CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9603110139 DOC.DATE: 96/03/01 NOTARIZED: NO DOCKET #
FACIL:50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
AUTH.NAME AUTHOR AFFILIATION
KNORR,J.E. Florida Power & Light Co.
HOVEY,R.J. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 96-001-00:on 960131,intake CWS flow rates found w/ potential to be less than required by design basis.Caused by influx of aquatic grass & algae onto basket strainers of ICW flow path.Mechanically cleaned strainers.W/960301 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 14
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-1 PD	1	1	CROTEAU,R	1	1
INTERNAL:	AEOD/SPD/RAB	2	2	AEOD/SPD/RRAB	1	1
	FILE CENTER	1	1	NRR/DE/ECGB	1	1
	NRR/DE/EELB	1	1	NRR/DE/EMEB	1	1
	NRR/DRCH/HHFB	1	1	NRR/DRCH/HICB	1	1
	NRR/DRCH/HOLB	1	1	NRR/DRCH/HQMB	1	1
	NRR/DRPM/PECB	1	1	NRR/DSSA/SPLB	1	1
	NRR/DSSA/SRXB	1	1	RES/DSIR/EIB	1	1
	RGN2 FILE 01	1	1			
EXTERNAL:	L ST LOBBY WARD	1	1	LITCO BRYCE,J H	2	2
	NOAC MURPHY,G.A	1	1	NOAC POORE,W.	1	1
	NRC PDR	1	1	NUDOCS FULL TXT	1	1

C A T E G O R Y 1 D O C U M E N T

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM OWFN 5D-5(EXT. 415-2083) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

A04

FULL TEXT CONVERSION REQUIRED
TOTAL NUMBER OF COPIES REQUIRED: LTTR 25 ENCL 25

FPL

MAR 01 1996

L-96-49
10 CFR §50.73

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

Gentlemen:

Re: Turkey Point Unit 3
Docket No. 50-250
Voluntary Reportable Event: 96-001-00
Intake Cooling Water System Flow Rates Found With
Potential to be Less Than Required by Design Basis

The attached Licensee Event Report, 250/96-001-00, is being provided as a voluntary report.

If there are any questions, please contact us.

Very truly yours,

Robert J. Hovey
Vice President
Turkey Point Plant

JEK

attachment

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
Thomas P. Johnson, Senior Resident Inspector, USNRC, Turkey Point Plant

IE22
1/1

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
TURKEY POINT UNIT 3	05000250	1 OF 13

TITLE (4) Intake Cooling Water System Flow Rates Found With Potential to be Less Than Required by Design Basis

EVENT DATE (5)			LER NUMBER (6)			RPT DATE (7)			OTHER FACILITIES INV. (8)	
MON	DAY	YR	YR	SEQ #	R#	MON	DAY	YR	FACILITY NAMES	DOCKET # (S)
01	31	96	96	001	00	03	01	96	Turkey Point Unit 4	05000251

OPERATING MODE (9)	1/1	Voluntary
POWER LEVEL (10)	60/100	

LICENSEE CONTACT FOR THIS LER (12)

	TELEPHONE NUMBER
J. E. Knorr, Regulation Compliance Specialist	305-246-6757

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

CAUSE	SYSTEM	COMPNT	MANUFACTURER	NPRDS?	CAUSE	SYSTEM	COMPNT	MANUFACTURER	NPRDS?

	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
SUPPLEMENTAL REPORT EXPECTED (14) NO ☒ YES ☐				
(if yes, complete EXPECTED SUBMISSION DATE)				

ABSTRACT (16)

At approximately 2057 (EST), on January 31, 1996, the Intake Cooling Water (ICW) flow rate through the Component Cooling Water (CCW) heat exchangers fell below that assumed in the Turkey Point design basis. The reduced flow rate was due to an influx of aquatic grass and algae onto the basket strainers of the ICW flow path upstream of the CCW heat exchangers. The strainers were cleaned and flow was returned to required levels at 2105. The plant was operating at approximately 60 percent reactor power as a conservative measure due to the potential for an increasing influx of aquatic grass and algae into the ICW and circulating water systems.

Two similar events also occurred on February 16, 1996.

In all cases the affected plant systems remained operable.

I. DESCRIPTION OF THE EVENT

During the evening of January 31, 1996, and again on February 16, an influx of aquatic grass mixed with algae occurred at the cooling water intake [NN] from the closed cooling canal [BS:RVR] system at Turkey Point. The cooling water intake is common to the Intake Cooling Water (ICW) system [BS] and the circulating water system [NN]. The ICW system supplies water to the safety related component cooling water (CCW) system and the non-safety related Turbine Plant Cooling Water (TPCW) [TF] system. The ICW system has three pumps [BS:P] and two headers [BS] leading to three CCW heat exchangers [BS:HX], and two headers leading to two TPCW heat exchangers [TF:HX], with an in-line basket strainer [BS:STR] for each header. The TPCW headers are automatically isolated upon receipt of a safety injection signal. The circulating water system supplies water to the main condensers [NN:HX]. Upon realization that an influx of grass and algae was imminent on the evenings of January 31 and February 16, reactor power for Unit 3 was quickly reduced to 60% to provide operating margin if the grass and algae influx were to increase. Unit 4 was at 100 percent power both days.

The outlet of the ICW headers with basket strainers, feeds a common header at the inlet of the tube side of three CCW HXs. For a basket strainer to be mechanically cleaned, the strainer must be isolated. The ICW header containing that strainer is thus declared inoperable. The remaining header (basket strainer) must pass the minimum design flow to maintain operability. The minimum design flow for backwashing ICW/CCW basket strainers is provided in Operating Procedure 3-OP-019, Intake Cooling Water System, in the form of a family of curves which relate canal temperature to minimum flow assuming a particular HX fouling factor.

Event on January 31, 1996

On the evening of January 31, Unit 3 was operating at approximately 100% power. As the 3A1 circulating water pump and 3A1 traveling screen were being placed in service, a grass influx occurred which potentially affected the performance of the Intake Cooling Water (ICW) system. In particular, grass was entering the ICW system and was being captured in the ICW system basket strainers located upstream of the CCW heat exchanger (HX) inlet. During the influx, the 3B ICW basket strainer was being mechanically cleaned and the ICW header associated with that basket strainer was declared out of service in accordance with plant Technical Specifications. The 3A ICW basket strainer and associated ICW header were in service and available for heat removal from the CCW HXs.

In accordance with plant procedure 3-OP-019, the minimum required ICW flow to a single header during the basket strainer maintenance was determined to be 9500 gpm. (Note that the required minimum ICW flow was later determined to be 8500 gpm based on subsequent performance testing of the CCW HXs). This minimum ICW header flow requirement was based on actual plant

conditions at the time of the event (80.3°F canal temperature and predicted fouling level for the two most limiting CCW HXs). The minimum required ICW flow to a single header during basket strainer cleaning assures that sufficient heat removal capability exists assuming the occurrence of a design basis accident and the availability of only one ICW pump, one ICW header and 2 CCW HXs. During the event, the influx of aquatic grasses into the in-service 3A ICW basket strainer resulted in a reduction of ICW flow to a minimum observed value of 7500 gpm. The low flow lasted for a duration of 8 minutes until the out of service (OOS) 3B basket strainer was restored to service. No plant shutdown was required or begun. In response to this event, the plant entered Technical Specification 3.0.3 and made a 10 CFR 50.72 notification to the NRC stating that Turkey Point Unit 3 had been temporarily outside its ICW design basis. The notification has since been retracted.

Events on February 16, 1996

While backwashing the 3B ICW/CCW basket strainer on February 16, Unit 3 experienced ICW flows less those required by the system flow curves in 3-OP-019. The actual total flow through 3 CCW HXs was 7000 GPM from 0200 to 0208 for a total duration of 8 minutes. This was less than the system flow curve requirement of 10,250 gpm in 3-OP-019 and the actual plant operating conditions at the time of the event (73.5°F canal temperature and predicted fouling level for the two most limiting CCW HXs). The ICW flow requirement was again not met that same morning when removing the 3B ICW/CCW basket strainer from service for cleaning. The actual total flow through 3 CCW HXs for this event was near zero for 5 to 10 seconds and 9000 GPM from 0300 to 0310 for a total duration of 10 minutes. The flow was restored by returning the 3B strainer to service and throttling ICW flow to the TPCW HXs. At the direction of plant management, a voluntary Unit 3 shutdown to Mode 3 was commenced at 0320, and the 3A ICW pump was declared out of service since its operation appeared to cause the rapid fouling of the Unit 3 ICW basket strainers. The shutdown to Mode 3 was completed at 0447. In response to these events, the plant entered Technical Specification 3.0.3 and made 10 CFR 50.72 notifications to the NRC stating that Turkey Point Unit 3 had been temporarily outside its ICW design basis. The notification has since been retracted.

II. CAUSE OF THE EVENT

In January 1996, south Florida had little rain. As a result, the Turkey Point closed cooling canal water level was reduced. When some increased wind occurred just prior to the events, the canal aquatic grass (*Ruppia maritima*) mixed with algae (*Batophora spp.*) began to break loose and flow toward the ICW/circulating water system intake. Under normal grass and algae loading conditions, the aquatic grass and algae are captured by traveling screens at the plant's cooling water intake structure, and washed off the screens by a screen wash system into a weir pit. During the February 16 event, the weir pit was found to have limited effectiveness in keeping the washed material from returning to

the inlet side of the traveling screens. In these events, the large amount of suspended grass and algae was enough to cause some of the aquatic material to carry through the traveling screens and into the intake bays for the ICW and circulating water systems. The ICW pumps picked up the carry through material. The ICW basket strainers, as designed, removed the majority of the grass and algae from the flow stream to the CCW HXs. The 3A ICW pump was most affected due to its proximity to the weir pit. The circulating water pumps also pumped some of the material into the inlet side of the main condenser waterboxes affecting condenser cooling efficiency.

III. ANALYSIS OF THE EVENTS

The purpose of this analysis is to determine if the subject events actually resulted in a loss of the ICW design basis function related to heat removal and accident mitigation. This analysis is intended to review the ability of Turkey Point systems to comply with their accident design bases for a Maximum Hypothetical Accident (MHA).

DESIGN AND LICENSING BASES

The maximum hypothetical accident (MHA) for the Turkey Point plant is the large break loss-of-coolant accident (LOCA). During this event, hot pressurized reactor coolant system (RCS) fluid is discharged into containment, resulting in a large increase in containment temperature and pressure. The initial phases of this containment event are turned around by the volume of containment in conjunction with heat removal by containment heat sinks. Within the first minute of the event, active containment heat removal mechanisms are initiated, which include the containment spray (CS) pumps and the emergency containment coolers (ECCs). These are the mechanisms that provide for long-term containment heat removal and depressurization. Heat removed by the ECCs is transferred to the Component Cooling Water (CCW) system, which is an intermediate cooling loop, and then to the Intake Cooling Water (ICW) system via the CCW HXs. The heat is then dissipated into the closed cooling canal system.

Low ICW flow therefore has the potential to reduce the heat removal from the CCW system and from containment.

<u>Design Bases</u>

The ICW system provides cooling water to the safety related CCW HXs. The ICW system also provides cooling water to the TPCW HXs and supplies water to the Lube Water System.

During normal operations, two ICW pumps provide flow to the three CCW HXs and to both TPCW HXs. During an accident, only one ICW pump providing flow to two CCW HXs is required by design. Measures are in place to ensure the heat transfer capability of the CCW HXs satisfies the accident heat load. The measures include performance monitoring, and periodic cleaning of the CCW HXs.

The ICW system supplies cooling water to the tube side of the CCW and TPCW HXs. A redundant header system is provided with isolation valves that can be shut so that one header out of service does not require immediate shutdown of the unit. The TPCW and Service Water/Lube Water Systems are intended to serve non-safety related functions only. However, depending on the location of the automatic isolation valve or the flow restricting devices that establish the pressure boundary for the ICW supply to the CCW system, portions of these systems within that pressure boundary are treated as safety related.

The ICW system includes the three ICW pumps, cross-tie headers, two independent supply headers, piping, valves, basket strainers, and those components required to take cooling water from the closed cooling canals via the Intake Structure and supply the CCW, TPCW, and Lube Water Systems and return the water to the plant discharge canal.

Licensing Bases

The ICW system is required to be operable by plant Technical Specification 3/4.7.3. Three pumps and two headers must be operable in Modes 1 through 4 otherwise an ACTION statement of the Technical Specification will be entered. Likewise, the CCW system is required to be operable by Technical Specification 3/4.7.2. Three pumps and two HXs must be operable in Modes 1 through 4, otherwise a Technical Specification ACTION statement will be entered.

The Technical Specification bases for system operation of the ICW and CCW systems are that they provide the required cooling capacity for both normal and accident configurations. This design assumes a single active failure concurrent with an accident and loss of offsite power in establishing the design assumptions used in the accident analyses.

ANALYSIS OF EVENTS

The isolation of the one ICW header to facilitate basket strainer cleaning places the plant into a Technical Specification LCO Action Statement. While in an Action Statement, additional single active failures that could potentially affect system operation are not considered. However, to clearly demonstrate the acceptability of this situation, the performance of the ICW system was evaluated for all three events assuming standard single failure assumptions and degraded ICW flow to a single header. For this evaluation in each case, only one ICW pump, one ICW header and 2 CCW HXs were assumed to be available for heat removal from the CCW system, consistent with the design bases for the ICW system.

The low ICW flow event that occurred on January 31 was evaluated in detail by both FPL and Westinghouse. The low ICW flow events that occurred on February 16, were evaluated by comparing the performance capabilities of the ICW/CCW systems that existed on that day to the performance capabilities analyzed for the

January 31 event.

Event on January 31

For the low ICW flow event on January 31, all 3 CCW HXs were available for heat removal during the low ICW flow event. Therefore, an additional assessment was made to evaluate the performance of the ICW system under the actual plant configuration at the time of the event, also assuming a limiting single failure (i.e. one ICW pump, one ICW header and 3 CCW HXs).

Input Assumptions

As stated above, the minimum ICW flow observed during the event was 7500 gpm through the single in-service ICW header. However, this header flow was produced with 2 ICW pumps in service and ICW flow being delivered to 3 CCW HXs and 2 TPCW HXs (A review of plant operator logs indicates that ICW flow to one of the TPCW HXs was isolated during the event to divert additional ICW flow to the CCW HXs). To determine the actual ICW flow that would be delivered to the CCW HXs during accident conditions, a calculation using a previously developed hydraulic model of the ICW system was performed. The computerized hydraulic model was initially configured to represent the actual ICW system configuration at the time of the low flow event (7500 gpm to the single ICW header). The model was then reconfigured to represent the accident configuration for the ICW system (one ICW pump, one ICW header and ICW flow to the TPCW HXs isolated). The corresponding ICW flow to the CCW HXs during the 7500 gpm low flow (to 3 HXs) event, assuming only 2 CCW HXs being available in accordance with the design bases, was 3610 gpm per CCW HX. If all 3 CCW HXs were assumed to be available, as was the case during the event, the resulting flow to each CCW HX was calculated to be 2500 gpm. An additional case was analyzed assuming a single ICW header flow of 9500 gpm, which was the minimum flow required at the time of the event in accordance with plant procedure 3-OP-019. The corresponding ICW flow to only 2 CCW HXs, assuming the design basis accident configuration, was 4500 gpm per CCW HX.

The actual heat removal capability of the CCW HXs at the time of the low flow event was also calculated. This was necessary since the performance of the HXs and their associated heat removal capability is monitored in accordance with plant Technical Specifications and plant procedures. The actual HX performance is based on actual cooling canal temperature and HX tube fouling levels. The corresponding UA (transfer coefficient times the heat transfer area) for the CCW HXs at the time of the event was determined to be 1.25E6 BTU/hr°F and this value was used as an input in the design basis analyses. The RHR HX UA values assumed in the analyses were based on previous Westinghouse analyses performed for the Thermal Power Uprate project.

From an analysis standpoint, the limiting heat removal design requirement placed on the ICW and CCW systems is from the containment during a large break loss-of-coolant accident (LOCA).

Two LOCA cases assuming low ICW flow and the design basis configuration of the ICW system (2 CCW HXs) were specifically evaluated by Westinghouse using the containment analysis code COCO. In one case, the LOCA is assumed to occur concurrent with failures that tend to limit heat removal from containment and thus challenge containment integrity. The second case involves maximizing heat removal from containment but minimizing heat removal from the CCW system, thus challenging CCW system design requirements. These two cases bound plant operation for an MHA and validate whether the plant design basis functions are achieved. As an added level of conservatism, both cases were evaluated assuming that the low ICW event occurred for the duration of the event. Selected assumptions for these cases were provided to Westinghouse and are summarized below:

Parameter	Containment Integrity	CCW Temperature
Single Failure	EDG	ICW Pump
ICW Inlet Temp	80.3°F	80.3°F
Containment Air Temp	130°F	130°F
RWST Temp.	105°F	105°F
LOOP	Yes	Yes
Cont. Spray Pumps	1	2
ECCs	2	3
CCW Pumps	1	2
CCW Heat Exchangers	2	2
ICW Pumps Inservice	1	1
CCW HX UA	1.25E6 BTU/hr-°F	1.25E6 BTU/hr-°F
CCW HX Tube Side Flow	3610 gpm/HX	3610 gpm/HX
RHR HX Available	1	2
RHR HX UA	0.97E6 BTU/HR-°F	1.50E6 BTU/HR-°F
RHR HX Tube Side Flow	3000 gpm	3750 gpm
Initial Containment Pressure	0.3 psig	0.3 psig

ICW System Operability

The operation of the ICW system during the January 31 low flow event was examined by Westinghouse and FPL. At the ICW flows experienced, Westinghouse demonstrated that the ICW system was capable of removing sufficient heat from the CCW system assuming the availability of only 2 CCW HXs. The ICW system design basis functions were maintained during and following the most limiting design basis accident.

In addition, FPL evaluated the impact of low ICW flow on the established performance capability of the ICW system. At the low ICW flow condition experienced during the event and considering the availability of all 3 CCW HXs, the ICW system was capable of removing the heat load specified in the ICW system operability curves.

Accordingly, the ICW system remained operable during this event.

CCW System Operability

The operation of the CCW system during the January 31 low flow event was examined by Westinghouse and FPL. At the ICW flows experienced, Westinghouse demonstrated that the CCW system was capable of removing sufficient heat from containment and other auxiliary heat loads assuming the availability of only 2 CCW HXs. In addition, Westinghouse confirmed that the CCW system supply temperature would remain below the established design limit of 150°F established for Thermal Power Uprate. This established limit is that analyzed for the Turkey Point Uprate Project (Uprate) by Westinghouse. These CCW system Uprate design basis functions were maintained during and following the most limiting design basis accident.

In addition, FPL evaluated the impact of low ICW flow on the established performance capability of the CCW HXs. At the low ICW flow conditions experienced during the events and considering the availability of all 3 CCW HXs, the CCW HXs were capable of removing the heat load specified in the ICW system operability curves.

Accordingly, the CCW system remained operable during this event.

Containment Integrity

The impact of the ICW low flow event that occurred on January 31 has been evaluated with respect to the large break LOCA containment response. The current limiting transient for Turkey Point is the containment response to a double-ended pipe break with concurrent loss of offsite power and the failure of a diesel generator. The current peak containment pressure for this event is 49.9 psig which occurs during the initial blowdown period.

The analysis for the low ICW flow condition was conservatively based on uprated power mass and energy releases, degraded ECCS pump operation, and elevated containment and RWST temperatures to

bound worst case design conditions. Using these conservatisms, considering an event with a single active failure, and only crediting the availability of two CCW HXs (3 were available) and one pump (2 were running), a peak containment pressure of 46 psig resulted, which is less than the current limit of 49.9 psig.

Accordingly, containment integrity is not adversely affected.

Equipment Qualification

The impact of the ICW low flow event that occurred on January 31 has been evaluated with respect to the large break LOCA for impact on equipment qualification. The current limiting transient for EQ is the containment response to a double ended reactor coolant pump suction break with concurrent loss of offsite power and the failure of a diesel generator. This event, which was reperformed with reduced ICW flow, did not result in temperatures in containment at any point greater than that analyzed for equipment qualification.

Accordingly, equipment qualification was not adversely affected.

ECCS Performance

The accident analysis was not impacted by this event as long as the engineered safety features pumps (e.g., safety injection, RHR, containment spray pumps, etc) remained operable. These pumps have been previously evaluated and found to be functional assuming CCW supply temperatures higher than identified by Westinghouse during this event. Therefore, their operability was unaffected. Elevated CCW system temperatures would result in a slightly higher containment backpressure, which is a benefit for LOCA Peak Clad Temperature (PCT) calculations. ECCS performance for non-LOCA events remains unaffected.

Radiological Consequences

The design basis offsite doses were not affected by this event. The design basis containment integrity evaluation remains bounding and LOCA PCT calculations are not adversely affected. The plant response to non-LOCA events remains as analyzed in the FSAR. Therefore, this reduced ICW flow event would not have had any impact on current design basis dose analysis.

Events on February 16

As stated above, the minimum ICW flow observed during the event was 7000 gpm for 8 minutes and 9000 gpm for 10 minutes through the single in-service ICW header. However, this header flow was produced with 2 ICW pumps in service and ICW flow being delivered to 3 CCW HXs and 2 TPCW HXs. For 5 to 10 seconds during the 9000 gpm flow event, flow indicated zero. This was due to selecting the strainer with the least need for cleaning, thereby restricting flow to the remaining ICW header. This situation has been reviewed in the past and was revisited in a safety evaluation crediting adiabatic cooling and allowing a very low to zero flow

in the ICW system for up to 5 minutes.

To determine the actual ICW flow that would be delivered to the CCW HXs during accident conditions, an additional calculation was performed. The computerized hydraulic model was initially configured to represent the actual ICW system configuration at the time of the low flow events (7000 and 9000 gpm to the single ICW header). The model was then reconfigured to represent the accident configuration for the ICW system (one ICW pump, one ICW header and ICW flow to the TPCW HXs isolated). The corresponding accident ICW flow to the CCW HXs, assuming only 2 CCW HXs being available in accordance with the design bases, was 3475 gpm per CCW HX for the 7000 gpm low flow event. This flow is below the 3610 gpm per CCW HX calculated for the January 31 event. The corresponding accident ICW flow to the CCW HXs, assuming only 2 CCW HXs being available in accordance with the design bases, was 4393 gpm per CCW HX for the 9000 gpm low flow event. This flow is above the 3610 gpm per CCW HX calculated for the January 31 event. The CCW HX heat removal capabilities for these two low flow events was compared to the heat removal capabilities that existed during the January 31 low flow event. If the CCW HX heat removal capability for the February 16 low flow events is greater than that which existed during the January 31 event, the analysis results and corresponding evaluation for the January 31 event would be bounding.

Three variables were used to evaluate the heat removal capability of the CCW HXs for the various low flow events; cooling canal inlet temperature, corresponding ICW flow to each CCW HX during the design basis accident configuration and CCW HX fouling. A comparison of these 3 parameters for each of the 3 low flow events is tabulated below. The base case that has been evaluated in detail by Westinghouse and FPL is the January 31 low flow event.

	1-31-96	2-16-96	2-16-96
ICW Header Flow	7500 gpm	9000 gpm	7000 gpm
CCW HX ICW Flow During Accident	3610 gpm/HX	4393 gpm/HX	3475 gpm/HX
Canal Temperature	80.3°F	73.5°F	73.5°F
CCW HX Fouling	0.00156	0.00256	0.00256

The CCW HX performance capabilities were analyzed with HX software developed specifically for the CCW HXs and the results are discussed below.

9000 gpm Low Flow Event

The CCW HX heat removal capability for the 9000 gpm February 16 low flow event was calculated to be 2.5% less than that which was available in the detailed Westinghouse analyses for the January 31 event. This heat removal difference is considered to be negligible when compared to the margin available in the Westinghouse analysis results and conservative analysis assumptions used (such as mass and energy releases calculated for the thermal power uprate project). The peak containment pressure of 46 psig determined by Westinghouse is unaffected, since the peak containment pressure is dependant primarily on the containment volume and passive containment heat sinks immediately following accident initiation. The slight reduction in CCW HX performance would have a negligible affect on the calculated peak containment pressure and the CCW system supply temperature would remain below the 150°F acceptance criteria. Accordingly, the ICW and CCW systems remained operable for this event and were capable of performing their design basis functions. Equipment qualification, ECCS performance and radiological consequences would have remained unaffected by this low ICW flow condition.

7000 gpm Low Flow Event

The CCW HX heat removal capability for the 7000 gpm February 16 low flow event was calculated to be 13.2% less than that which was available in the detailed Westinghouse analyses for the January 31 event. However, this low flow condition existed for only 8 minutes. After this 8 minute time interval, ICW flow was restored to an acceptable level. The impact of this reduced heat removal capability for the 8 minute duration was evaluated against the Westinghouse analysis results. With respect to containment integrity, the peak containment pressure of 46 psig was determined by Westinghouse to be unaffected, since the peak containment pressure is dependant primarily on the containment volume and passive containment heat sinks immediately following accident initiation. Sensitivities of the impact of CCW HX cleanliness and corresponding performance, on peak post-accident containment pressure was performed in Westinghouse WCAP-12261 "Analysis of Containment Response Following Loss of Coolant Accidents for Turkey Point Units 3 and 4," dated August 1989. The analyses confirm that peak containment pressure is unaffected by CCW HX performance. The long-term containment pressure and temperature response indicated in the specific Westinghouse analysis for the January 31 event would also not be adversely affected since this low flow condition only existed for an 8 minute time interval. Analysis acceptance criteria would have been maintained. Although the effective CCW HX heat removal capability for the 7000 gpm low flow event was less than that determined for the January 31 low flow event, the results of the FPL calculation for this event also conclude that the CCW system supply temperature would remain below the 150°F acceptance criteria due to the short duration of the event. Accordingly, the ICW and CCW systems remained operable for this event and were capable of performing their design basis functions. Equipment qualification, ECCS performance and radiological consequences would have remained unaffected by this

low ICW flow condition.

CONCLUSION

Based on the assessments performed by Westinghouse using the COCO containment code and additional assessments performed by FPL, the ICW and CCW systems remained operable and capable of performing their intended design basis functions for all three events considering degraded ICW flow (due to an influx of aquatic grasses) and the availability of only 2 CCW HXs. Therefore, the ICW/CCW systems remained capable of performing their design basis functions for all three events.

Additionally, FPL performed a probabilistic safety assessment for an event of this type as part of an analysis done for LER 95-003 in March of 1995. In that evaluation low ICW flow was conservatively modeled as a complete loss of CCW flow for one hour. The assessment concluded that the calculated core damage frequency did not increase above the base line of 6.63×10^{-5}/year.

IV. CORRECTIVE ACTIONS

1. The basket strainers were mechanically cleaned to restore ICW flow to greater than the minimum flow required for the canal temperature and CCW HX fouling factors found at the time of the event.

2. Five floating booms are now installed in the canal system. The first, installed prior to the 1995 event (LER 95-003), is at the extreme southern end of the canal system to catch floating aquatic grass and algae material prior to the flow release point into the return canals. This first boom was only partially effective in controlling the grass and algae influx. The second was installed in the final return canal within a quarter mile of the intakes to catch any floating material which was not caught by the first floating boom as a result of the March 1995 low ICW flow event. Others have been installed in selected areas of the canal system to further aid in reducing the transport of the plant material into the intake system. The performance and number of booms and pumps will be evaluated during subsequent grass influx events and changed as required.

3. Pumps have been installed at some of the booms to remove floating grass and algae from the canal. These pumps are used on an as needed basis.

4. The use of the weir pit has been discontinued. The material washed off the screens is now directed to the plant discharge.

5. Guidance has been provided for operation of the traveling screens in high speed during times of high grass influx.

6. Training brief No. 603 has been written to review these events and discuss the revision of operator actions to be taken during grass influx events which affect ICW/CCW basket strainers.

7. The weir pit was cleaned of all grass. As a result, improvement in screen wash efficiency has been observed with no grass collecting in the weir pit.

8. Additional guidance has been provided for manual removal of grass collected on the traveling screens during large grass influx conditions.

9. Frequent inspection of screen wash system effectiveness is being made.

10. Reliability of the traveling screens has been improved by the removal of a low speed trip from the control logic for the screens.

V. ADDITIONAL INFORMATION

EIIS Codes are shown in the format [EIIS SYSTEM: IEEE component function identifier, second component function identifier (if appropriate)].

Licensee Event Report 95-003 was submitted concerning a low ICW flow event.