NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Duane Arnold Energy Center | 0 5 0 0 0 3 3 1 | 1 OF 0 3 |

TITLE (4)

High Reactor Water Conductivity Due to Resin or Air Intrusion

| 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 | DOCKET NUMBER(S) |
| 1 1 | 1 1 | 8 4 | 8 4 | — | 0 4 1 | — | 0 0 | 1 2 | 1 1 | 8 4 | None | 0 5 0 0 0 |
| | | | | | | | | | | | | 0 5 0 0 0 |

| OPERATING MODE (9) | N | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11) | | | |
|---|---|---|---|---|---|
| POWER LEVEL (10) | 0 3 6 | 20.402(b) | 20.405(c) | 50.73(a)(2)(iv) | 73.71(b) |
| | | 20.405(a)(1)(i) | 50.36(c)(1) | 50.73(a)(2)(v) | 73.71(c) |
| | | 20.405(a)(1)(ii) | 50.36(c)(2) | 50.73(a)(2)(vii) | OTHER (Specify in Abstract below and in Text, NRC Form 366A) |
| | | 20.405(a)(1)(iii) | X 50.73(a)(2)(i) | 50.73(a)(2)(viii)(A) | |
| | | 20.405(a)(1)(iv) | 50.73(a)(2)(ii) | 50.73(a)(2)(viii)(B) | |
| | | 20.405(a)(1)(v) | 50.73(a)(2)(iii) | 50.73(a)(2)(x) | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER |
|---|---|
| Wendell Keith, Technical Support Engineer | AREA CODE 3 1 9 8 5 1 - 7 3 3 9 |

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

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | S F | | | Yes | | | | | | | |
| | | | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE) | X NO | | | | |

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


After putting a freshly precoated condensate/demineralizer (one of five units) on-line on 11/11/84, reactor water conductivity increased to a maximum of 14 micromho/cm. This exceeded the Tech. Spec. conductivity limit of 10 micromho/cm for steaming rates above 100,000 lbs/hr. As required by the Tech. Spec. default LCO statement, plant shutdown was initiated. Conductivity was returned to below 10 micromho/cm in approximately 4 hours and pH was returned to an acceptable range in less than 24 hours. This event is being reported as a condition prohibited by T.S. per 10 CFR 50.73(a)(2)(i)(B).

This conductivity excursion was the result of resin or air intrusion. This intrusion has been attributed in part to operating procedures which can be improved to minimize system disturbances. Air intrusion during a previous transient (see LER 84-040) is considered a likely contributing cause. System operating procedures are being revised to provide additional guidance for startup and operation of the condensate/demineralizer system. This problem may have been aggravated by an extended period of time between maintenance on the condensate/demineralizer system.




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## Summary

After putting a freshly precoated condensate/demineralizer on-line, reactor water conductivity increased to 14 micromho/cm. As required by Tech. Spec., a plant shutdown was initiated. This was cancelled when conductivity was restored to below 10 micromho/cm. Later disassembly and inspection of the demineralizer found some septums caked with resin. After subsequent cleanup and unit startup incorporating venting and more gradual flow increases, demineralizer performance has returned to normal. Operating procedures are being augmented to reduce system disturbances.

## Description

At 0531 hours on 11/11/84, the reactor mode switch was taken from Startup to Run. At 1900 hours with the reactor at approximately 36% power, the 'E' condensate/demineralizer (C/D, EIIS System SF) was brought on-line at 500 gpm following a fresh resin precoat. The main steam line radiation monitors (EIIS System IL) began alarming at 1907 hours, indicating an apparent radiation level greater than 225 mrem/hr. (Some increase in main steam line radiation is expected following air or resin intrusion. The MSIV isolation setpoint of three times normal radiation was not reached.) The operators immediately began reducing reactor power with the recirculation pumps and removed the 'E' C/D from service. Reactor conductivity on the Control Room recorder rose above 10 micromho/cm at 1920 hours. A reactor water sample was drawn. Results received at 2020 hours indicated a conductivity of 14 micromho/cm and a pH of 4.5. Chlorides remained at normal levels throughout the event. An orderly shutdown of the reactor was commenced at 2039 hours as required by the action statement of Tech Spec 3.6.B.4. Reactor Water Cleanup system continued to operate and regular samples were drawn as reactor power was reduced. Sample results at 2330 hours indicated a conductivity of 9.65. As the conductivity was restored to less than the Tech Spec limit of 10 micromho/cm, the plant shutdown was cancelled. However, gradual power reduction was continued until the pH was returned to an acceptable range at 1729 hours on 11/12/84.

This conductivity excursion was the result of resin or air intrusion while putting a C/D in service. Duane Arnold has in the past experienced milder resin intrusions. The frequency of these intrusions was greatly reduced following a 1983 study of the system which resulted in hardware and operational changes. However, mild resin intrusions were again noted during the month preceding this occurrence. During this event, the C/D was operated in accordance with the updated operating instructions, i.e., flow through the C/D was increased to an interim setting and the system was allowed to equalize.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Operational testing of the 'E' C/D was unable to identify a specific problem. The unit was backwashed, disassembled, and inspected. Resin was found still caked on the septums and some septums were bowed. The unit was cleaned and the bowed septums were replaced. Outlet conductivity has been excellent through subsequent startup and full flow operation of the unit. Disassembly and inspection of the remaining four units has been initiated on an individual basis. Inspection of the 'B' C/D has found some septums with breaks in the mesh and one septum split open along a seal weld.

The plant is presently nearing the end of an extended operating cycle. This extended run is considered to have contributed to the resin caking problem. It is noted that the septums are not rigid and are susceptible to some flexing which can crack the resin cake or even result in damage to the septum. Either condition can lead to resin intrusion. The possibility of air in the C/D system which then enters the reactor vessel was raised because main steam radiation was higher than would be expected due to resin breakdown alone. This is considered likely due to the transient experienced prior to this startup due to loss of the auxiliary transformer (see LER 84-040). The C/D Operating Instructions will be revised to augment venting during system startup. Consideration will be given to using even smaller flow increments when starting up or shutting down a C/D unit.

Duane Arnold Tech Spec sets an upper conductivity limit of 10 micromho/cm for steaming rates greater than 100,000 lbs/hr. It also includes the requirement that pH be measured and brought within the range of 5.6 to 8.6 within 24 hours if conductivity exceeds 1.0 micromho/cm. If these conditions cannot be met, Tech Spec 3.6.B.4 requires that an orderly shutdown be initiated. The plant complied with each of these requirements throughout the event. An orderly shutdown was commenced when conductivity was confirmed to be above 10 and continued while this condition existed. As the shutdown was not completed, this event is not reportable under 10 CFR 50.73(a)(2)(i)(A). Although the plant was operated within the Tech Spec LCO action statements, this event is being classified as a condition prohibited by Tech Spec in accordance with 10 CFR 50.73(a)(2)(i)(B) by virtue of initiating the plant shutdown required by T.S. 3.6.B.4.

Iowa Electric Light and Power Company

December 11, 1984
DAEC-84- 787

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

Subject: Duane Arnold Energy Center
Docket No. 50-331
Op. License DPR-49
Licensee Event Report No. 84-041

Gentlemen:

In accordance with 10 CFR 50.73 please find attached a copy of the subject Licensee Event Report.

Very truly yours,

Keith Young for
Daniel L. Mineck
Plant Superintendent - Nuclear
Duane Arnold Energy Center

DLM/WRK/kp

attachment

cc: Mr. James G. Keppler
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

NRC Resident Inspector - DAEC

File A-118a

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