NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION

UNIT II OPERATIONS

02-REQ-006-344-2-20 Revision 0

TITLE: INTRODUCTION TO EOP'S

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Summary of Pages

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4/29/86

I. TRAINING DESCRIPTION

A. Title of Lesson: Introduction to EOPs

B. Lesson Description: This lesson will provide the student with an explanation of the development of symptom oriented procedures (EOPs), the reason for their development, define numerous terms used in the EOPs, and explain the basis for various cautions included in the EOPs.

C. Estimate of the Duration of the Lesson: 3 hours

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 instructional skills per NTP-16 and/or 16.1.
2. Trainee:
   a. In accordance with NTP-10 and NTP-11 <u>or</u>
   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,
NMP-s EOP Training Guide

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. Transparencies Package
2. Overhead Projector
3. Whiteboard and Felt Tip Markers

B. Trainee Materials:

1. EOP Flowcharts

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:

Explain the development of symptom oriented procedures for emergency operation including terms used and caution bases.

B. Enabling Objectives:

1. Define the following terms:

a. Adequate Core Cooling.
b. Assure
c. Available
d. Before
e. Bypassing
f. Can/cannot be determined
g. Can/cannot be maintained
h. Can/cannot be restored
i. Cold Shutdown Boron Weight
j. Confirm
k. Containment Temperature
l. Core Damage
m. Defeating
n. Drywell Temperature
o. Enter
p. Exceeds
q. Gross Fuel Failure
r. Execute
s. Hot Shutdown Boron Weight
t. If
u. Independent
v. Initiate
w. Line up
x. Maintain below/above
y. Maximum Normal Operating
z. Maximum Safe Operating
aa. Maximum Sub-Critical Banked Rod Withdrawal Position
bb. Monitor
cc. Multiple
dd. Prevent
ee. Primary Containment
ff. Primary System
gg. Purge
hh. Restore
ii. Secondary Containment
jj. Shutdown
kk. Suppression Chamber
ll. Suppression Chamber Pressure
mm. Suppression Pool
nn. Suppression Pool Temperature
oo. Terminate
pp. Trend
qq. Vent
rr. When
ss. Until

EO-2.0 Describe the philosophy used by the EOPs to prevent or mitigate the release of radioactivity to the environment.

EO-3.0 Describe the basis for the used of symptom oriented EOPs vice event based procedures. Include the advantages and disadvantages of each.

EO-4.0 Describe the basis (bases) for each of the cautions used in the EOPs.

EO-5.0 Describe strategies and procedures for restoring core cooling.

EO-6.0 Describe the purpose of the RPV Water Level Caution.

I. INTRODUCTION

A. Student Learning Objectives

B. Purpose

Provide an overview of the development of the EOPs. The reason for symptom based vice event based procedures. In addition, provide definitions for terms used throughout the EOPs.

II. CONTENT

A. Introduction to EOPs.

1. As a result of the TMI accident the NRC has made many recommendations. One of which is the development of emergency procedures based on symptoms rather than specific causes or events.

2. The BWR Owners Group Emergency Procedures Committee comprised of representatives from each participating utility with support from General Electric and other organizations developed the Generic Emergency Procedure Guidelines (EPGs).

3. One criterion for the development of the EPGs is that they work for all participating plants without exception. This criterion has been implemented with only one exception, that being control of Hydrogen for the Mark 3 containment type.

Due to extremely large volume containments that cannot feasibly be inerted.

4. Another basis for the development of the EPGs is that contingency planning should not be based on the probability of occurrence. Every mechanistically possible event for which actions can be provided, must be considered.

Even though an event might be postulated to occur only once in 1,000,000 Reactor years, it cannot be said that, that event won't happen tomorrow.

5. The purpose of normal operating procedures is to maintain (or bring) the plant within licensing and design limits. The EPGs define limits beyond which operation is not permitted even under accident conditions.

These limits are generally beyond the licensing basis and are based upon best estimate rather than the conservative conditions used in licensing. The EPGs provide the direction to restore and maintain parameters within these limits.

6. EOP Development was based on providing direction to reduce or prevent the release of radioactive material to the public and the environment. This can be detailed by three tasks: EO-2.0

   a. Protection of the Containment Boundary Integrity
      1) Fuel Cladding Boundaries
      2) Reactor Pressure Vessel Boundaries
      3) Primary Containment Boundaries
      4) Secondary Containment Boundaries
   b. Control of Reactivity
   c. Maintenance of the Heat Sink (Suppression Pool)

   The EOPs address these first and foremost. Only after these are assured and protected, is it appropriate to turn to the event cause.

B. Symptom Versus Event Based

1. Procedure development in this industry began with design basis concepts. The number of possible events is so enormous that some criteria had to be applied. From the criteria come concepts such as Maximum Credible Accident, Single Failure Criteria, Double Failure Criteria, and Design basis Events. In addition, attempts were made to determine the probability of occurrence of some design basis, as well as beyond design basis. This approach did not change until after TMI.

2. This event orientation is not the approach in other professions, such as:

   a. Medicine - Stabilize vital bodily functions, ie. Breathing, Circulation, etc.

   b. Aviation - Stabilization of vital parameters take precedence over cause, ie. Altitude, Attitude and Direction.

   c. Driving - Maintain vehicle within safe boundaries of the road takes precedence over determining cause, ie. Flat tire, Broken spindle.

3. Event based procedures depend on the operator diagnosing the cause so that the correct procedure can performed. EO-3.0

4. Symptom oriented procedures differ in that a set of parameters that are needed to be controlled are defined and then the necessary actions are developed to maintain those parameters within prescribed limits, assures the Reactor can remain safe, regardless of the event.

5. Once event is known, combating that event with event based procedures becomes appropriate. Provided symptom based procedures continue to be used to maintain the important parameters within safe limits, use of event based procedures is viable and recommended.

   a. PRO's of symptom based procedures: EO-3.0

      1) Stabilizes plant during an event.

      2) Diagnosis of cause is not necessary or required to obtain correct answer.

      3) Provides guidance and sets limits.

      4) Provides corrective actions while the operator plans additional actions or diagnose the event.

5) Entry into and decisions are based on unambiguous parameters. EO-3.0

6) Tolerant of errors.

7) Addresses multiple events in multiple procedures.

8) Actions are appropriate regardless of initiating event.

9) Not limited to design basis events and licensing requirements.

b. CON's of symptom based procedures: EO-3.0

1) Does not address actions for recovery.

2) For a particular event, may not provide optimum actions.

3) In some cases conflicts with classical or design basis concepts.

c. PRO's of event based procedures: EO-3.0

1) Provides the best guidance for a particular event - once that event is diagnosed.

2) Addresses recovery from the specific event.

3) Works in conjunction with symptom based procedures once the event is positively identified.

d. CON's of event based procedures: EO-3.0

1) Event MUST be diagnosed correctly.
2) Event MUST progress as the scenario that was developed.
3) No assurance to the operators as to proper action UNLESS they are sure the event is correctly diagnosed.
4) Not all possible events can be addressed due to available resources (ie. time, money, manpower). Thus range of events provided for is limited.
5) Use of the incorrect procedure may result in further degradation of plant conditions and reduce the capability of the plant to recover.
6) If multiple events occur, several event based procedures must be used with a high probability that conflicting direction would be given.
7) Time might be lost trying to diagnose the event when time critical action is required.

C. EPG Rationale

1. The EPG's provide protection to the public by addressing individual boundaries, listed in order: EO-2.0

   Fuel Cladding
   Reactor Pressure Vessel
   Primary Containment
   Secondary Containment
   Site Boundary

2. All mechanistically possible events, regardless of probability of occurrence, which can be practically addressed by operator action, are addressed by the EPG's. Including:
   a. Design basis events
   b. Events more severe than design basis
   c. Events less severe than design basis
   d. Multiple failure events or multiple events beyond design basis including:
      1) Sequential failure
      2) Simultaneous failure
      3) Sequential and simultaneous failures

3. In many cases, the safety envelope is outside that determined by Tech. Specs. or other normal operating procedural limits. The EPG safety envelope is derived from best estimates (instead of licensing models). This does not mean that it is permissible to operate outside the administrative limits in an emergency, nor does it mean that administrative limits are inappropriate. It does define the absolute limit beyond which safety cannot be assured. Therefore, conformance with the EPG's does not ensure strict conformance with administrative limits.

D. Control EOPs

1. The EPG's consist of four basic procedures, each with a certain area of control:

   a. Reactor Pressure Vessel Control provides entry and actions based on upon certain Reactor vessel parameters, ie. RPV water level, RPV pressure, and Reactor pressure.

b. Primary Containment Control provides entry and actions based upon certain Primary Containment parameters, ie. Suppression Pool temperature, Suppression Pool level, Drywell pressure, Drywell temperature and Drywell hydrogen content.

c. Secondary Containment Control provides entry and actions based upon certain secondary containment parameters such as area temperatures, radiation levels and area water levels.

d. Radioactivity Release Control provides entry and actions based upon radiation levels used for the activation of the Emergency Plan.

E. Contingencies

1. The Contingencies provide for direction under conditions that are too degraded for adequate direction by the Control EOP's.

a. Alternate Level Control provides direction for the recovery of RPV level without regard for mechanical limits imposed by NPSH Curves or Vortex Limits. Also provides for injection sources in preferred order. EO-5.0

b. Emergency RPV Depressurization provides direction for rapid depressurizing of the RPV.

c. Steam Cooling provides direction to cool the core while no injection source is available.

d. RPV Flooding provides direction to inject water until the Main Steam Lines flood or should the Reactor not be shutdown provide direction to cool the core while RPV level is unknown. EO-5.0

e. Level/Power Control provides direction for power control by use of RPV level when the Reactor cannot be determined that control rod insertion alone will assure that the Reactor will remain shutdown under all conditions. EO-5.0

f. Primary Containment Flooding provides direction to restore adequate core cooling when previous actions to do so have been unsuccessful. EO-5.0

F. Graphic Design and Symbols

1. Flowchart Layout

a. Flowchart Layout is such that it is aesthetically appealing and flowpaths are readily apparent. Flow is generally from top to bottom and from left to right.

b. One flowchart is created for each procedure and each procedure is wholly contained on a single page. Where space permits, more than one procedure shares a page.

c. Those procedures with parallel elements (concurrent execution paths) are divided into sections such that each major path is designated as a division. Each division is placed side-by-side on the page with sufficient space between divisions so that each path is clearly delineated. In addition, each division is labeled with its corresponding title above the section.

d. Each page has a title block in the lower right corner. Should the page contain multiple flowcharts, each title and procedure number will be listed.

Utilize EOP flowpath TP to describe.

e. Large figures and tables are placed either below or to the side of the flowchart. Small figures or tables are placed next to the flowchart step that refers to that figure or table.

2. Symbols

a. Entry Conditions are contained within a heavily bordered rounded corner rectangle labeled at the top center "ENTRY CONDITIONS". Within the rectangle individual boxes separate the parameters of concern and the respective limiting value.

Use TP showing entry condition block.

Those procedures that are only entered from other procedures use a similar symbol, a rounded corner rectangle, but without the inner dividing boxes. Within the rectangle is the word, "START".

b. Exit Criteria use rounded rectangles.

c. Action Statements that are simple direct instructions are within individual rectangles.

d. Decision Steps are presented as "YES/NO" questions within diamonds. Arrows representing the appropriate "YES/NO" extend from the diamond, with the preference of "YES" extending to the right and the "NO" extends to the left.

Use TP showing decision block.

G. Definitions and Usage of Key Terms

1. Adequate Core Cooling.

Three viable methods of Adequate Core Cooling exist, in order of preference they are; EO-1.0a

a. Core Submergence - Indicated RPV water level is at or above TAF constitutes the principal means of confirming the adequacy of core cooling achieved via this mechanism. Level $\geq$ TAF (RL, C1, or C4).

b. Steam Cooling with Injection - Steam updraft through the uncovered portion of the core is sufficient to maintain the fuel temperature from exceeding 1500°F (threshold for fuel perforation). Assurance of cooling adequacy is achieved when either:

1) RPV pressure can be maintained at or above the Minimum Alternate Core Flooding Pressure, or
2) RPV water level can be maintained at or above the Minimum Steam Cooling RPV Water Level.

EO-1.0a

Steam Cooling with Injection is used in;

1) RPV Flooding evolution when Reactor may not be shutdown.
2) Level/Power Control when level is controlled below TAF to reduce Reactor power.
    - Greater than Minimum Alt. Flooding Press (C4 or C5)
    - Greater than Minimum Steam Cooling Water Level

Minimum alt. flooding pressure and Minimum Steam Cooling Water Level will be defined.

c. Steam Cooling without Injection - Steam updraft through the uncovered portion of the core is sufficient to maintain the fuel temperature from exceeding 1800°F (threshold temperature for significant metal-water reaction). Assurance of cooling adequacy is achieved only when indicated RPV water level is at or above the Minimum Zero Injection Water Level (C3).

2. Assure

Make sure that a specified state or condition is established and will be maintained. Implies action to operate appropriate systems to accomplish the stated objective. EO-1.0b

3. Available

The state or condition of being ready and able to be placed into operation to perform the stated (or implied) action or function. As applied to systems, requires that all necessary support systems work as designed. EO-1.0c

4. Before

Any time prior to. Used where an event independent margin is not appropriate or cannot be defined. EO-1.0d

Lesson Content	Objectives/Notes
5. Bypassing Temporarily disabling the function of an automatic protection feature. Use is generally limited to conditions where a bypass feature has been included in the system.	EO-1.0e
6. Can/cannot be determined The current value or status of an identified parameter relative to that specified in the procedure can/cannot be ascertained using all available indications (direct/indirect, singly or in combination).	EO-1.0f
7. Can/cannot be maintained The value of the identified parameter(s) is/is not able to be kept above/below specified limits. Evaluation of current as well as future system performance must be made in relation to current value and trend of the parameter(s) to make this determination. Cannot does not imply that the actual value of the parameter must be exceed the specified limit.	EO-1.0g

8. Can/cannot be restored EO-1.0h

   The value of the specified parameter is/is not able to be returned to above/below specified limits after having exceeded those limits. Evaluation of current as well as future system performance must be made in relation to current value and trend of the parameter(s) to make this determination. This statement does not imply any specific time interval, but the intent does not permit prolonged operation beyond a limit without taking specified action.

9. Cold Shutdown Boron Weight EO-1.0i

   The least weight or soluble boron which, if injected into the RPV and mixed uniformly, will maintain the Reactor shut down under all conditions.

10. Confirm EO-1.0j

    Use all available indications and/or physical observation to establish that, as applicable, the specified action has occurred, conditions are as stated.

11. Containment Temperature

    Bulk temperature of the atmosphere in the containment. EO-1.0k

12. Core Damage
    Gross Fuel Failure — EO-1.0l
13. Defeating
    Permanently disabling the function or logic of a system so as to prevent it from operating. — EO-1.0m
14. Drywell Temperature
    Bulk temperature of the Drywell airspace. — EO-1.0n
15. Enter — EO-1.0o
    Unless otherwise specified, exit the present procedure and begin in the identified procedure. If concurrent execution is specified, execute the steps of the entered procedure(s) in parallel with the steps of the procedure containing the enter instruction.
16. Exceeds
    To go above or beyond, by any amount the specified value or limit. — EO-1.0p
17. Execute
    Leave the step containing the executive instruction and take the action specified in the identified step, continuing on through the subsequent steps of that section. — EO-1.0r

18. Gross Fuel Failure — EO-1.0q

Either of the following;

a. 3 times normal full power background radiation level in the Main Steam Lines.

OR

b. 3 times normal full power coolant activity levels.

19. Hot Shutdown Boron Weight — EO-1.0s

The least amount of soluble boron which, if injected into the RPV and uniformly mixed, will maintain the Reactor shut down under hot standby conditions.

20. If — EO-1.0t

Logic term which indicates that taking the prescribed action is contingent upon current existence of the stated condition(s). If the identified condition(s) do not exist, the prescribed action is not to be taken. The operator should proceed to the next step.

21. Independent — EO-1.0u

Separateness of signal, source, signal processors, and indicators.

22. Initiate EO-1.0v

Manipulate appropriate controls as required to establish the specified system operating mode or plant condition. Does not imply that prolonged attempts to accomplish actions (jumper interlocks, align alternate or backup power supplies, or enter remote areas to manually position valves, etc.) is intended.

23. Line up EO-1.0w

Establish the initial conditions necessary for system operation including positioning of valves and breakers, installation of spool pieces, etc. This term does not include the actual starting of main system pumps.

24. Maintain below/above EO-1.0x

Take the action necessary to prevent the value of the parameter from rising above (decreasing below) the identified limit or action level.

25. Maximum Normal Operating EO-1.0y

The highest value of the identified parameter expected to occur during normal operation with all directly association support and control systems functioning.

26. Maximum Safe Operating — EO-1.0z
The highest value of the identified parameter beyond which personnel access or continued operation of equipment important to safety cannot be assured.

27. Maximum Sub-Critical Banked Rod Withdrawal Position — EO-1.0aa
The lowest control rod position to which all control rods may be withdrawn in a bank and still ensure the Reactor will remain shut down under all conditions.

28. Monitor — EO-1.0bb
Observe or evaluate at a frequency sufficient to remain appraised of the values, trend, and rate of change of the identified parameter.

29. Multiple — EO-1.0cc
As applied to plant instrumentation, more than one but as many as may be conveniently included. Independence is not required.

30 Prevent — EO-1.0dd

Take whatever action is necessary to preclude the stated action. Where not otherwise qualified or prohibited, this includes closing valves, tripping equipment, jumpering (or opening) contacts in the control logic of system components, de-energizing equipment, overriding automatic signals.

31. Primary Containment — EO-1.0ee

The Drywell and suppression chamber.

32. Primary System — EO-1.0ff

The pipes, valves, and other equipment that connect to the RPV such that a reduction in RPV pressure will decrease the steam or water being discharged through an unisolated break in the system.

33. Purge — EO-1.0gg

Force flow through an enclosed volume. Includes establishing both an influent and effluent flowpath similar to that of a "feed and bleed" process.

34. Restore — EO-1.0hh

Take the appropriate action required to return the value of an identified parameter to within applicable limits.

35. Secondary Containment EO-1.0ii
The airtight spaces immediately adjacent to or surrounding the Primary Containment.

36. Shutdown EO-1.0jj
As applied to the Reactor, the condition of being, or actions to become subcritical with Reactor power below the heating range.

37. Suppression Chamber EO-1.0kk
The structure enclosing the Suppression Pool water and the atmosphere (air or nitrogen) above it.

38. Suppression Chamber Pressure EO-1.0ll
The pressure of the atmosphere (air or nitrogen) in the suppression chamber.

39. Suppression Pool
The volume of water in the suppression chamber intended to: EO-1.0mm
   a. Condense steam discharged from a primary system break inside the Drywell.
   b. Condense steam discharged from the RPV via the SRVs.
   c. Provide a water source for certain ECCS to cool the core.

40. Suppression Pool Temperature
Bulk temperature of the Suppression Pool. EO-1.0nn

41. Terminate
Take the appropriate action required to stop the stated action, process, evolution. EO-1.0oo

42. Trend
The direction of the average rate of change of the value of a parameter. EO-1.0pp

43. Vent
Open an effluent (exhaust path from an enclosed volume). EO-1.0qq

44. When
Direction provided to wait until the identified condition occurs then take the action prescribed in the step. Execution of subsequent operator actions is not permitted until the identified condition exists. EO-1.0rr

45. Until
Indicates that the associated prescribed action is to proceed only as long as the identified condition does not exist. EO-1.0ss

H. Operator Precautions EO-4.0

Cautions identify potentially adverse consequences of certain plant conditions or actions. Cautions do not specify operator actions or limit the applicability of specified actions.

1. Caution #1 EO-6.0

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

- The hottest Drywell temperature is below the RPV Saturation Temperature (Figure RPV - 1)
- For each of the instruments in the table below, the instrument reads above the Minimum Indicated Level

Minimum Indicated Level

Instrument	Hottest Drywell Temperature Below 350°F	Hottest Drywell Temperature 350°F or Above
Shut Down Range	200 in.	260 in.
Upset Range	190 in.	262 in.
Wide Range	25 in.	25 in.
Narrow Range	152 in.	152 in.
Fuel Zone	-155 in.	-155 in.

a. RPV level is sensed by measuring the differential pressure between the downcomer region and the reference leg. EO-6.0

b. Changes in the density or the height of water in the reference leg can cause change in the indicated RPV water level.

Example:

If actual RPV level is constant at some on-scale value, and the reference leg head of water (height and/or density) decreases, sensed pressure decreases causing indicated water level to increase.

c. Extreme conditions of high and increasing Drywell temperature can decrease the density of water in the reference leg such that the instrument falsely indicates on scale and perhaps even increasing when in reality the actual RPV water level is below the lower instrument variable tap and decreasing.

d. This caution defines the conditions under which the displayed value and the indicated trend of RPV water level cannot be relied upon. EO-6.0

e. The first part of Caution #1 describes the conditions beyond which the water in the reference legs may boil. That is, the Drywell temperature in the vicinity of the reference legs exceeds the saturation temperature for the existing RPV pressure.

f. Boiling is a concern in both the variable and reference horizontal and vertical runs.

- Boil off of the reference leg causes a decrease in the reference head of water, reducing the sensed pressure and results in an erroneously high indicated RPV level.
- Boiling in the variable leg exerts increased pressure on the instrument, this effect results in a lower sensed pressure and an erroneously high indicated RPV level.

g. The second part of Caution #1 addresses the effect the hottest drywell temperature has on:

1) The validity of indicated RPV level trend.

2) The ability to determine RPV level within the specific instrument range.

For each instrument listed, the hottest Drywell temperature is provided at which the instrument will indicate RPV level at the bottom of the instrument scale when RPV water level is actually at the elevation of the instrument tap.

EO-6.0

The Minimum Indicated Level is defined to be the highest RPV water level instrument indication which results from off calibration conditions when RPV water level is actually at the elevation of the Variable leg tap.

2. RCIC

- Maintain turbine speed greater than 1500 RPM.

- Elevated suppression chamber pressure may trip the RCIC turbine.
- Defeat low RPV pressure interlocks if necessary.

a. Caution #3 identifies the minimum RCIC turbine speed which permits unrestricted operation. The minimum speed is based upon the following: EO-4.0

- Turbine is lubricating by a shaft driven oil pump and auxiliaries are cooled by a shaft driven water pump. The minimum speed maintains adequate lubrication and cooling water flow.
- Turbine control valve is supplied shaft driven pump oil to operate. The minimum speed ensures adequate pressure to function properly.

- Operation of the RCIC turbine at very low speeds positions the control valve (governor) very close to its seat. This low steam flow condition may cause exhaust steam pressure to be insufficient to keep the exhaust line check valve open continuously, this repeated opening and closing of the check valve may cause damage to the check valve.

b. The second part of the RCIC caution addresses elevated suppression chamber pressure and the possibility of RCIC trip on high exhaust pressure. The high exhaust pressure trip is to protect the shaft seals and exhaust piping. The exhaust pressure trip may be reached by either of the following methods: EO-4.0

- Low suppression chamber pressures and elevated Suppression Pool levels.

- High suppression chamber pressures and "normal" pool levels.

Since the pressure drop that occurs between the turbine exhaust discharge device and the sensor varies with exhaust flow, the exact point at which the trip will actuate cannot be determined in advance, thus the caution is stated in general terms.

c. The third part of this caution is to facilitate RPV water level restoration. It is possible that RCIC may be the only available injection system and thus maintaining the ability to inject warrants the bypassing of the low pressure isolation. EO-4.0

3. Irrespective of the resulting RPV cooldown rate...

Actions directed in the EOPs to control RPV pressure may result in RPV cooldown rates greater than those allowed by Tech. Specs. This caution makes it clear that, where indicated, performance of the specified action takes precedence over abiding by the RPV cooldown rate LCO.

4. CAUTION: A Rapid increase in injection into the RPV may induce a large power excursion and result in substantial core damage.

This caution warns the operator of the potential plant response if injection of cold unborated water into the core is to rapid under conditions where little or no shutdown margin may exist. This may result in a large increase in positive reactivity with a subsequent Reactor power excursion large enough to substantially damage the core. EO-4.0

III. WRAP UP

A. The TMI accident has brought about many changes to the industry, one of which is the development of symptom oriented procedures used to protect the fuel, RPV, Primary Containment, and the health and safety of the general public. These procedures have certain advantages over event based procedures, as is also true event based procedures have certain advantages over symptom based procedures. It must be realized that the two types must be used together to achieve the maximum benefit.