tube sustained significant plastic deformation. Both analyses assumed that the fuel support piece transmitted the stress load from the fuel bundle to the control rod guide tube and did not sustain plastic deformation itself. As indicated in the "Corrective Action" section of this report, the fuel support piece and control rod guide tube were replaced as a precautionary measure. It should be noted that considerable force was required to remove the control rod guide tube,and that as a result, machining was required to remove surface gouges from the wall of the hole in the lower core support plate. No other damage to the lower core plate was noted.

Corrective Action

The damaged channels for fuel assemblies AR 149 and AR 174 were replaced.

The dropped bundle (AR 156) and the bundle which received the direct impact during the drop (AR 356) were replaced with new fuel assemblies. Two other undamaged fuel bundles were replaced with new fuel assemblies in order to maintain core symmetry. The four new assemblies were placed on the periphery of the core.

The fuel support piece and control rod guide tube in cell 10-27 were replaced with new components and a new control rod was installed and functionally tested.

In order to prevent a repetition of the occurrence, an underwater TV camera was temporarily attached to the refuel grapple prior to the resumption of fuel movement operations. Using a monitor on the refuel bridge, the Operator was able to verify proper grapple - fuel bundle engagement prior to lifting a bundle. The camera remained attached to the grapple until fuel movement operations were completed.

A design change recommended by the nuclear steam supply system vendor will be implemented as soon as possible. The design change involves the installation of two switches, an indicating light, mounting hardware and a new hook. The change will give the fuel grapple operator an indication that the grapple hook is fully closed. By having an indication that these two conditions have occurred, the operator can be confident that he has positive engagement of the fuel bundle to the fuel grapple. The parts for the modification have been ordered from the nuclear steam supply system vendor.

Conclusion

The DAEC Operations Committee reviewed and approved this report on September 26, 1975. The Committee concluded that the occurrence did not present a hazard to the health and safety of the public.

G. G. Hunt
Chief Engineer
Duane Arnold Energy Center

DLW/GGH/mg

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL
(TEMPORARY FORM)

CONTROL NO: 11943

FILE: INCIDENT REPORT FILE

FROM: Iowa Elec. Light & Power Co. Palo, Iowa E.L. Hammond	DATE OF DOC	DATE REC'D	LTR	TWX	RPT	OTHER
	10-4-75	10-15-75	XX			

TO:	ORIG	CC	OTHER	SENT AEC PDR XX
Mr. J. G.Keppler	1 signed			SENT LOCAL PDR XX

CLASS	UNCLASS	PROP INFO	INPUT	NO CYS REC'D	DOCKET NO:
	XXX			1	50-331

DESCRIPTION: Ltr trans the following:

ENCLOSURES: Abnormal Occurrence AO-50-331/75-49 on 9-24-75 re temperature indicating switches were found to have trip setting....

(1 cy encnl rec'd)

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ACKNOWLEDGED

PLANT NAME: Duane Arnold Plant

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9Py AO-4

IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office

CEDAR RAPIDS, IOWA

DUANE ARNOLD ENERGY CENTER
PALO, IOWA
OCTOBER 4, 1975
DAEC - 75 - 371

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

Subject: Abnormal Occurrence No. AO 50-331/75-49

File: A-110, A-118a

Dear Mr. Keppler:

In accordance with Appendix A to Operating License DPR-49, Technical Specifications and Bases of Duane Arnold Energy Center, please find enclosed a written report on the subject abnormal occurrence.

Very truly yours,

E. L. Hammond

E. L. Hammond
Assistant Chief Engineer
Duane Arnold Energy Center

DWL/ELH/mg

cc: B. C. Rusche
D. Arnold
J. A. Wallace
L. Liu
H. W. Rehrauer - Chairman, Safety Committee
J. R. Newman
G. G. Hunt

IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office

CEDAR RAPIDS, IOWA

10-4-75

Subject: Abnormal Occurrence

Report Number: AO 50-331/75-49

Report Date: October 3, 1975

Occurrence Date: September 24, 1975

Facility: Duane Arnold Energy Center, Unit No. 1, Palo, Iowa

Identification of Occurrence

Out-of-specification Main Steam Line High Temperature switch settings, reportable in accordance with Appendix A to Operating License DPR-49, Specifications 1.0.4.b and 3.2.F (Table 3.2-A).

Description of Occurrence

During the performance of Surveillance Test No. 42A005 - Main Steam Line Area High Temperature Instrument Functional Test and Calibration, temperature indicating switches TIS 4444 A, B and C were found to have trip settings as indicated below:

TIS 4444A	207°F
TIS 4444B	207°F
TIS 4444C	206°F

In accordance with the Technical Specifications, the limiting setpoint for operation is 204°F (200°F Technical Specification limit plus 4°F instrument tolerance).

Designation of Apparent Cause of Occurrence

The definite cause of the occurrence is unknown. Previous surveillance data did not indicate a trend towards an out-of-calibration condition. It is suspected that the high temperature switches were not properly calibrated by maintenance personnel during surveillance testing the previous month.

Analysis of Occurrence

The occurrence did not present an unsafe plant condition. Each of the four trip channels in the nuclear steam supply shutoff system contains four high temperature indicating switches. Temperature Indicating Switches 4444A, B, and C are all part of trip system B1. Since TIS 4444D was found to be calibrated within limits during the surveillance test, and since the main steam line high temperature switches are connected in a one out-of-two twice logic, trip channel B1 still maintained the capability of providing a main steam line area high temperature trip.

Corrective Action

Temperature Indicating Switches TIS 4444A, B and C were recalibrated.

Maintenance personnel performing the calibration of the subject switches will be monitored for verifications that the proper calibration techniques are being used. Future data resulting from the performance of STP 42A005 will be monitored closely for verification that the switches are not trending toward an out-of-specification condition.

Conclusion

This report was reviewed and approved by the DAEC Operations Committee on October 4, 1975. The Committee concluded that the occurrence did not present a hazard to the health and safety of the public.

E. L. Hammond

E. L. Hammond
Assistant Chief Engineer
DAEC

ELH/mg