NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION

UNIT II OPERATIONS

02-REQ-006-344-2-03 Revision 4

TITLE: EMERGENCY OPERATING PROCEDURES, RPV WATER LEVEL CONTROL (RL)

	SIGNATURE	DATE
PREPARER		8/30/90
TRAINING SUPPORT SUPERVISOR		9-28-90
TRAINING AREA SUPERVISOR		9/6/90
PLANT SUPERVISOR/ USER GROUP SUPERVISOR		9/7/90

Summary of Pages

(Effective Date: 9/28/90)

Number of Pages:	23
Date	1 Pages
September 1990	

TRAINING DEPARTMENT RECORDS ADMINISTRATION ONLY:

VERIFICATION: _____ _____

DATA ENTRY: _____ _____

RECORDS: _____ _____

4/29/006

I. TRAINING DESCRIPTION

A. Title of Lesson: Emergency Operating Procedure, RPV Water Level control (RL)

B. Lesson Description: This lesson discusses the actions taken to control RPV water level.

C. Estimate of the Duration of the Lesson: Approximately 1 hour

D. Method of Evaluation, Grade Format, and Standard of Evaluation: Written Examination with 80% minimum passing grade.

E. Method and Setting of Instruction:

1. Classroom Lecture
2. Assign the Student Learning Objectives as review problems with the students obtaining answers from the text, writing them down and handing them in for grading.

F. Prerequisites:

1. Instructor:
   a. Qualified in instructional skills per NTP-16 and/or 16.1.
2. Trainee:
   a. In accordance with NTP-10 and NTP-11 or
   b. Be recommended for this training by the Operations Superintendent or his designee or by the Training Superintendent.

G. References:

BWROG Emergency Procedure Guidelines, Rev. 4,
Plant Procedure N2-EOP-RL

II. REQUIREMENTS

A. AP-9, Administration of Training

B. NTP-10, Training of Licensed Operator Candidates

C. NTP-11, Licensed Operator Requalification Training

III. TRAINING MATERIALS

A. Instructor Materials:

1. Transparency Package
2. Overhead Projector
3. Whiteboard and Felt Tip Markers
4. EOP Flowchart for RL

B. Trainee Materials:

1. EOP Flowchart for RL

IV. EXAM AND MASTER ANSWER KEYS

Will be generated and administered as necessary. They will be on permanent file in the Records Room.

V. LEARNING OBJECTIVES

A. Terminal Objectives:

TO-1.0 Given conditions requiring the use of the Emergency Operating Procedure, use the procedure to place the plant in a stable condition as prescribed in the procedure.

B. Enabling Objectives:

EO-1.0 State the purpose of the RPV Water Level Control Procedure.

EO-2.0 State the entry conditions for the RPV Water Level Control Procedure.

EO-3.0 Given the procedural step, discuss the technical basis for that step.

LESSON CONTENT	DELIVERY NOTES	OBJECTIVES/ NOTES

I. INTRODUCTION

A. Student Learning Objectives

B. Purpose

Provide actions necessary to restore and maintain RPV water level to above the Top of Active Fuel and thereby maintain adequate core cooling.

EO-1.0

C. Procedure Overview

1. The RPV Water Level Control procedure is executed concurrently with the following procedures:
   a. N2-EOP-RP RPV Pressure Control
   b. N2-EOP-RQ RPV Reactivity Control
2. Concurrent execution of these procedures is necessary because:
   a. The actions taken to control any one RPV parameter may directly affect control of the others.
   b. This procedure is based on the symptomatic approach to emergency response, where the initiating event of the transient is not known in advance. Assignment of priorities to any one of the three parameters is therefore not possible. Primary concern of the operator should be, "I am controlling Reactor Level via use of": Section RL.

3. The values and trends of parameters, and the status of plant equipment during the event will dictate the order of execution of each flowpath (procedure).

II. DETAILED DESCRIPTION

A. Entry Conditions

1. Setpoints

a. The conditions which require entry into this procedure are:

- RPV Water Level below 159.3 in.
- RPV Pressure above 1037 psig.
- Drywell Pressure above 1.68 psig.
- Rx power above 4% OR unknown
  AND
  a Scram is required.

EO-2.0

b. The occurrence of any one of these conditions requires entry into this procedure.

c. If an entry condition clears prior to exiting this procedure, and then re-occurs, re-entry at the beginning of the procedure is required.

d. If a second entry condition occurs while performing the procedure, re-entry at the beginning is again required.

e. If all entry conditions clear while executing this procedure, this procedure may be exited.

f. Termination of the emergency rather than termination of an event is the basis for exiting conditions for EOP's. Consequently, these procedures may be exited at any point during their execution if the operator determines that an emergency no longer exists. The EOP's have been written so that if an operator remains in a procedure when an emergency no longer exists, they still provide proper guidance. Alternately, if the operator exists a procedure prematurely, reoccurrence of an entry condition will follow and the appropriate EOP procedure will be re-entered.

TMR #02-88.232
Noted weakness on previous NRC Requal exam.

2. Setpoint Bases

   a. The values selected were chosen on the basis of being simple, readily identifiable and operationally significant. They also provide advance warning of potential emergency conditions, allowing action to be taken which may prevent more sever circumstances.

   b. The entry conditions address the following plant conditions: EO-2.0

      1) RPV Water Level below 159.3 in

         - Addresses LOCAs where make up flow is inadequate for break flow.
         - Although RPV water level at the low level Scram setpoint does not in itself constitute an emergency, correct & prompt operator action is required.
         - The setpoint is sufficiently high to allow prompt correct operator action restore RPV level without automatic initiation of ECCS.

2) RPV pressure above 1037 psig
   - SRV failures
   - Turbine trip with bypass valve failure
     - Indirectly addresses steam line breaks and/or fuel failures which both cause MSIV closure.

3) Drywell pressure above 1.68 psig
   - LOCAs inside the Drywell
   - Loss of Drywell cooling

4) Reactor power above 4% or unknown
   AND
   a Scram is required
   - Failure to Scram events where the Reactor remains at power.
   - 4% is the APRM downscale setpoint.
     - Loss of APRMs, for any reason, does <u>not</u> constitute inability to determine power. Other means, such as
     * Reactor period

* steam flow, pressure
* main generate load, etc.

B. Procedural Steps

1. Execute EOP-RL, RP and RQ concurrently.

   Show TP or flowchart of RL when discussing steps. EO-3.0

   a. As previously discussed, concurrent control of all three RPV parameter is required when taking action to control any one of them.

2. Execute the following two steps concurrently:

   a. Activate the emergency plan, if required, in accordance with EAP-1.

   EAP-1 gives guidance on how to activate the plan. The SSS needs to determine if the plan will be activated.

   b. Has a Reactor Scram been initiated?

      1) A "Yes" answer directs the operator to each leg in the RPV Control Procedure.

      2) A "No" answer directs the operator to initiate a Scram prior to entry into the RPV Control Procedure.

         • The purpose of this step provides for a Scram initiation if entry is directed from a procedure where no condition existed which would have Automatically initiated a Scram. EO-3.0

- Re-entry into this procedure is required whenever any entry condition occurs or re-occurs. However, a Reactor Scram need to be initiated only once.

3. Along with the entry conditions for RPV Control, Section RL may be entered from the following contingency procedures:

   a. Contingency #1, Alternate Level control. EO-2.0
      - Whenever RPV water level is determined to be rising.

   b. Contingency #2, RPV Flooding
      - Whenever RPV water level can be determined AND all control rods are inserted to or beyond position 02 OR the Reactor will remain shutdown under all conditions without boron.
      - After RPV water level indication has been restored within the Maximum Core Uncovery Time Limit.

c. Contingency #5, Level/Power Control
   - Whenever all control rods are inserted to or beyond position 02 or the Reactor will remain shutdown under all conditions without boron.

d. Contingency #6, Primary Containment Flooding
   - Whenever RPV water level can be restored and maintained above -14 inches.

4. Monitor and control RPV water level
   - The possibility exists that RPV water level is not the concern, this step provides instruction to monitor level and maintain adequate core cooling by submergency as directed by the following steps.

EO-3.0

a. An RPV water level instrument may be used to determine RPV water level only when:

   1) The hottest Drywell temperature is below the RPV Saturation Temperature.

Show TP of Fig. RPV-1

2) For each of the instruments in the table below, the instruments reads above the Minimum Indicated level.

Basis for caution discussed in Lesson Plan 21.

Review Instrument table on EOP-RPV Control.

5. Initiate any of the following which should have initiated but did not.

EOP-6, Att. 1

a. Isolation

1) Actions taken to initiate an isolation may terminate a loss of Reactor coolant inventory and simplify RPV level control.

EO-3.0

b. ECCS

1) Actions taken to initiate ECCS will align sources of water and start pumps for injection into the RPV. Detailed instructions to operate these systems to establish and maintain control of RPV level are provided in subsequent steps.

EO-3.0

2) ECCS injection may or may not simplify RPV water level control, depending upon whether or not high injection flowrates are required.

6. While executing the following step:

   a. IF

      All control rods are not inserted to at least position 02

      AND

      The Reactor will not remain shutdown without boron

      - All rods inserted to or beyond position 02 is positive confirmation that the Reactor will remain shutdown under all conditions.

      Max. Subcritical Banked Rod Withdrawal Position EO-3.0

      - Reactor Analysts will determine if adequate Shutdown Margin exists.

      THEN

      Exit section RL of this procedure and enter C5, Level/Power Control.

      - If any possibility exists the Reactor will not remain shutdown, then the actions specified in Level/Power are appropriate, but are not consistent with the instructions of RL therefore exiting RL is required.

      EO-3.0

b. IF
RPV water level cannot be determined
THEN
Exit Section RL of this procedure and enter C4, RPV Flooding.

- Since the actions specified in this procedure require water level trend information, a loss of water level indication required an exit from this procedure. RPV flooding is entered to assure continued adequate core cooling.

EO-3.0

c. IF
Primary Containment water level and Suppression Chamber pressure cannot be maintained below the Maximum Primary Containment Water Level Limit.
THEN
Terminate injection into the Primary Containment from sources outside the until the Primary Containment pressures are below the curve.

Show TP of Fig. RPV-10

Show TP of Fig. RPV-10

- With water level above this limit, effective Primary Containment venting capability is lost.

EO-3.0

- These actions are taken, irrespective of whether adequate core cooling is assured.
- SRVs may not be able to be manually opened.

7. Restore and maintain RPV level between 159.3 in. and 202.3 in using one or more of the systems listed below.
   - This step defines the preferred range in which the RPV water level should be maintained.
   - The upper limit corresponds to the level at which RCIC shuts down, feedpump trips and main turbine trips. Maintaining level below this point preserves these systems for future use in controlling level.
   - The lower limit assures adequate core cooling, allows the use of normal shutdown cooling systems and allows for setting the Scram.
   - This wide control band was selected because:
     - Sufficient to assure adequate core cooling and stabilize the plant.

EO-3.0

- Avoids unwarranted demands on the operator's attention.

EO-3.0

- Efforts necessary to restore RPV level may entail a wide variety of actions and decisions, depending upon plant conditions cannot be known in advance specific systems or methods of level control cannot be given.
- The operator is cautioned at this point to be aware of possible automatic ECCS injection and to assure adequate core cooling is available prior to securing these ECCS pumps.

a. Condensate/feedwater

b. CRD

c. RCIC with suction from the CST

1) Maintain turbine speed greater than 1500 rpm.

2) Elevate Suppression Chamber pressure may trip the RCIC turbine.

3) Defeat low RPV pressure isolation interlocks if necessary.

- Ensures the highest quality water is used for injection with RCIC suction from CST.

d. HPCS

1) Control and maintain pump flow less than the HPCS Vortex Limit flow.

2) Observe NPSH requirements when taking suction from the Suppression Pool.

- Throttling of HPCS flow will have little effect on NPSH and may cause further problem.

EO-3.0

e. LPCS

Show TP of Fig. RPV-3

1) Control and maintain pump flow less than the LPCS Pump NPSH Limit.

2) Control and maintain pump flow less than the LPCS Vortex limit.

Show TP of Fig. RPV-6

f. LPCI

1) Inject through the heat exchangers as soon as possible.

- Promotes rapid removal of heat, minimizing Suppression Pool heatup prolonging availability of pool as a heat sink.

EO-3.0

- "As Soon as Possible", means at the earliest possible time within the constraints imposed by interlocks, stroke times, and concurrent operator actions.

EO-3.0

2) Control and maintain pump flow less than the RHR Pump NPSH Limit. — Show TP of Fig. RPV-4

3) Control and maintain pump flow less than the RHR Vortex Limit. — Show TP of Fig. RPV-7

8.

a. IF

RPV water level cannot be restored and maintained above 159.3 in.

THEN

1) Maintain RPV water level above -14 in.

2) Augment RPV water level with one or more of the systems listed below

- RHR service water crosstie
- Fire System
- ECCS keep full systems

- SLC (test tank)
- SLC (boron tank)
- Condensate transfer

a) If RPV cannot be maintained above the lower level Scram setpoint, an alternative control range with a lower limit is defined, as part of original step to allow the operator to re-establish level bands as the ability to do so becomes apparent. EO-3.0

b) The lower limit provides added operational flexibility while still assuring adequate core cooling through core submergence. It also provides additional time to place injection systems, not yet operating, inservice.

c) Widened band also accommodate breaks below the low water level Scram setpoint and TAF where break flow is greater than injection flow.

b. IF
RPV water level can be maintained above -14 in.
AND
The ADS timer has initiated
THEN
Place the ADS Logic inhibit switches in "ON".

1) If the operator has determined that RPV level can be maintained above -14 in, it is appropriate to prevent ADS initiation since 1) ADS imposes a severe pressure and temperature transient on the RPV, 2) complicates efforts to restore and maintain level, and 3) In severe cases with no low pressure injection systems available, may create a loss of adequate core damage which other wise could have been avoided.

2) The defeating of ADS initiation is appropriate because

Placing the ADS logic inhibit switches to on is the approved NMP2 method for preventing ADS initiation.

EO-3.0

a) The conditions assumed in the design of the ADS logic (e.g., no operator action for 10 minutes) do not exist when the operator is carrying out the actions of this procedure.

b) The operator has access to much more information than is available to the ADS logic and therefore can better judge when and how to depressurize the RPV to minimize transient loads and optimize adequate core cooling.

EO-3.0

c. IF

RPV water level cannot be maintained above -14 in.

THEN

Exit section RL of this procedure and enter C1, Alternate Level Control.

Show entry point into EOP-C1

1) If RPV water level cannot be maintained above the Top of Active Fuel (-14 in) using the preferred systems previously listed, the more explicit instructions of EOP-C1 must be performed to assure continued adequate core cooling. EO-3.0

9. WAIT until OP-101C is entered from EOP-RPV at "D" OP-101c is the normal shutdown procedure. EO-3.0

- When point D is reached in Section RP shutdown has been achieved by either; control rod insertion OR boron injection to the Cold Shutdown boron weight.

10. Exit section RL of this procedure and proceed to cold shutdown IAW OP-101C.

a. After RPV pressure has been reduced to below the shutdown cooling interlocks, normal operating procedures provide the appropriate instructions for control of RPV water level.

III. WRAP-UP

The RPV water level control procedure (RL) restores and maintains RPV water level to above the Top of Active Fuel, thereby assuring adequate core cooling. When this cannot be accomplished with the preferred systems listed or when plant parameters require different actions to control RPV water level, appropriate instruction to exit this procedure and enter other EOPs are provided. Likewise, instructions to re-enter this procedure when plant conditions require are provided in various other EOPs.