NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Virgil C. Summer Nuclear Station	05000395	1 of 5

TITLE (4)

Unanalyzed Condition for Speed Controller on Turbine Driven Emergency Feedwater Pump

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
										05000
10	06	1998	1998	-- 009 --	00	11	05	1998	FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)		20.2203(a)(1)		20.2203(a)(3)(i)	X	50.73(a)(2)(ii)	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)	OTHER
		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	TELEPHONE NUMBER (Includeude Area Code)
A. R. Rice Manager, Nuclear Licensing & Operating Experience	(803) 345-4232

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

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

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

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

On October 06, 1998, it was discovered that there is an issue concerning the ability of a non-safety related component to affect the operation of the Turbine Driven Emergency Feedwater Pump (TDEFWP). This non safety related device (ISY-02034) is a current to pneumatic (I/P) transducer used in the speed control circuitry for the TDEFWP.

An engineering evaluation of the recent failure of the TDEFWP to achieve rated speed concluded that there are failure mechanisms that could prevent the TDEFWP from performing its design function under postulated accident conditions outside containment. The I/P had previously been thought to only fail (on loss of air or power) to full speed. During a steam line break coincident with the loss of offsite power, and a loss of "B" train DC power, there may not be sufficient EFW flow to the non-faulted steam generators to mitigate the accident.

The unanalyzed condition is the potential failure mechanisms/modes for the I/P converter which allow it to fail in a position which corresponds to less than rated speed.

The safety significance has been determined to be small, based on the existence of operating and emergency procedures which cover such situations. No credit for the speed control is taken for normal operation or any event from Condition I through Condition IV.

Corrective action was immediately taken to isolate the I/P from the air supply and verify that the TDEFWP is capable of achieving rated speed. An evaluation is ongoing to determine if similar non-safety related devices could prevent any other safety related systems from functioning as designed. Should any similar conditions be discovered, they will be reported as either separate report(s) or as a supplement to this report. This evaluation will be completed by January 29, 1999.

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

PLANT IDENTIFICATION

Westinghouse - Pressurized Water Reactor

EQUIPMENT IDENTIFICATION

Emergency Feedwater System - Turbine Driven Emergency Feedwater Pump Governor Speed Controller Current to Pneumatic (I/P) Transducer - ISY - 02034

EIIS Code - BA

IDENTIFICATION OF EVENT

Unanalyzed Condition. A previously un-evaluated failure mechanism to a non-safety related I/P could prevent the Turbine Driven Emergency Feedwater Pump (TDEFWP) from achieving rated speed and flow requirements during a postulated accident scenario. It was discovered that this device could fail in such a way that the TDEFWP speed never reaches the required speed and flow. This was determined during the engineering evaluation for condition report 98-0823 after the TDEFW did not achieve rated speed due to internal contamination of the I/P converter.

EVENT DATE

October 06, 1998. This is the date that it was determined this condition was unanalyzed and could have an adverse effect on the TDEFWP.

REPORT DATE

November 05, 1998

CONDITIONS PRIOR TO EVENT

Mode 1 - Power Operations (100%)

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

DESCRIPTION OF EVENT

On October 06, 1998, the Virgil C. Summer Nuclear Station (VCSNS) discovered that there is an issue concerning the ability of a non-safety related component to affect the operation of the Turbine Driven Emergency Feedwater Pump (TDEFWP). This non-safety related device (ISY-02034) is a current to pneumatic (I/P) transducer that is used in the speed control circuitry of this pump. This condition was determined to be an unanalyzed condition since under specific accident conditions there is no assurance that the TDEFWP will provide the required flow and pressure at rated speed.

Engineering was performing an evaluation on the failure mechanism of a recent failure of a TDEFWP surveillance test when the question of unanalyzed failure mechanisms became an issue. The pump failed to reach rated speed due to contamination in the I/P nozzles. As a result, the non-safety related I/P was replaced with another non-safety related I/P and the surveillance test was repeated, this time successfully.

Initially the I/P was determined to be acceptable as a non-safety related component since the normal setting of the speed controller is full speed, the accident setting is full speed, and the device was presumed to only fail on loss of air or power (fail safe to full speed). Under the accident scenario of Steam Line Break outside containment coincident with a Loss of Offsite Power (LOOP) and a loss of "B" train DC power, a consequential failure of the I/P in the non conservative direction could prevent the TDEFWP from achieving full speed. Under this scenario, it is possible that there would not be sufficient EFW flow into the intact Steam Generators (SG).

With the scenario described above, the "B" train Motor Driven Emergency Feedwater Pump (MDEFWP) would not start and the flow control valves on the "A" MDEFWP flow path would not be capable of isolating flow to the ruptured SG. Therefore, all flow from the MDEFWP would be expected to preferentially feed the ruptured SG. At the same time, the pressure in the intact SGs would be above the discharge head of the TDEFWP when running at minimum speed (2100 RPM). This condition is unanalyzed as the minimum EFW flow to 2 out of 3 SGs assumed in accident analyses cannot be achieved.

CAUSE OF EVENT:

The cause of this event was the belief that the I/P could only fail due to loss of air or power. As a result of this belief, no other failure modes were considered credible. This is apparently an engineering oversight dating back prior to the receipt of the plant operating license.

ANALYSIS OF EVENT:

The following considerations indicate that this issue does not have a significant impact on plant safety and that there is reasonable assurance that all other safety related equipment will perform as required in the event of a accident scenario similar to that postulated above.

The speed control for the TDEFWP consists of 2 selectable manual setpoint stations (one on the Main Control Board and one on the Control Room Evacuation Panel) and a current to pneumatic converter (I/P) which feeds an air signal to the input of the TDEFW governor. Minimum air pressure (about 3 psig) corresponds to rated pump speed (4100 - 4200 rpm). The normal setting for this controller is rated speed and the accident setting is also rated speed. The failure mode for the I/P on loss of air or power is rated speed.

In the initial design of the plant, no credit was taken for the speed control in any event from Condition I to IV and the failure of the speed control would be considered the active failure. The speed control is only used during surveillance testing to lessen the challenges to the TDEFWP during starting and stopping.

Secondary pipe breaks are an important design consideration in determining many design features of the plant, however, the accident sequences associated with this type of high energy line break are not regarded as major contributors to public risk, as a secondary pipe break by itself will not uncover the core. Some cooling will be provided by the flow out of the break and the continued supply of EFW to the faulted SG will assure the generator does not dry out.

Two separate sources of offsite power are available for the Class IE power distribution system. One source is the South Carolina Electric & Gas transmission grid and the other is from the existing Parr generating complex. Load studies have shown the loss of station output, in conjunction with a postulated line break, will not result in a degraded voltage on either source. Therefore, the sequence of events which requires a loss of all offsite power coincident with the postulated line break, is not expected without multiple failures occurring.

ANALYSIS OF EVENT Continued:

In the event that there is insufficient EFW flow during accident conditions, there is an Emergency Operating Procedure (EOP-15 "Response to Loss of Secondary Heat Sink") that provides an alternate methodology for cooling down and depressurizing. This assures that the core remains cooled and that there is no danger to the health and safety of the public.

INTERIM CORRECTIVE ACTIONS:

As interim action, the I/P has been isolated from the air supply and is, therefore, in the "failed safe" position. The TDEFWP governor is set for rated speed and is in the safety related equipment population, which receives periodic maintenance and surveillance tests to assure continued operability.

ADDITIONAL CORRECTIVE ACTIONS:

Engineering is evaluating the EFW system for proposed modifications to enhance the control and isolation capabilities of the system. Also, an evaluation is ongoing to determine if similar non-safety related devices could prevent any other safety related systems from functioning as designed. Should any similar conditions be discovered, they will be reported as either a separate report or as a supplement to this report. This review will be completed by January 29, 1999.

PRIOR OCCURRENCES:

None