

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)

R. E. Ginna Nuclear Power Plant

DOCKET NUMBER (2)

05000244

PAGE (3)

1 OF 5

TITLE (4)

Containment Recirculation Fan Moisture Separator Vanes Incorrectly Installed Results in Unanalyzed Condition

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 NAME	DOCKET NUMBER
04	12	1999	1999	-- 004	-- 00	05	12	1999		05000
OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		000	20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)	50.73(a)(2)(viii)
			20.2203(a)(1)			20.2203(a)(3)(i)		X	50.73(a)(2)(iii)	50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)	73.71
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)	X OTHER Part 21
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

John T. St. Martin - Technical Assistant

TELEPHONE NUMBER (Include Area Code)

(716) 771-3641

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

X	YES (If yes, complete EXPECTED SUBMISSION DATE).	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
				06	30	1999

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 12, 1999, at approximately 1600 EDST, the plant was shutdown in Mode 5. It was discovered that the containment recirculation fan chevron moisture separator vanes were installed backwards, so that the path for air flow was less tortuous, decreasing moisture separation effectiveness.

Corrective action was to remove the vanes and install them in the proper orientation.

The incorrect installation was a result of improper assembly by the manufacturer in the 1960's. The original moisture removal equipment consisted of an assembly made up of the chevron type vanes and fiberglass moisture removal pads. This equipment was shop-assembled and shipped to Ginna Station. Vendor photographs taken during original shop assembly show the vanes installed in a manner now known to be incorrect.

Corrective action to prevent recurrence is outlined in Section V.

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

I. PRE-EVENT PLANT CONDITIONS:

On April 12, 1999, the plant was shutdown in Mode 5 for the 1999 refueling outage. Among the many activities in progress during the 1999 refueling outage, maintenance was being performed on the Containment Recirculation Fan Coolers (CRFC). At approximately 1600 EDST, an engineer from Nuclear Engineering Services (NES) discovered that the chevron moisture separator vanes for the CRFCs were installed contrary to that shown in a vendor manual diagram, but correctly as shown on a vendor outline drawing.

II. DESCRIPTION OF EVENT:

A. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

- Original construction circa 1969: Event date and time.
- April 12, 1999, 1600 EDST: Discovery date and time.
- April 17, 1999, 1000 EDST: Chevron moisture separator vanes are correctly installed.

B. EVENT:

On April 12, 1999, the plant was shutdown in Mode 5 for the 1999 refueling outage. Among the many activities in progress during the 1999 refueling outage, maintenance was being performed on the Containment Recirculation Fan Coolers (CRFC). At approximately 1600 EDST, an engineer from Nuclear Engineering Services (NES) discovered that the chevron moisture separator vanes for the CRFCs were installed contrary to that shown on a vendor manual diagram, but correctly as shown on a vendor outline drawing. After further evaluation and discussions with the vendor, it was concluded that the vanes were installed backwards, so that the path for air flow is less tortuous than if the vanes were correctly installed. These vanes are Type T Mist Extractors, manufactured by American Air Filter Co., Inc.

The CRFC System consists of four fan units (A, B, C, and D), of which the A and C units supply charcoal filters. Each cooling unit consists of a motor, fan, cooling coils, dampers, moisture separators (vanes and pads), high efficiency particulate air (HEPA) filters, duct distributors and necessary instrumentation and controls. Air is drawn into the coolers through the fan and discharged into the containment atmosphere. The moisture separators function to reduce the moisture content of the airstream to support the effectiveness of the HEPA and post-accident charcoal filters.

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Following the cooling coils is the moisture separator section, designed to remove entrained moisture exiting the cooling coils. Two separate moisture removal processes are employed; the first by direct impingement on vertical hooked vanes, and the second by trapping on separator pads. Runoff from both stages flows into collection pans from which it is piped to the containment sump. The moisture separator casings, hooked vanes, and collection pans are fabricated of galvanized steel. With the vanes installed backwards, the moisture separation capability is decreased. CRFC performance has not been completely analyzed for this condition.

The supplier of the moisture removal equipment (American Air Filter) was contacted. It was concluded that this condition was a result of improper assembly by the manufacturer in the 1960's. The original moisture removal equipment consisted of an assembly made up of the chevron type vanes and fiberglass moisture removal pads. This equipment was shop-assembled and shipped to Ginna Station. Vendor photographs taken during original shop assembly show the vanes installed in a manner now known to be incorrect. As directed by the supplier, the vanes had to be dismantled and then correctly installed.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

None

D. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

None

E. METHOD OF DISCOVERY:

This event was discovered by an engineer from NES, who was supporting CRFC maintenance.

F. OPERATOR ACTION:

The plant was in Mode 5 at the time of discovery, and the CRFCs are not required to be operable in this mode. After the NES engineer notified the Shift Supervisor of this condition, no actions were needed by the Control Room operators.

Subsequently, the Shift Supervisor notified higher supervision and the NRC Ginna Senior Resident Inspector. The Shift Supervisor notified the NRC per 10 CFR 50.72 (b) (2) (i), non-emergency four hour notification, at approximately 1948 EDST on April 12, 1999.

G. SAFETY SYSTEM RESPONSES:

None

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III. CAUSE OF EVENT:

A. IMMEDIATE CAUSE:

The immediate cause of the plant being in an unanalyzed condition was decreased moisture separation capability after a design basis accident with the CRFC moisture separator vanes installed backwards.

B. INTERMEDIATE CAUSE:

The intermediate cause was installation of improperly assembled moisture separator units. The original moisture removal units consisted of assemblies made up of the chevron type vanes and fiberglass moisture removal pads. This equipment was shop-assembled and shipped to Ginna Station. Vendor photographs taken during original shop assembly show the vanes installed in a manner now known to be incorrect.

C. ROOT CAUSE:

The underlying cause of the vanes being installed backwards was a manufacturing error.

IV. ANALYSIS OF EVENT:

This event is reportable in accordance with 10 CFR 21 and in accordance with 10 CFR 50.73, Licensee Event Report System, item (a) (2) (ii) (A), which requires a report of, "Any event or condition that resulted in the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; or that resulted in the nuclear power plant being: (A) In an unanalyzed condition that significantly compromised plant safety". With the CRFC moisture separator vanes installed backwards, the plant was in an unanalyzed condition.

An assessment will be performed considering both the safety consequences and implications of this event.

A preliminary qualitative assessment indicates that the CRFC units would still have been capable of performing their intended function:

- The maximum loss-of-coolant accident (LOCA) air velocity through the coil is below the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) threshold for moisture entrainment both for the new and old coils.
- The coils will act as moisture separators due to the depth of the coil and spacing between fins.

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- A second set of louvers are located on the inlet to the coils which will remove some entrained moisture prior to entering the coil.
- The air velocity significantly reduces after exit from the cooling coils, and would allow entrained droplets to fall to the fan unit floor prior to reaching the HEPA filters.
- The moisture separator media pads have additional capacity beyond the Ginna design requirements.
- Even though the moisture separator vanes on the outlet of the coil were installed backwards, they would still remove entrained water (at a reduced efficiency) due to their tortuous path. The moisture removal efficiency is dominated by the spacing between adjacent vanes, length of each vane and number of vane turns in path, which does not change due to reversing the direction of flow.

A supplement to this LER will be submitted with the results of the final assessment.

V. CORRECTIVE ACTION:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

The moisture separator vanes were dismantled and correctly re-installed.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

The as-left configuration of the moisture separator units does not allow the vanes to be installed incorrectly.

VI. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

None

B. PREVIOUS LERs ON SIMILAR EVENTS:

A similar LER event historical search was conducted with the following results: No documentation of similar LER events with the same root cause at Ginna Station could be identified.

C. SPECIAL COMMENTS:

None