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RECIP. NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to Generic Ltr 87-12. Util requested Westinghouse Owners Group to evaluate time response for loss of RHR w/estimates of potential core damage & radioactive releases. Info will be provided when available.

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FPL

SEPTEMBER 17 1987

L-87-380

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

Gentlemen:

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Generic Letter 87-12

Attached is FLorida Power & Light Company's (FPL) response to Generic Letter 87-12 for Turkey Point Units 3 and 4.

FPL has requested the Westinghouse Owners Group (WOG) to evaluate the time response for loss of RHR with estimates of potential core damage and radioactive releases. We have been advised that a project authorization is being prepared for WOG approval. FPL will provide that information when it is made available.

Should there be any questions on this information, please contact us.

Very truly yours,

C. O. Woody
Group Vice President
Nuclear Energy

COW/RG/gp
Attachment

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

A061
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STATE OF FLORIDA)
) ss.
COUNTY OF PALM BEACH)

J. W. Dickey being first duly sworn, deposes and says:

That he is Vice President of Nuclear Operations 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.

J. W. Dickey

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

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.

ATTACHMENT

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Generic Letter 87-12

REQUEST 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 operating 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 coordination of such operations while the RCS is partially filled; restrictions regarding testing, operations, and maintenance that could perturb the nuclear steam supply system (NSSS); 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 Turkey Point Units 3 and 4 reactor and secondary system is a Westinghouse designed 3-loop Nuclear Steam Supply System. This system requires draining to mid-nozzle when maintenance activities on the steam generator tubes (i.e., eddy current, tube plugging) or piping systems that penetrate the RCS loops is required.

UNIT SHUTDOWN FOR MAINTENANCE

During the normal process to shutdown the unit and cool the RCS to Cold Shutdown, the following sequence of events occurs:

a) All control rods are fully inserted and the RCS is borated to Cold Shutdown, xenon free boron concentration.

b) As the RCS is depressurized below 2000 psi, the safety injection low pressurizer pressure block is energized.

c) A cool down rate is established which has a Technical Specification maximum limit 100°F per hour.

d) This cooldown, from 547°F to 350°F utilizing the steam generators to remove residual and decay heat requires approximately 6 hours.

e) The Operations Department requires approximately 18 hours for testing and alignment of equipment and then perform the Cold Shutdown clearance, prior to reducing the RCS to below 350°F.

f) The RHR system is placed in service for cooldown below 350°F. The RHR system becomes the primary means of removing decay heat and the steam generators become the secondary means.

g) The RCS is then cooled to below 200°F. The RHR design is such that approximately 20 hours is required to reduce the RCS temperature from 350°F to 140°F. While RHR is in service, an interlock is activated that will isolate the RHR suction to the RCS if the RCS pressure increases above 525 psig. Also during this cooldown all reactor coolant pumps are shutdown and secured.

In summary the time required to shutdown and cooldown is estimated to be 44 hours (6+18+20) utilizing the maximum cooldown rates and past performances in testing, re-alignment and securing equipment for a normal shutdown.

Once drained to mid-nozzle, the maintenance activities are scheduled and reviewed by the plant staff (operations, technical and engineering) at the outage planning meetings, held two or three times daily depending on the number of shifts that are being worked. Prior to beginning work on the primary system, the Operations Department would issue and hang equipment clearances for the piping systems which require maintenance.

RCS PRESSURE CAPABILITY

Previous calculations, performed in 1981, determined that the maximum acceptable pressure for the RCS in a Cold Shutdown condition was 1100 psi.

EQUIPMENT HATCH CLOSURE TIMES

The time required to close the equipment hatch depends on what 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 through the hatch. Removal of this sled requires approximately 15 minutes once the load that is being transported is removed. Therefore, FPL maintenance crews can secure the equipment hatch (4 bolts) in approximately 1/2 hour to one hour depending on equipment hatch status. An additional 30 minutes would be required to completely bolt the hatch.

RCS INTEGRITY TIME

The time required to re-establish RCS integrity depends on many conditions, such as, whether or not the head is tensioned; the steam generators manways are off or on; and whether the maintenance activity being performed involves the removal of a loop isolation valve. Therefore, this estimate can range from 15 minutes, to replace a check valve bonnet, to several hours, to retorque a steam generator manway or the reactor head.

REQUEST 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

When the RCS is at mid-nozzle, the pressurizer PORV must be operable or an opening of greater than 2.2 sq. inches be provided in accordance with Technical Specifications. Therefore, the RCS would be near or at atmospheric pressure. The RCS pressure transmitters PT-*-403 and PT-*-405, which display in the control room provide the interlock function for RHR isolation.

RCS level is provided by a "Drain Down" level transmitter LT-*-6421 for accurate level indication in the control room. An alarm function is provided to all three steam generator manway platforms for water rising above mid-nozzle setpoint (18' elevation) to allow clearing of the steam generator and the primary nozzles and plenums. This transmitter utilizes an atmospheric reference leg. In addition to the level transmitter a tygon hose is attached to a 3/8" drain tap to allow static head level indication inside the containment.

REQUEST 3

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

Turkey Point has the following pumps available per unit when drained to mid-nozzle:

a) RHR pumps (2) - both operable and required by Technical Specifications.

Charging pumps (3) - one pump required to be operable and aligned for boration of RCS as required by Technical Specifications.

Primary water pumps (2) - one required for station service operation but not required by Technical Specifications.

Maintenance and testing is allowed as long as the Technical Specifications are not violated.

b) Safety injection pumps (4) - not aligned and associated valve's breakers racked out for cold operation. However, these pumps could be utilized in an emergency situation.

c) Technical Specification requirements were provided in responses to a and b.

REQUEST 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

Turkey Point Technical Specifications (TS) require containment integrity to be established if the RCS temperature is above 200^0F (TS 3.3) or if core alterations are being performed in Mode 6 (TS 3.13). The RCS would not be drained to mid-nozzle during either of these conditions. During Mode 5 with the RCS borated to a xenon free boron concentration and both trains of RHR available, containment integrity is not required. It is during this condition that maintenance activities are performed. These include preparation for the reactor head detensioning prior to refueling, eddy current testing on the steam generators and performing other maintenance on the RCS loops as necessary. The purge system is routinely in operation providing cooling air for personnel and the equipment hatch is open to support maintenance.

REQUEST 5

Reference to and a summary description of procedures in the control 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 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 from loss of RHR to core damage, level differences 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 instrumentation 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 perturb the NSSS, including restrictions upon testing, maintenance, and coordination of operations that could upset the condition of the NSSS; and (c) responses to loss of RHR, including regaining control 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

Provided as attachments to this response are Off-Normal Operating Procedures 3208.1 "Malfunction of Residual Heat Removal System" and 4-ONOP-050 "Loss of RHR" to demonstrate various methods available to the operators to maintain RCS inventory, maintain core cooling and re-establish RHR system operation. Also provided is the Cold Shutdown administrative procedure (ADM 103.32), Pages 5 and 6, which provide instructions for RHR operation and mid-nozzle operation (pages provided).

Westinghouse provided Operations Instruction M-1 "Draining the Reactor Coolant System" dated August 1969, which was used as a basis for the normal operating procedures and refueling procedures used to start-up the Turkey Point Units in 1972 and 1973. Since that time, these procedures have evolved incorporating industry and plant events. In response to I&E Notice 80-20, Loss of RHR While at Refueling at Davis-Besse, Turkey Point modified its Loss of RHR procedure to incorporate use of the RWST to flood the core. New procedures and changes were made in response to INPO SOER 85-4. These changes include a step in the cold shutdown procedure on how to correct vortexing and air-entrainment of an RHR pump. It should be noted here, that at Turkey Point, the elevation difference between the RHR pumps and mid-nozzle is such that the pumps will vent themselves when stopped.

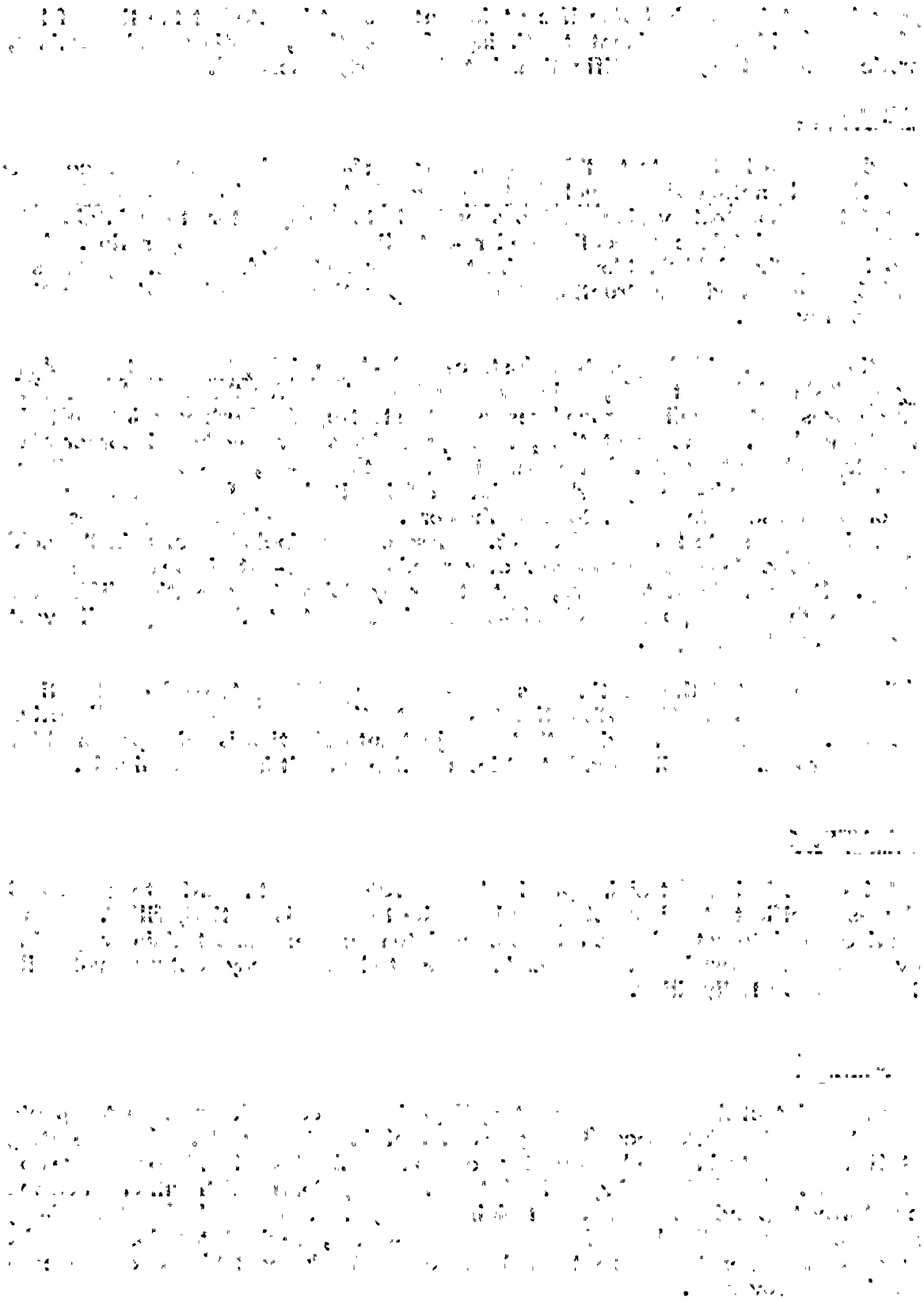
FPL has requested the Westinghouse Owners Group (WOG) to evaluate the time response for loss of RHR with estimates of potential core damage and radioactive releases. We have been advised that a project authorization is being prepared for WOG approval. FPL will provide that information when it is made available.

REQUEST 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 perturbing the NSSS and response to loss of decay heat removal while the RCS is partially filled.

RESPONSE

Turkey Point utilizes the of Operating Experience Feedback Program to update operators and maintenance (I&C) personnel of industry events. The operating staff has been trained and has performed parts of the loss of RHR procedures on simulators. FPL is installing a simulator at Turkey Point which will enhance the capability to provide loss of RHR training. FPL, in response to I&E Notice 80-20, Loss of RHR While In Refueling at Davis-Besse, revised the loss of RHR procedure. Operators were trained on new methods available to assure core cooling and coverage.



The operators at Turkey Point have already reviewed I&E Notice 87-23, concerning the Diablo Canyon incident, during Cycle II of this year's licensed operator requalification program. Generic Letter 87-12 will also be presented in an upcoming cycle of the requalification program.

REQUEST 7

Identification of additional 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

At Turkey Point Plant, FPL has installed a drain down reactor vessel level indication which has a readout indicator on Vertical Panel B, the panel next to the operators console. This additional level indication system was added in response to plant events and INPO SOER 85-4 recommendations. Additional system enhancements will be evaluated as an on-going process, such as enhancements made to the draindown level indication as recommended in INPO SOER 85-4.

The Shift Technical Advisor, who is a degreed member of the plant staff is trained on plant responses to thermal-hydraulic transients and the proper actions required to mitigate such events.

REQUEST 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

FPL implemented several procedure changes in response to reviews conducted in response to INPO SOER 85-4. These procedure changes included additional notes, cautions, and a recovery step which addresses the Loss of RHR due to air entrainment, should it occur. In addition, the Westinghouse evaluation report, which is in the review process, at this time, has, as one of its recommendations, a new lower RHR flow value to be utilized while the RCS is drained down.

REQUEST 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 safely during a partially filled situation, describe those changes and tell when they were made or are scheduled to be made.

RESPONSE

FPL implemented procedure changes and provided training to the operators following the Loss of RHR at Davis-Besse in 1980 (I&E Notice 80-20). In response to NUREG 0737, FPL implemented and has maintained an Operating Experience Feedback Program. This program has been responsible for changes made to plant operations and equipment modifications. Specifically, enhancements to the drain down level indication system was a result of FPL's feedback program. This process is on-going and the analysis and recommendations provided to respond to the issues raised in Generic Letter 87-12 will be incorporated into plant operations in the same manner that the previous notices have been analyzed and addressed.

ATTACHMENTS

1) ADMINISTRATIVE PROCEDURE 0103.32
REACTOR COLD SHUTDOWN CONDITION
Pages 5 and 6

2) OFF-NORMAL OPERATING PROCEDURE 3208.1
MALFUNCTION OF RESIDUAL HEAT REMOVAL SYSTEM

8.0 Instructions:

8.1 Complete Table 1 to independently verify proper system alignment for cold shutdown conditions. Perform additional independent verification as required.

8.1.1 If Position/Status is as indicated in Table 1, initial the Independent Verification block.

8.1.2 If Position/Status is NOT as indicated in Table 1, indicate Position/Status, initial, complete Table 2, Discrepancy Evaluation Sheet (DES) and notify the PS-N.

8.1.3 The PS-N is responsible to ensure that the required evaluation is done and appropriate action is taken. The PS-N shall sign the DES and indicate the Position/Status in which to be left. If no change from the as found condition is necessary, the PS-N shall N/A the remaining blocks.

8.1.4 If change from the "As Found" condition is required, the person performing the change shall take action accordingly and initial the "Positioned By" block.

8.2 Verify that the controller for FCV-*-605 (VPB) is in auto and maintaining RHR flow between 3000 GPM and 5000 GPM.

CAUTION: DO NOT RUN MORE THAN ONE RHR PUMP WITH ONLY ONE RHR HEAT EXCHANGER IN SERVICE.

CAUTION: DO NOT EXCEED 3750 GPM AS SEEN ON FI-*-605 WITH ONE RHR HEAT EXCHANGER IN SERVICE.

8.3 Maintain RCS temperature between 70°F and 190°F, by operating the HCV-*-758 hand controller (VPB). Opening HCV-*-758 will reduce RCS temperature and closing HCV-*-758 will increase RCS temperature.

CAUTION: Open and close HCV-*-758 slowly to avoid rapid RCS temperature changes.

8.4 If temperature cannot be controlled between 70°F and 190°F, go to ONOP-3208.1, Malfunction of Residual Heat Removal System.

8.5 Maintain RCS level by balancing charging flow and letdown flow. Verify stable VCT level indication.

8.6 RCS level may be changed by either of two methods:

8.6.1 To lower RCS level, increase letdown flow by opening HCV-*-142 (VPB) OR by decreasing charging flow by either decreasing speed of running charging pump(s) (console) or closing HCV-*-121 (console).

8.6.2 To raise RCS level, decrease letdown flow by closing HCV-*-142 (VPB) OR by increasing charging flow by increasing speed of running charging pump(s) (console) or opening HCV-*-121 (console).

CAUTION: When raising RCS level, verify proper operation of the VCT level makeup system. Ensure that the makeup water contains the proper boron concentration to prevent the possibility of inadvertant RCS dilution.

8.7 MID NOZZLE LEVEL OPERATIONS - When the RCS is drained to mid nozzle, carefully monitor RHR pump amperage and RHR flow. Erratic indications on either requires immediate operator action to raise RCS level. If erratic amperage or flow are indicated, perform the following:

8.7.1 Adjust FCV-*-605 and HCV-*-758 (as necessary) to reduce RHR flow as seen on FI-*-605 (VPB). THEN:

CAUTION: Monitor RCS temperature and RHR pump outlet temperature closely to maintain RCS temperature below 190°F.

8.7.2 Raise RCS level as dictated in Step 8.6.2 of this procedure.

8.8 BORIC ACID FLOW PATHS TO THE CORE: When fuel is in the reactor there shall be at least one flow path to the core for boron injection by the CVCS.

8.8.1 During Cold Shutdown conditions, the Preferred flow path to the core is:

BASTs through Boric Acid Transfer Pumps through *-113A and *-113B (Console) to Charging Pump(s) suction. Charging pump(s) discharge through their normal charging path via HCV-*-121 (Console) and *-310A or *-310B (Console).

If *-113A or *-113B is unavailable, use MOV-*-350 (Console) to supply boric acid to Charging Pump(s) suction. If *-113A is available by *-113B and MOV-*-350 are unavailable, use *-113A and *-356 (local) to supply boric acid to Charging Pump(s) suction.

8.8.2 The preferred alternate flow path to the core is:

RWST through LCV-*-115B (VPB) to Charging Pump(s) suction. Charging Pump(s) discharge through their normal charging path via HCV-*-121 (Console) and *-310A or *-310B. If LCV-*-115B is inoperable, V-*-358 may be used to supply boric acid to the charging pump(s) suction.

8.8.3 An acceptable Alternate flow path to the core THAT WILL WORK ONLY WHEN THE RCS IS DEPRESSURIZED AND DRAINED TO MID NOZZLE IS:

RWST through *-864A (VPB) and *-864B (VPB) through *-887 (local) and the alternate low head SI flow path, *-872 (VPB).