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AUTH. NAME AUTHOR AFFILIATION
WOODY, C. O. Florida Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards response to Generic Ltr 87-12, "Loss of RHR While RCS Partially Filled." Util will respond to certain aspects of generic ltr in future.

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FPL

SEPTEMBER 18 1987

L-87-390

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

Gentlemen:

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Generic Letter 87-12

Attached is Florida Power & Light Company's response to Generic Letter 87-12 for St. Lucie Units 1 and 2. As identified in the attachment, FPL will respond to certain aspects of this Generic Letter in the future.

This information is provided pursuant to 10 CFR 50.54(f).

If additional information is required, please contact us.

Very truly yours,

C. O. Woody
Group Vice President
Nuclear Energy

COW/EJW/gp

Attachments

cc: Dr. J. Nelson Grace, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

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EJW3/040/1

STATE OF FLORIDA)
) ss.
COUNTY OF PALM BEACH)

C. O. Woody being first duly sworn, deposes and says:

That he is a Group Vice President of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said Licensee.

C. O. Woody
C. O. Woody

Subscribed and sworn to before me this
18 day of September, 1987.

Dennise M. Dalius
NOTARY PUBLIC, in and for the County
of Palm Beach, State of Florida

My Commission expires: NOTARY PUBLIC STATE OF FLORIDA
MY COMMISSION EXP SEPT 18,1989
BONDED THRU GENERAL INS. UND.

LOSS OF RESIDUAL HEAT REMOVAL (RHR) WHILE THE REACTOR COOLANT SYSTEM (RCS) IS PARTIALLY FILLED (GENERIC LETTER 87-12)

ITEM #1

A detailed description of the circumstances and conditions under which your plant would be entered into and brought through a draindown process and operated with the RCS partially filled, including any interlocks that could cause a disturbance to the system. Examples of the type of information required are the time between full-power operation and reaching a partially filled condition (used to determine decay heat loads); requirements for minimum steam generator (SG) levels; changes in the status of equipment for maintenance and testing and coordinaton of such operations while the RCS is partially filled; restrictions regarding resting, operations, and ability of the RCS to withstand pressurization if the reactor vessel head and steam generator manway are in place; requirements pertaining to isolation of containment; the time required to replace the equipment hatch should replacement be necessary; and requirements pertinent to reestablishing the integrity of the RCS pressure boundary.

RESPONSE

The following is a summary of the sequence of events that would occur when taking the plant from power operation to a partially drained condition. Some of these steps may occur simultaneously:

(a) PSL would be brought from 100% power to Hot Standby using Control Element Assembly (CEA) insertion and boration.

(b) The RCS is borated to the required concentration for Shutdown Margin for a cooled down condition.

(c) The RCS is cooled using the Atmospheric Dump Valves (ADVs) or the Steam Bypass Control System (SBCS) dumps to the main condenser. Depressurization is accomplished using main or auxiliary spray.

(d) When the RCS temperature is less than 500°F and pressure is less than 1500 psia, the Safety Injection Tanks are isolated (325°F, 275 psia - PSL2).

(e) The Shutdown Cooling System is warmed.

(f) The LTOP (OMS-PSL 2) System is placed in service when RCS temperature is less than 340°F (286°F - PSL 2). These systems provide RCS overpressure protection while at low temperatures by opening PORVs on high RCS pressure. SDC relief valves are also in service to provide overpressure protection on PSL 2 once SDC is established.

(g) RCS pressure is lowered further and SDC is estalished. There is an interlock on the SDC suction valves which will isolate SDC when RCS pressure is excessive with respect to SDC piping requirements.

(h) RCPs are stopped. At this point all High Pressure Safety Injection (HPSI) pumps are racked out.

(i) The pressurizer is taken solid with the charging pumps, and pressure is maintained at less than or equal to 200 psia.

(j) All charging pumps are stopped, the RCS is depressurized and vented.

(k) The RCS is drained to either the Refueling Water Tank (RWT) or the Waste Holdup Tanks. Pressurizer level instrumentaion is monitored along with the tygon tube refueling level indicator during this draining. Direct communications are established between the control room and the refueling level indicator while draining. (PSL 2 has control room refueling level indication - See Item 2).

(l) RCS level is maintained at the desired level.

OTHER REQUESTED INFORMATION

The minimum total time to reach a drained condition from 100% power is approximately 34 hours utilizing a normal controlled shutdown. This includes two hours for power reduction, five hours for cooldown to SDC entry conditions, one hour to establish SDC, ten hours to cooldown and degas the RCS while on SDC, six hours to cool the pressurizer and ten hours to drain the RCS to mid nozzle (these times are based on outage experience).

Maintenance and testing is coordinated through the Nuclear Plant Supervisor (NPS)/Assistant Nuclear Plant Supervisor (ANPS) on shift. Any maintenance or tests performed while the RCS is drained would be done with extreme caution.

The time required to close the equipment hatch depends on whether equipment is being transported through the hatch. During certain outages, an air driven sled that runs on rails is utilized to transport heavy equipment, motors or materials. Once the load that is being transported is removed, FPL maintenance crews can secure the equipment hatch (4 bolts) in approximately 30 minutes. An additional 30 minutes would be required to completely bolt the hatch (time for testing requirements is not included).

ITEM #2

(2) A detailed description of the instrumentation and alarms provided to the operators for controlling thermal and hydraulic aspects of the NSSS during operation with the RCS partially filled. You should describe temporary connections, piping, and instrumentation used for this RCS condition and the quality control process to ensure proper functioning of such connections, piping, and instrumentation, including assurance that they do not contribute to loss of RCS inventory or otherwise lead to perturbation of the NSSS while the RCS is partially filled. You should also provide a description of your ability to monitor RCS pressure, temperature, and level after the RHR function may be lost.

RESPONSE

The following instrumentation and alarms are provided to the operators for controlling the RCS while drained:

(a) RCS Level - PSL 1 & 2 are both provided with clear tygon tube refueling level indicators. These are connected between a cold leg drain and the pressurizer vent. This tubing is routed through areas of low personnel traffic and is walked down to check for kinks prior to use. The pressurizer level and the tygon tube are compared during the first part of the drain to ensure proper functioning of the tube. Leakage from this tube could be detected and alarmed in the control room by the Reactor Cavity Leakage Detection System. PSL 2 also has a level transmitter that indicates refueling level in the control room. The reference leg system for this transmitter is planned to be upgraded and a similar remote indicator system is planned to be installed on PSL 1.

(b) RCS Pressure - Low range RCS pressure indication is provided in the control room. Two instruments are provided on PSL 1 and four are provided for PSL 2. High RCS pressure shuts the Shutdown Cooling suction valves. Instrument range available is 0-1600 psia (0-750 psia - PSL 2).

(c) RCS Temperature - Temperature is monitored using the suction and discharge temperatures of the shutdown cooling system. Instrument range is 0-400°F - PSL 2). This indication may not provide meaningful information should SDC flow be lost.

ITEM #3

(a) Identification of all pumps that can be used to control NSSS inventory include: (a) pumps you require be operable or capable of operation (include information about such pumps that may be temporarily removed from service for testing or maintenance); (b) other pumps not included in item a (above); and (c) an evaluation of items a and b (above) with respect to applicable TS requirements.

RESPONSE

(a) Pumps required to be available to control RCA inventory are the charging pumps and Low Pressure Safety Injection (LPSI) pumps. Two charging pumps would normally be operable with the third charging pump tagged out of service to preclude dilution events. Two LPSI pumps would be operable.

(b) PSL 1 has three High Pressure Safety Injection (HPSI) pumps and PSL 2 has two HPSI pumps. These would be tagged out of service when the RCS loops are in a drained condition, but one pump could be utilized for inventory control if charging was unavailable.

(c) Technical Specifications require at least one charging pump or one HPSI pump to be operable as a boration flow path. Two LPSI pumps are required to be operable with one operating. The operating LPSI pump may be shut down for up to one hour provided the RCS is not diluted and it is maintained

subcooled greater than 10°F. The nonoperating loop can be inoperable for up to two hours for surveillance testing. If the RCS is open to atmosphere and normal RWT level is maintained makeup can be provided to the RCS from the RWT by gravity feed.

ITEM #4

A description of the containment closure condition you require for the conduct of operations while the RCS is partially filled. Examples of areas of consideration are the equipment hatch, personnel hatches, containment purge valves, SG secondary-side condition upstream of the isolation valves (including the valves), piping penetrations, and electrical penetrations.

RESPONSE

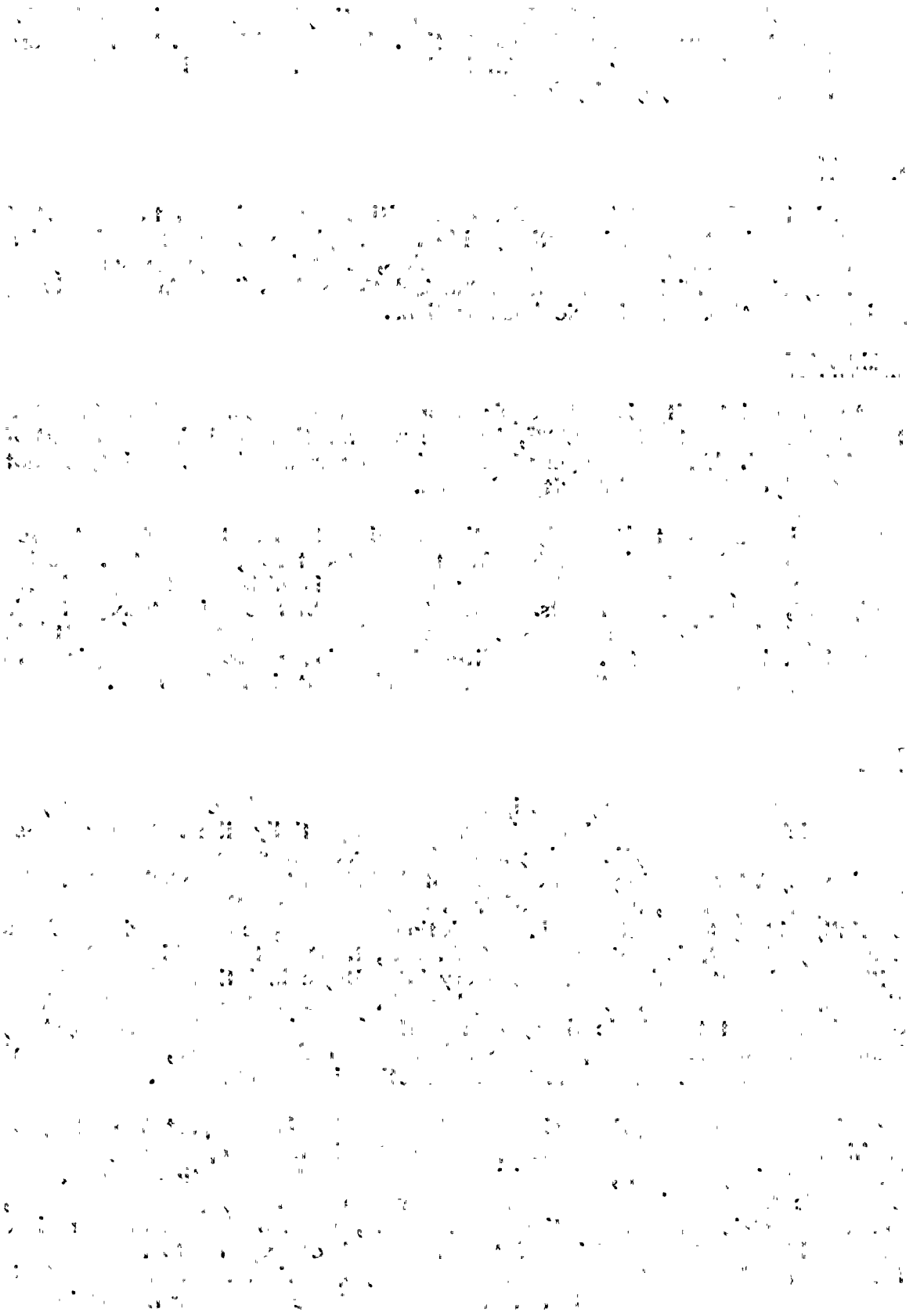
Containment integrity is not required or maintained except when the RCS temperature is greater than 200°F, during core alterations or during movement of irradiated fuel. If refueling operations are in progress and SDC capability cannot be restored, containment integrity is insured.

As noted in response to Item #1, the time required to close the equipment hatch depends on whether equipment is being transported through the hatch. During certain outages, an air driven sled that runs on rails is utilized to transport heavy equipment, motors or materials. Once the load that is being transported is removed, FPL maintenance crews can secure the equipment hatch (4 bolts) in approximately 30 minutes. An additional 30 minutes would be required to completely bolt the hatch (time for testing requirements is not included).

ITEM #5

Reference to and a summary description of procedures in the contol room of your plant which describe operation while the RCS is partially filled. Your response should include the analytic basis you used for procedures development. We are particularly interested in your treatment of draindown to the condition where the RCS is partially filled, treatment of draindown to the condition where the RCS is partially filled, teatment of minor variations from expected behavior such as caused by air entrainment and de-entrainment, treatment of boiling in the core with and without RCS pressure boundary integrity, calculations of approximate time form loss of RHR to core damage, level difference in the RCS and the effect upon instrumentation indications, treatment of air in the RCS/RHR system, including the impact of air upon NSSS and instrumentaion response, and treatment of vortexing at the connection of the RHR suction line(s) to the RCS.

Explain how your analytic basis supports the following as pertaining to your facility: (a) procedural guidance pertinent to timing of operations, required instrumentation, cautions, and critical parameters: (b) operations control and communications requirements regarding operations that may pertrub the NSSS, including restrictions upon testing, maintenance, and coordination of operations that could upset the condition of the NSSS; and (c) response to loss of RHR, including regaining contol of RCS heat removal, operations involving the NSSS if RHR cannot be restored, control of effluent from the containment if containment



was not in an isolated condition at the time of loss of RHR, and operations to provide containment isolation if containment was not isolated at the time of loss of RHR (guidance pertinent to timing of operations, cautions and warnings, critical parameters, and notifications is to be clearly described).

RESPONSE

FPL is evaluating this item and a draft report dated September 1, 1987, provided by Combustion Engineering that deals with loss of RHR. The response to this item will be provided in a separate letter.

ITEM #6

A brief description of training provided to operators and other affected personnel that is specific to the issue of operation while the RCS is partially filled. We are particularly interested in such areas as maintenance personnel training regarding avoidance of pertrubing the NSSS and response to loss of decay heat removal while the RCS is partially filled.

RESPONSE

Reactor Operators are trained on the Shutdown Cooling (SDC)/Low Pressure Safety Injection System off normal Operating Procedure. This procedure provides guidance to not start the redundant LPSI pump when SDC is lost until determining the reason for losing the running pump. It also gives specific instructions on reestablishing SDC flow should it be lost due to a lowering of RCS level in addition to other off normal events. PSL has SDC training modules that cover SDC operations and emergency response. The Reactor Operators are trained on the loss of SDC event and other industry events of this type. Maintenance and testing is coordinated through the NPS/ANPS on shift. Any maintenance of test performed while the RCS is drained would be done with extreme caution. Reactor Operators are also trained on the instructions provided in the Draining Reactor Coolant System Operating Procedure.

ITEM #7

Identification of additonal resources provided to the operators while the RCS is partially filled, such as assignment of additional personnel with specialized knowledge involving the phenomena and instrumentation.

RESPONSE

Personnel with additional specialized knowledge beyond that of the Reactor Operators are not assigned. An additional person continuously monitors RCS level during level changes.

ITEM #8

Comparison of the requirements implemented while the RCS is partially filled and requirements used in other Mode 5 operations. Some requirements and procedures followed while the RCS is partially filled may not appear in the other modes. An example of such differences is operation with a reduced RHR flow rate to minimize the likelihood of vortexing and air ingestion.

RESPONSE

Technical Specifications require that when the RCS loops are not filled, two SDC loops must be operable with one operating. With the RCS loops filled, only one SDC loop is required to be operable and operating. If one SDC Loop is inoperable with the loops filled, the secondary side water level must be greater than 10% indicated on the narrow range instruments for both steam generators. Procedural requirements prohibit draining the RCS below the hot leg centerline. Also, continuous monitoring of the refueling level is required while draining.

ITEM #9

As a result of your consideration of these issues, you may have made changes to your current program related to these issues. If such changes have strengthened your ability to operate safety during a partially filled situation, describe those changes and tell when they were made or are scheduled to be made.

RESPONSE

FPL considers that PSL, at this time, is adequately protected for the loss of SDC event. We are, however, planning enhancements to the RCS level remote indication on PSL 1 and PSL 2. PSL 2 has control room indication. It will be provided with a reference leg connection to the pressurizer to eliminate level variations due to RCS pressure changes. PSL 1 will be provided with a similar design as it does not have remote indication at this time. The engineering design packages are currently scheduled for release on September 18, 1987, and July 15, 1988, for PSL 2 and PSL 1, respectively. Procedures were reviewed and precaution and steps were added after reviewing prior industry operating event experience, specifically, Significant Operating Event Report 85-4, Significant Event Report (SER) 60-83, SER 79-84, etc.