

50-331

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

FILE NUMBER  
INCIDENT REPORT

TO: MR J G KEPPLER

FROM: IOWA ELEC LIGHT & POWER CO  
CEDAR RAPIDS, IOWA  
G G HUNT

DATE OF DOCUMENT  
7-29-76

DATE RECEIVED  
8-10-76

LETTER  
 ORIGINAL  
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NOTORIZED  
 UNCLASSIFIED

PROP

INPUT FORM

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DESCRIPTION  
LTR TRANS THE FOLLOWING.....

ENCLOSURE  
LTR ABNORMAL OCCURRENCE UPDATE REPORT  
AO 50-331/75-35 ON 6-30-75.....FURN UPDATE  
INFO FOR MAIN STEAM RELIEF VALVE WHICH  
HAD BROKEN LOOSE.....

DO NOT REMOVE  
ACKNOWLEDGED

PLANT NAME: Duane ARNOLD

NOTE: IF PERSONNEL EXPOSURE IS INVOLVED  
SEND DIRECTLY TO KREGER/J. COLLINS

SAFETY

FOR ACTION/INFORMATION

ENVIRO

8-12-76 RB

BRANCH CHIEF:	LEAR
W/3 CYS FOR ACTION	
LIC. ASST.:	PARRISH
W/ CYS	
ACRS CYS HOLDING/SENT TO LA	

INTERNAL DISTRIBUTION

<input checked="" type="checkbox"/> REG FILE			
<input checked="" type="checkbox"/> NRC PDR			
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<input checked="" type="checkbox"/> TEDESCO/MACCARY			
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<input checked="" type="checkbox"/> BAER			
<input checked="" type="checkbox"/> SHAO			
<input checked="" type="checkbox"/> VOLLMER/BUNCH			
<input checked="" type="checkbox"/> KREGER/J. COLLINS			

EXTERNAL DISTRIBUTION

<input checked="" type="checkbox"/> PDR: CEDAR RAPIDS, IO			
<input checked="" type="checkbox"/> TIC:			
<input checked="" type="checkbox"/> NSIC:			

CONTROL NUMBER

8124

*A. Johnson*

# IOWA ELECTRIC LIGHT AND POWER COMPANY

DUANE ARNOLD ENERGY CENTER  
P. O. Box 351  
Cedar Rapids, Iowa 52406  
July 29, 1976  
DAEC -76 -240

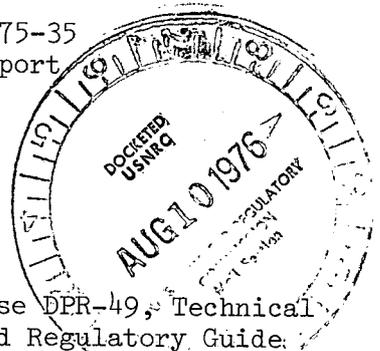
*Regulatory District File*

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 50-331/75-35  
UPDATE REPORT - Previous Report  
Date - 063075

File: A-118a



Dear Mr. Keppler:

In accordance with Appendix A to Operating License DPR-49, Technical Specifications and Bases for Duane Arnold Energy Center and Regulatory Guide 10.1, please find attached a copy of the subject Abnormal Occurrence report. (Total of 3 copies transmitted).

This update report has been submitted in the narrative form because the initial report was written and submitted prior to the development of the Licensee Event Report computer form and therefore, there would be no previous LER form to refer to.

Very truly yours,  
*G. G. Hunt*  
G. G. Hunt, Chief Engineer  
Duane Arnold Energy Center

GGH/MS/mg  
attachment

cc: Director, Office of Inspection and Enforcement (30)  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Director, Management Information and Program Control (3)  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

8124

**AUG 2 1976**

# IOWA ELECTRIC LIGHT AND POWER COMPANY

DUANE ARNOLD ENERGY CENTER  
P. O. Box 351  
Cedar Rapids, Iowa 52406

Subject: Abnormal Occurrence Update Report  
Report Number: AO 50-331/75-35  
Report Date: July 29, 1976  
Occurrence Date: June 30, 1975  
Facility: Duane Arnold Energy Center

## Description of Occurrence

During a pre-startup drywell inspection on February 15, 1975, it was noticed that the discharge piping for main steam relief valve PSV-4406 had broken loose from its first restraint and had impacted against structural steel in the drywell. After repair and analysis by ie: Engineering, startup continued. As a result of this discovery, it was decided to perform an inspection of all relief valve discharge piping during the next plant outage.

This inspection was performed on June 30, 1975. In addition to the above damage, the following observations were made.

1. PSV-4400 - the vertical run of piping in the torus had moved against the U-bolt causing distortion of the 10" channel and loosening of the U-bolt. The U-bolt on both sides of the rams head were missing. They were found at the bottom of the torus. A 3/4" space was measured between the rams head and the support beam it should have been secured to. The 3/4" diameter rod at the inlet to the 10" tee was still intact. The upper U-bolt in the vent header was bent 10° and fit snug against the pipe.
2. PSV-4401 - the upper U-bolt was bent 10° from the perpendicular and fit snugly against the pipe. All rod hangers at this location were intact and the rams head was flush with the support plate.
3. PSV-4402 - the 5/8" diameter rod on the vertical section of piping was intact, but pipe movement had pulled the 10" channel webbing until it was no longer perpendicular with the sides. The U-bolt on both ends of the rams head were missing. They were found at the bottom of the torus. A 1 3/8" space was measured between the rams head and the support beam it should have been secured to. The rams head was displaced 3/4" to the right of its normal centerline, however, it could not be determined if the displacement was due to pipe movement or if it was originally fit up that way. The 3/4" diameter rod at the inlet to the 10" tee was intact. No hanger deficiencies were noted in the vent header.

4. PSV-4405 - U-bolts in the vent header were fit snug against the piping. All rod hangers inside the torus were intact and the rams head was flush with the support plate.
5. PSV-4406 - all U-bolts in the torus were broken. A 1 1/2" space was measured between the rams head and the support beam it should have been secured to. The U-bolt and angle iron inside the vent header was broken on the upper guide.
6. PSV-4407 - the vertical run of piping in the torus had moved against the U-bolt causing it to break. The U-bolt on both sides of the rams head were broken. A 2" space was measured between the rams head and the support beam it should have been secured to. The support beam had rotated slightly away from the perpendicular. The 3/4" diameter rod at the inlet to the 10" tee was intact. The U-bolt at the upper guide in the vent header was bent 20° and fit snug to the pipe.
7. It was determined that the nuts used to secure several of the missing U-bolts had been stripped off. The length of the rod that would protrude through the beam was long enough for only one nut, original design called for two, one above and one below.
8. The bolts that were used to secure the support beam to the ring girders were used with bevel washers. This resulted in uneven loading on the bolts which caused several to vibrate loose.

#### Cause

It has been determined that this occurrence was caused by the deficient design of the relief valve discharge piping supports in the torus. The original design apparently did not correctly identify the loads that would be imposed on the piping under relief valve discharge conditions. In addition, the original design was not completely adhered to, as evidenced by the use of one instead of two nuts on the U-bolts.

#### Analysis of Occurrence

An analysis was performed on the damaged portion of the PSV-4406 discharge piping which confirmed that the piping could still safely perform its intended service. An inspection was performed on the original support design and it was concluded that the horizontal load component was being carried by both the U-bolts and the discharge pipe itself, and having the discharge load carried by the pipe could eventually lead to fatigue problems at the pipe anchor to the vent pipe.

#### Corrective Action

The following actions were taken to repair the damage and to prevent recurrence of the problem.

1. The following design changes were made to all discharge lines.
  - a. The load carrying capability and stiffness of the rams head support

beam was increased by the addition of 1" x 8" cover plates along the top and bottom flanges, by placing gusset plates between the flanges under both ends of the existing cover plate and at the ends of the rams head, and by tack welding the bolts fastening the support beam to the ring girder.

- b. The rams head was secured to the support beam by placing a 3/8" x 3" steel strap over each end of the rams head and welding it to the support beam.
- c. A new beam spanning two torus ring girders was added to the torus. The vertical run of the piping has been secured to this beam by a 1/2" x 6" steel strap which was wrapped around the pipe and welded to the beam.

An analysis was performed on the new support design. The results indicated that the load carrying capability had been increased by a factor of 4 as compared to the original design and should provide adequate support.

2. The broken restraint in the drywell on the discharge line of PSV-4406 was repaired.
3. The U-bolts in the vent pipe on the discharge line of PSV-4400, PSV-4401, PSV-4405, and PSV-4407 were adjusted for the proper clearances.
4. The vent piping adjacent to the penetration of PSV-4406 discharge piping was ultrasonically tested. No evidence of fractures was found.
5. The portion of the discharge piping for PSV-4406 that impacted the structural steel was ultrasonically and liquid penetrant tested. No evidence of fractures was found and the pipe wall thickness was above the minimum acceptable.
6. A visual examination of the torus structural supports was performed to determine if the torus had undergone any shifting. No evidence of shifting was found.

Between the time that all corrective actions were completed and the February 1976 refueling outage took place, several relief valves operated under pressure conditions. On February 15, 1976, the relief valve discharge piping supports were inspected and no abnormalities were observed.