

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

LIMERICK GENERATING STATION AND PEACH BOTTOM ATOMIC POWER STATION
FOLLOWUP ON TRANSIENT RESPONSE IMPLEMENTING PLAN (TRIP) PROCEDURE
INSPECTION FINDINGS

Combined Report No.: 50-352/91-04 and 50-353/91-05, 50-277/91-07 and
50-278/91-07

Facility Docket No.: 50-352, 50-353, 50-277 and 50-278

Facility License No.: NPF-39, NPF-85, DPR-44 and DPR-56

Licensee: Philadelphia Electric Company
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Facility Name: Limerick Generating Station, Units 1 and 2
Peach Bottom Atomic Power Station, Units 2 and 3

Inspection At: Limerick, PA and Delta, PA

Inspection Conducted: February 25 - March 1, 1991

Inspectors:

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S. Hansell, Operations Engineer

3/15/91
date

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3-15-91
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Approved By:

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3/28/91
date

Inspection Summary: Inspection on February 25 - March 1, 1991 (Combined
Inspection Report Nos. 50-352/91-04, 50-353/91-05, 50-277/91-07 and
50-278/91-07.

Areas Inspected: Special announced inspections of the Limerick Generating
Station (LGS) and Peach Bottom Atomic Power Station (PBAPS) to follow up on
previous inspection findings on Transient Response Implementing Plan (TRIP)
procedures and observations of facility administered requalification simulator
examinations.

Results: See Executive Summary in report.

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EXECUTIVE SUMMARY

An NRC team inspection conducted in May 1990 at Limerick Generating Station (LGS) on Transient Response Implementing Plan (TRIP) procedures identified two unresolved items and several other findings in the areas of technical adequacy of the TRIP procedures, human factor concerns, and comments from control room and plant walkdowns, simulator and other human factor observations. By letters dated July 3, 1990 and September 28, 1990, the NRC requested that the licensee provide the short term (ST) and long term (LT) actions on these findings and the status of the licensee's plans to review the Peach Bottom Atomic Power Station (PBAPS) TRIP procedures as a result of the inspection at LGS. The second letter also requested that the licensee provide the status of the licensee's plans to incorporate the inspection findings into the Nuclear Group Administrative procedures.

The licensee's letter dated August 10, 1990 and its supplement dated January 31, 1991 documented licensee's ST and LT actions. All ST actions were completed prior to August 10, 1990. Although the LT actions were not complete as of the date of this report, the licensee is making good progress towards the completion of these actions by the established date provided in the January 31, 1991 letter. In general, the licensee's actions and responses to the NRC inspection findings were appropriate, adequate and timely (Sections 3.1 through Section 3.8 of this report). Based on the NRC review and conclusions from this review, the licensee's actions were found satisfactory. Therefore, these unresolved items and other inspection findings are resolved and closed.

During the report period, the NRC staff also observed the facility administered requalification simulator examinations to gather additional insights into the operator performance problems previously observed. Generally, the NRC observations confirmed the findings in Combined Inspection Report 50-352/91-01 and 50-353/91-01 (OL). The facility training staff was found to be thorough in their evaluations of crew and individual performance.

DETAILS

1.0 Background

An NRC team inspection (50-352/90-80 and 50-353/90-80) conducted in May 1990 at Limerick Generating Station (LGS) on Transient Response Implementing Plan (TRIP) procedures identified two unresolved items: one on technical adequacy of the TRIP procedures and another on human factors concerns about the TRIP procedures. In addition, the inspection report documented several comments resulting from control room and plant walkdowns, simulator observations, and other human factors observations. The cover letter, which transmitted the NRC inspection report, requested the licensee provide short term (ST) and long term (LT) actions related to the unresolved items. The licensee's actions and responses related to the unresolved items and the NRC comments were documented in the licensee's letter dated August 10, 1990 and its supplement dated January 31, 1991. The August 10, 1990 letter identified ST actions already completed by the licensee as well as the LT actions planned to be completed, but without a scheduled completion date. The January 31, 1991 supplement provided resolution of both ST and LT actions, including the scheduled completion dates for LT actions.

In response to the August 10, 1990 letter, NRC requested the licensee (by letter dated September 28, 1990) to provide the status of the licensee's plans to review the Peach Bottom Atomic Power Station (PBAPS) TRIP procedures as a result of the inspection findings at LGS. The letter also requested the licensee provide the status of its plans to incorporate the inspection findings into the Nuclear Group Administrative procedures. The status of these two items were also provided in the supplement.

The purpose of this inspection was to review the licensee's actions as applicable to both LGS and PBAPS and as documented in the supplement.

2.0 Persons Contacted

2.1 Philadelphia Electric Company (PECO)

- M. Chokran, P&SP Engineer - Technical Section
- J. Doering, Plant Manager (LGS)
- G. Edwards, LGS Technical Superintendent
- *J. Kovalchick, Operations Support Engineer
- *D. Neff, Licensing Engineer
- S. Palena, System Engineer - Technical Section
- *R. Shoff, System Engineer - Technical Section
- D. Shutt, Licensing Technician
- K. Walsh, Senior Engineer

2.2 U.S. Nuclear Regulatory Commission

- *S. Hansell, Operations Engineer
- *S. Pullani, Senior Operations Engineer
- *L. Scholl, Resident Inspector

*Denotes those present at the exit meeting conducted on March 1, 1991.

3.0 Followup of Previous Inspection Findings

The licensee's response letter, dated August 10, 1990 and its supplement dated January 31, 1991 itemized different topics under the two unresolved items and the NRC comments documented in the original inspection report and also listed licensee's actions and response for each of these items separately. The NRC review and conclusion are also given separately for each of these items following the format in the licensee's response and are documented in Sections 3.1 through 3.8 that follow. The review and conclusion for each item is separately given for Limerick and Peach Bottom.

In general, the licensee's actions and responses to the NRC inspection findings were appropriate, adequate and timely. Although the LT actions were not complete as of the date of this report, the licensee is making good progress toward completion of these actions by the established dates. Based on the above and as further discussed below, all inspection findings were resolved and closed.

3.1 (Closed) Unresolved Items (50-352/90-80-01 and 50-353/90-80-01) Technical Adequacy of TRIP Procedures

The NRC review and conclusions for 13 separate items under this subject area (Section 4.0 of the original inspection report) are discussed in Sections 3.1.1 through 3.1.13 below. Based on these reviews and conclusions, this unresolved item is resolved and closed.

3.1.1 Inspection Finding (Item 1)

The inspection team identified that when transitioning to the contingency portion of the PSTG, the PSTG refers to specific procedure numbers, such as the T-100 series, rather than the individual PSTG contingencies.

Licensee Actions and Response

The PSTG has been revised to reference contingency numbers rather than TRIP procedure numbers (ST).

NRC Review and Conclusion

Limerick:

The inspector performed a random review of the items revised in the PSTG. The licensee's corrective actions satisfy the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom PSTG correctly references the contingency procedures by noun name, not TRIP procedure numbers.

3.1.2 Inspection Finding (Item 2)

The inspectors identified a TRIP procedure deviation from the PSTG on entering T-100 (SCRAM procedure) instead of entry into the Reactor Pressure Vessel (RPV) Control procedure, T-101. This constitutes extra steps which may not be required and has the potential to cause operator error.

Licensee Actions and Response

The appropriate Emergency Operating Procedures (EOPs) will be revised to direct entry into T-101 whenever a SCRAM is necessary during performance of the EOPs. T-100 will be revised to be no longer included in the EOPs. These revisions will be incorporated into a Human Factors revision, expected to be completed by December 31, 1991.

NRC Review and Conclusion

Limerick:

The licensee has committed to incorporating this item, with the next TRIP procedure revision by December 31, 1991. The inspector determined that the scheduled completion date for this item is reasonable.

Peach Bottom:

This item does not apply to Peach Bottom. Peach Bottom enters T-101, "RPV Control," directly from all TRIP procedures.

3.1.3 Inspection Finding (Item 3)

A deviation between the PSTG and the TRIP procedures was identified. The PSTG direction given, when emergency RPV depressurization is required, is to enter T-101 at Step RC-1 and execute it concurrently. The TRIP procedures only direct entry into T-112, "Emergency Blowdown." Procedure T-112 has direction to SCRAM the reactor if it has not already been

scrammed, therefore, entry into T-101 is redundant. The inspection team concluded that since T-101 gives the operator guidance to control level and power that T-112 does not, T-101 should be entered when emergency blowdown is required.

Licensee Actions and Response

Item 3 is related to Item 2, revision of T-100. Item 3 resolution will be addressed accordingly, based on resolution of Item 2.

NRC Review and Conclusion

Limerick:

The licensee has committed to incorporating this item, with the next TRIP procedure revision by December 31, 1991. The inspector determined that the scheduled completion date for this item is reasonable.

Peach Bottom:

This item does not apply to Peach Bottom. (See Item 2 review)

3.1.4 Inspection Finding (Item 4)

There were several examples of incorrect information in the PSTG that reflect on system capability. The PSTG refers to the steam condensing mode of the Residual Heat Removal (RHR) system, the High Pressure Coolant Injection (HPCI) system use for boron injection, the Low Pressure Coolant Injection (LPCI) system loops C and D heat exchanger capability, and RPV flooding sources, none of which exist in the plant.

Licensee Actions and Response

The PSTG has been revised to reference only Limerick Generating Station (LGS) systems and not generic systems (ST).

NRC Review and Conclusion

Limerick:

Appendix A of the PSTG was reviewed by the inspector. The generic systems not specific to Limerick were deleted from the PSTG. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The inspector's review of the Peach Bottom PSTG revealed Peach Bottom's systems were referenced, not generic systems.

3.1.5 Inspection Finding (Item 5)

There are several actions contained in the TRIP procedures which are not directed by the PSTGs. In T-101 (RPV Control), when an SRV is cycling, adequate core cooling is not considered when establishing suppression pool cooling. T-112 contains direction to avoid emergency depressurization of the reactor vessel below 100 psig unless motor driven pumps are available. Technical Specifications actions are included in the SP/T portion of T-102.

Licensee Actions and Response

Direction for suppression pool cooling operation will be deleted from T-101 (RPV Control) since high suppression pool temperature is an entry condition into T-102 (Primary Containment Control). T-112 (Emergency Blowdown) has been revised to remove this direction. T-102 will be revised to remove Technical Specifications recheck steps. T-101 and T-102 will be revised as part of the Human Factors revisions, expected to be completed by December 31, 1991.

NRC Review and Conclusion

Limerick:

The inspector verified removal of the T-112 step, requiring motor driven pumps to depressurize below 100 psig. The licensee will remove the Technical Specification recheck steps prior to December 31, 1991. The inspector determined that the licensee's actions are appropriate and the scheduled completion date is reasonable.

Peach Bottom:

The inspector noted Technical Specification steps in TRIP procedure T-102, "Primary Containment Control." The Peach Bottom PSTG contains justification for these differences. However, the inspector's recommendation is to remove the Technical Specification steps, T/T-5 and T/T-6, from TRIP procedure T-102. Step T/T-5 and T/T-6 address a normal plant evolution (surveillance testing), not an emergency condition.

3.1.6 Inspection Finding (Item 6)

A number of transition points were found to be in error in several TRIP procedures.

Licensee Actions and Response

All TRIP procedure flowcharts have been reviewed and revised where necessary to ensure the proper step numbers at the entry/exit arrows are correctly providing proper transition directions (ST).

NRC Review and Conclusion

Limerick:

The inspector reviewed the TRIP procedures and verified the transition point discrepancies were corrected. The licensee's corrective actions satisfies the inspection finding for this item.

Peach Bottom:

The Peach Bottom TRIP procedures were randomly checked for proper transition point documentation. The inspector concluded the licensee's verification and validation process adequately detected and corrected problems in this area of the Peach Bottom TRIP procedures.

3.1.7 Inspection Finding (Item 7)

Terminology used in certain flowcharts is ambiguous. Such terms as "stabilize," "consider," and "shutdown" require concise definitions that are clearly understood by the operators.

Licensee Actions and Response

NOTE: Administrative procedure A-94, "TRIP Writer's Guide," is superseded by Nuclear Group Administrative Procedure (NGAP) NA-11T001, "TRIP Procedures Program for Limerick and Peach Bottom," Nuclear Guideline (NG) NG-001, "Peach Bottom and Limerick TRIP Procedures Writer's Guide," and NG-002, "Verification and Validation (V&V) Program for Peach Bottom and Limerick TRIP Procedures." The necessity for keeping procedure A-94 is being evaluated.

Guideline NG-001, provides definitions for "stabilize," "consider," and "shutdown." Additionally, the definition of "shutdown" has been expanded to include quantitative measures to determine if the reactor is shutdown, and is documented in the revised TRIP Bases. These TRIP Bases are utilized in the Licensed Operator Requalification Training program to ensure that the operators understand the definitions.

This expanded definition of "shutdown" will be included in the next revision of guideline NG-001, expected to be completed by December 31, 1991.

NRC Review and Conclusion

Limerick:

The inspector reviewed the definitions added to the Nuclear Group Administrative Procedures. The licensee's corrective actions satisfy the inspection finding for this item.

Peach Bottom:

The resolution for this item is identical to the Limerick conclusion.

3.1.8 Inspection Finding (Item 8)

The RPV Control Procedure, T-101, Step RC/P-14, directed an operator to hold at this step until "power is below 4%." The PSTG requires that the operator determine if the reactor is "shutdown" at this point.

Licensee Actions and Response

T-101 Step RC/P-14 has been revised to verify that the reactor is "shutdown" rather than "power ... below 4%" (ST).

NRC Review and ConclusionLimerick:

The inspector reviewed the revision to T-101 Step RC/P-14. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom procedure uses "shutdown" as specified in the PSIG.

3.1.9 Inspection Finding (Item 9)

The Primary Containment Control Procedure, T-102, Steps SP/L-22 and SP/T-14, permit depressurization only if boron injection is not required. The PSTG requires depressurization regardless of whether boron injection is required.

Licensee Actions and Response

The wording, "UNLESS BORON IS REQUIRED" has been removed from T-102 (ST).

NRC Review and ConclusionLimerick:

The inspector reviewed the Primary Containment Control Procedure, T-102, Steps SP/L-22 and SP/T-14. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

The inspector reviewed the applicable steps of T-102 and verified the omission of this instruction. The licensee's corrective action was found satisfactory.

3.1.10 Inspection Finding (Item 10)

The Primary Containment Control Procedure, T-102, Step SP/L-8 has a note which states that at 17.8 feet suppression pool level, the Suppression Pool Temperature Monitoring System (SPOTMOS) temperature indication becomes invalid. The note does not direct the operator to use an alternate indication, in this case RHR pump suction temperature indication with an RHR pump in service.

Licensee Actions and Response

Note No. 2 of T-102 has been revised to add use of the RHR suction temperature indicator with the RHR pump running (ST).

NRC Review and Conclusion

Limerick:

The inspector reviewed Note No. 2 of T-102. The licensee's correction to Note No. 2 satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply directly to Peach Bottom due to the containment difference. The licensee has committed to adding the effective level range of the SPOTMOS instruments to an existing operator aid.

3.1.11 Inspection Finding (Item 11)

The Emergency Blowdown Procedure, T-112, Steps EB-1, EB-2 and EB-3 require the operator to SCRAM the reactor and enter the SCRAM Procedure, T-100. This action is considered by the inspection team to be a redundant step since all T-112 entry conditions but one, T-102 DW/T, already direct the reactor to be scrammed prior to entering T-112.

Licensee Actions and Response

There are three entry conditions into T-112 (Emergency Blowdown) from T-102 (Primary Containment Control) that do not direct the reactor to be scrammed prior to entering T-112: T-102, SP/L (if suppression pool level is too low); T-102, DW/T; and T-102, PC/H. The deletion of the direction to SCRAM in T-112 will be addressed during the Human Factors revisions, expected to be completed by December 31, 1991.

NRC Review and ConclusionLimerick:

This long term item will be incorporated in the next TRIP procedure revision by December 31, 1991. The inspector determined that the licensee's actions were appropriate and the scheduled completion date for this item is reasonable.

Peach Bottom:

This item does not apply at Peach Bottom. The Peach Bottom TRIP procedures always enter T-101 prior to an emergency blowdown. This direction is not repeated in T-112, "Emergency Blowdown."

3.1.12 Inspection Finding (Item 12)

T-112, Step EB-19 directed securing HPCI on high suppression pool level. This is considered to be redundant due to this guidance appearing in T-102.

Licensee Actions and Response

Step EB-19 of T-112 has been deleted (ST).

NRC Review and ConclusionLimerick:

The inspector verified that Step EB-19 of T-112 was deleted. The licensee's corrective action satisfies the inspection findings for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom T-112 procedure does not include a step to secure HPCI on high torus level.

3.1.13 Inspection Finding (Item 13)

The north and south stack process radiation monitor HI-HI alarm setpoints, used as entry conditions into the Radioactivity Release Control Procedure, T-104, are conservative with respect to the BWR Owners Group Emergency Operating Procedure (EOP) Guideline entry condition requirement of "release rate above the offsite release rate which requires an Alert." The T-104 entry conditions are satisfactory with respect to monitored releases, but do not directly address the unmonitored release path scenario.

Licensee Actions and Response

T-104 has been revised to show an entry from EP-101 (ST). EP-101 has been revised to give direction to enter T-104 on appropriate radiological conditions (ST). The PSTG has been revised to incorporate the above changes (ST).

NRC Review and ConclusionLimerick:

The inspector reviewed the revision to T-104, "Radioactivity Release," and EP-101, "Emergency Plan Procedures." The licensee's corrective action satisfies the inspection findings for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom procedure T-104, "Radioactivity Release Procedure," contains an entry condition to address an unmonitored release path scenario.

3.2 (Closed) Unresolved Items (50-352/90-80-02 and 50-353/90-80-02)
Human Factors Concerns about TRIP Procedures

The NRC review and conclusions for three separate items under this subject area (Section 7.0 of the original Inspection Report) are discussed in Sections 3.2.1 through 3.2.3 below. Based on these reviews and conclusions, this unresolved item is resolved and closed.

3.2.1 Inspection Finding (Item 1)

Two principal human factors concerns about the TRIP flowcharts were identified: size and complexity. T-101 (RPV Control) and T-102 (Primary Containment Control) are inconvenient to use because of their dimensions. The size of the flowcharts is related to the wording of the step instructions which are frequently long and complex.

Licensee Actions and Response

A Human Factors review was performed in December 1990. This review included those specific items referenced in Attachment C of the NRC Inspection Report and other related comments throughout the report. Appropriate changes will be incorporated into the Human Factors revisions expected to be completed by December 31, 1991.

NRC Review and Conclusion

Limerick:

The human factors review by the contractor was concise and listed recommendations to simplify and enhance the Limerick TRIP procedures. The licensee has committed to incorporating this item, with the next TRIP procedure revision, by December 31, 1991. The licensee's corrective actions and the scheduled completion date for this item were found satisfactory.

Peach Bottom:

This item did not apply to Peach Bottom. The Peach Bottom TRIP procedures were generated using the new NGAP NA-11T001. This procedure specifies a writer's guideline and provides an independent human factors review. The operators suggestions are solicited to enhance the human factors review.

3.2.2 Inspection Finding (Item 2)

Procedure A-94, "TRIP Writer's Guide," revision 5, provides minimum guidance for the preparation of TRIP satellite procedures (T-200 Series).

Licensee Actions and Response

Guideline NG-001, "Peach Bottom and Limerick TRIP Procedure Writer's Guide (PSWG)," provides specific guidance on the preparation of TRIP satellite procedures (T-200 Series).

NRC Review and Conclusion

Limerick:

The new Nuclear Group Administrative Procedure NG-001, Section 7.5, provides detailed guidance on the preparation of satellite procedures (T-200 Series). The licensee corrective action satisfies the inspection finding for this item.

Peach Bottom:

The resolution for this item is identical to Limerick.

3.2.3 Inspection Finding (Item 3)

It is possible to laydown T-101 and T-102 side by side in the simulator which is not possible in the control room, given the flowchart laydown space in the control room.

Licensee Actions and Response

An evaluation is being performed to determine if any adjustments of the TRIP procedure flowchart laydown area in the simulator is necessary. This evaluation is expected to be completed by May 31, 1991.

NRC Review and ConclusionLimerick:

The item evaluation will address a possible extension of the control room laydown area to permit laying T-101 and T-102 TRIP procedures side by side. The licensee has committed to completing the evaluation by May 31, 1991. The licensee's corrective actions and the scheduled completion date were found satisfactory.

Peach Bottom:

This item does not apply to Peach Bottom. The T-101 and T-102 TRIP procedures are permanently mounted side by side in the simulator and control room.

3.3 Comments from Control Room and Plant Walkdowns

The NRC review and conclusions for two separate items under this subject area (Sections 5.0 and 10.0 of the original Inspection Report) are discussed in Sections 3.3.1 and 3.3.2 below. Based on these review and conclusions, these items are closed.

3.3.1 Inspection Finding (Item 1)

Based on walkdowns performed during the EOP Inspection, the glare from the plexiglass covering the flowcharts in the Main Control Room (MCR) is excessive. The glare makes it difficult to use the procedures.

Licensee Actions and Response

TRIP procedure flowcharts in the Main Control Room (MCR) have been laminated with a dull finish to reduce the glare caused by the plexiglass.

NRC Review and ConclusionLimerick:

The inspector examined the TRIP procedures in the main control room. The new lamination material completely eliminated the glare. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

The Unit 3 TRIP table was replaced with a nonglare acrylic surface. Inspection of this arrangement concluded that the glare from the new surface is negligible. The Unit 2 TRIP table will be surfaced when the process computer modification is complete. The licensee's corrective action is found satisfactory.

3.3.2 Inspection Finding (Item 2)

Non-licensed operators (NLOs) occasionally had difficulty in locating infrequently operated valves during the walkdown of the T-200 series procedures.

Licensee Actions and Response

Plant area maps were added to the T-200 Series procedures to assist operators in locating equipment in the plant.

NRC Review and ConclusionLimerick:

The inspector performed a random sample of the T-200 Series procedures. The plant area maps incorporated in the T-200 Series procedures adequately correct the original finding. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom T-200 Series procedures specify the location of infrequently operated valves within the text of the procedure.

3.4 Other Walkdown Comments

The NRC review and conclusions of licensee's actions on eight other walkdown comments documented in Attachment C of the original inspection report are discussed in Sections 3.4.1 through 3.4.8 below. Based on these reviews and conclusions, these items are closed.

3.4.1 Inspection Finding (Item 1)

Many of the T-200 Series procedures contain sets of steps which install jumpers or lift leads. However, the purpose for performing each step is not always obvious.

Licensee Actions and Response

Descriptive text for each major set of jumper/lifted lead steps will be added to the T-200 Series procedures as part of their periodic reviews. These revisions are expected to be completed by June 30, 1992.

NRC Review and ConclusionLimerick:

The licensee has committed to correcting this finding for each T-200 Series procedure during the required two-year review. The corrective actions are expected to be complete by June 30, 1992. The licensee's corrective actions and the scheduled completion date are found satisfactory.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom T-200 Series procedures contain descriptive notes prior to steps that are not obvious in their intent.

3.4.2 Inspection Finding (Item 2)

The inspector noted that some of the area maps and signs formerly located at the tops of stairwells and entrances to areas have fallen down, or are missing. This makes it more difficult for operators to locate infrequently operated components which are required to be operated in the T-200 Series procedures.

Licensee Actions and Response

Plant area maps were added to the T-200 Series procedures to assist operators in locating equipment in the plant.

NRC Review and ConclusionLimerick:

The plant area maps were incorporated in the applicable T-200 Series procedures. The licensee's corrective actions satisfy the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The location of infrequently operated valves is stated within the text of the T-200 procedure.

3.4.3 Inspection Finding (Item 3)

Step RC/P-8 of T-101 has the operator open the Main Steam Isolation Valves (MSIVs) to provide a heat sink, using Procedure T-221 if necessary. T-101 did not "Restore Instrument Air" after a LOCA signal per Procedure SE-10, nor did T-221 restore instrument air to the outboard MSIVs. Without instrument air, the outboard MSIVs could not be opened.

Licensee Actions and Response

The licensee added the proper steps to T-221 prior to the inspection team departing the site (ST). The licensee determined that a revision of T-101 is not required for this concern.

NRC Review and Conclusion

Limerick:

The inspector verified that T-221 was changed satisfactorily to restore instrument air to the outboard MSIVs. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The instrument air system does not isolate on a LOCA signal. The outboard MSIV's air supply will be available without reliance on operator actions.

3.4.4 Inspection Finding (Item 4)

The T-102 related curves in the SPDS did not match the current revision of the BWR Owners Group EOPs. SPDS does caution the operators that the curves currently in SPDS are not valid for use with the TRIP procedures.

Licensee Actions and Response

The SPDS curves are being revised to agree with those in the current revision of the BWR Owners Group EOPs and the LGS TRIP procedures. These changes are nearly complete with final testing expected to be completed by March 31, 1991.

NRC Review and Conclusion

Limerick:

The inspector reviewed the new SPDS curves for Unit 2. The SPDS curves were changed to reflect the Revision 4 implementation of the TRIP procedures. Unit 1 SPDS curves will be updated after Unit 2 testing is complete. The licensee has committed to completing this item by March 31, 1991.

Peach Bottom:

The SPDS work is in progress at Peach Bottom. The SPDS testing completion date for Units 2 and 3 is June 30, 1991. This commitment is stated in Action Request Number: A0001722.

3.4.5 Inspection Finding (Item 5)

Curve PC/P-3 (Primary Containment Pressure Limit) of T-102 asks for Drywell Pressure on recorder PR57-*01 to calculate containment level. The recorder is labeled "Pri Cont Atm" versus "Drywell Pressure."

Licensee Actions and Response

The TRIP flowchart was corrected to agree with the recorder (ST).

NRC Review and ConclusionLimerick:

The inspector reviewed the control room recorder and TRIP procedure labeling. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The recorder numbers reviewed in the Peach Bottom TRIP Procedures correspond to the control room recorder labels.

3.4.6 Inspection Finding (Item 6)

In Step RF-19 of T-116, "RPV Flooding," the operator is directed to check for a 69 psid pressure difference between the Reactor Pressure Vessel (RPV) and the Suppression Pool (SP). The RPV pressure instrument has 20 psig scale increments and the SP instrument has a 5 psig scale increments. A 69 psid would be difficult to read.

Licensee Actions and Response

The 69 psid has been changed to 70 psid (ST).

NRC Review and ConclusionLimerick:

The inspector reviewed Step RF-19 of T-116, "RPV Flooding," to verify the change to 70 psid. The licensee corrective action satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The inspector reviewed the applicable TRIP procedure revealing no instrument scale problems.

3.4.7 Inspection Finding (Item 7)

The borax and boric acid stored in the locker near the SLC tank would be of little use for filling the Control Rod Drive (CRD) pump suction strainer body, as it would need to be transported down three floors and from the reactor enclosure building to the turbine building. The locker contains no thermometer as specified in the procedure.

Licensee Actions and Response

A thermometer was added to the cabinet prior to the inspection team leaving the site. The T-211 Procedure "CRD System Boric Acid-Sodium Pentaborate Injection," has since been cancelled as recommended by the inspection team since this procedure is difficult to implement and more desirable methods are available (ST).

NRC Review and ConclusionLimerick:

The inspector verified Procedure T-211, "CRD System Boric Acid Sodium Pentaborate Injection," was cancelled. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

Peach Bottom has a similar procedure to the Limerick T-211 procedure. The Peach Bottom boric acid would be transported from an outside storage area into the turbine building. It is assumed that this method would only be used when other methods fail. This procedure requires no access to the reactor building, reducing the possibility of radiation exposure to personnel if boron injection is required. This response was found satisfactory.

3.4.8 Inspection Finding (Item 8)

The handswitch for SV-57-201 also controls SV-52-239, but is not labeled as such on the control board. (The inspection report referenced the second valve as SV-57-239).

Licensee Actions and Response

PECO Nonconformance Report NCR L90-259 was generated to relabel the handswitch. The response to this NCR was completed on January 30, 1991, and the corrective action is expected to be completed by June 30, 1991. In addition, review of remaining control room handswitches was completed and discrepancies were identified and are expected to be addressed by March 31, 1991, with corrective actions expected to be completed by August 31, 1991.

NRC Review and Conclusion

Limerick:

The inspector reviewed the licensee's response to this finding. The licensee has committed to completing the corrective actions by August 31, 1991. The licensee's corrective actions and the commitment dates were determined to be acceptable by the inspector.

Peach Bottom:

This item does not apply to Peach Bottom. The licensee performed a handswitch evaluation with no problems noted.

3.5 Simulator Comments

The NRC review and conclusions for the two separate items under this subject area (Section 6.0 of the original inspection report) are discussed in Sections 3.5.1 and 3.5.2 below. Based on these reviews and conclusions, these items are closed.

3.5.1 Inspection Finding (Item 1)

One of the comments noted during the plant walkdown was that the curves in the Safety Parameter Display System (SPDS) in the plant do not agree with the curves in the TRIP Procedures. The SPDS was not used by operators in the simulator because it is not yet functional in the simulator.

Licensee Actions and Response

The SPDS curves are being revised to agree with those in the TRIP procedures. These changes are nearly complete with final testing expected to be completed by March 31, 1991. SPDS is scheduled to be incorporated into the Licensed Operator Requalification Training Program during the first training quarter of 1991.

NRC Review and ConclusionLimerick:

The inspector reviewed the new Revision 4 TRIP Procedure curves at the SPDS terminal in the technical support center (TSC). The inspector determined that the licensee's corrective action and the commitment date of March 31, 1991 is acceptable and achievable. The new NGAP Procedure, NA-11T001, Section 7.8.4 provides the action required if a TRIP procedure revision affects SPDS curves.

Peach Bottom:

The Peach Bottom SPDS status is similar to Limerick. Peach Bottom has committed to complete SPDS testing for Unit 2 and 3 by June 30, 1991. The SPDS commitment is detailed in Action Request Number: A0001722. The licensee's actions and the commitment date were found acceptable.

3.5.2 Inspection Finding (Item 2)

The current location of the SPDS monitors is not conducive for use by the shift supervisor while using the TRIP procedures. The SPDS monitors are located on the shift supervisor's desk and the reactor operator's computer desk. The TRIP procedures are used by the shift supervisor on the back of the reactor operator's computer desk. Neither monitor is visible to the shift supervisor.

Licensee Actions and Response

A detailed study is being performed to determine the best technical and economical solution for providing a SPDS monitor that is visible by the shift supervisor while using the TRIP Procedures. This study is expected to be completed by December 31, 1992.

NRC Review and ConclusionLimerick:

The inspector observed the new Unit 2 six point computer display. The computer display is adjustable to provide the supervisor executing TRIP procedures an unobstructed view of six key parameters from SPDS. The licensee has committed to a detailed study pertaining to SPDS monitor visibility by December 31, 1992. The licensee's actions and the scheduled completion date were found acceptable.

Peach Bottom:

This item does not apply to Peach Bottom. The new process computer console places two SPDS monitors in direct view of the supervisor at the TRIP table. The process computer console modification is complete on Unit 3 and is in progress on Unit 2.

3.6 Human Factors Comments

The NRC review and conclusions for seven separate items are discussed below in Sections 3.6.1 through 3.6.6. Based on this review and conclusions, these items are closed.

3.6.1 Inspection Finding (Item 1)

Administrative Procedure A-94, "TRIP Writer's Guide," provides no guidance for the writing of logic statements and minimizing their complexity.

Licensee Actions and Response

Guidance for writing logic statements for both T-100 and T-200 Series Procedures is included in Guideline NG-001, "Peach Bottom and Limerick TRIP Procedures Writer's Guide (PSWG)." Guideline NG-001 also provides guidance for minimizing the complexity of procedural steps.

Guideline NG-002, "Verification and Validation Program for Peach Bottom and Limerick TRIP Procedures," has checklists to verify correct use of logic statements.

NRC Review and Conclusion

Limerick:

The inspector reviewed the new Procedure NG-001, "Peach Bottom and Limerick Trip Procedures Writer's Guide (PSWG)." NG-001, Sections 7.5 and 7.6 provide adequate guidance for writing logic statements and minimizing complexity of procedural steps. Procedure NG-002 provides adequate guidance for verification and validation. The licensee corrective actions satisfy the inspection finding for this item.

Peach Bottom:

The resolution for this item is identical to Limerick.

3.6.2 Inspection Finding (Item 2)

A-94 does not define a very effective way of using color in the flowcharts.

Licensee Actions and Response

Guideline NG-001 specifies use of color in TRIP procedures and the applicable checklist from guideline NG-002 verifies the appropriate use.

NRC Review and ConclusionLimerick:

The inspector reviewed the new procedure NG-001, Section 7.4.8. The new procedure provides adequate guidance for use of color in TRIP procedures. The licensee corrective action satisfies the inspection finding for this item.

Peach Bottom:

The resolution for this item is identical to Limerick.

3.6.3 Inspection Finding (Item 3)

A-94 does not fully state the conventions for presenting referencing instructions (i.e., instructions to execute another procedure concurrently) and branching instructions (i.e., instructions to leave the present procedure or branch and go to another procedure). In the flowcharts, references to T-200 procedures are put in command boxes. References to TRIP procedures are put in special symbols unless the reference is conditional, in which case it appears in the re-check step command symbol. These practices were found to be used consistently, but they are not mentioned in A-94. References to non-TRIP procedures are not treated as consistently. Sometimes they are in the command box and sometimes in the reference symbol. Examples of this inconsistency are given in the findings related to the TRIP procedures.

Licensee Actions and Response

Guideline NG-001 provides direction for formatting, referencing and branching instructions. The applicable Plant Specific Writer's Guide (PSWG) verification checklists from Guideline NG-002 verify the appropriate use.

NRC Review and ConclusionLimerick:

The inspector reviewed procedures NG-001, Section 7.6.7 and NG-002. The new procedures provide adequate guidance for formatting, referencing and branching instructions. The licensee has committed to completing the TRIP procedure inconsistencies by December 31, 1991. The licensee's corrective actions and the committed completion date were found satisfactory.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom TRIP procedures were implemented using the new NGAP guidelines.

3.6.4 Inspection Finding (Item 4)

A-94 specifies that flow lines are to be darker than the flowchart symbols. The difference in line intensity is substantial. The guidance is inconsistent with the recommended practice (as indicated in NUREG/CR-5228).

Licensee Actions and Response

NUREG/CR-5228 was reviewed and Guideline NG-001 was issued containing appropriate guidance for line weight 1 (thin) for all flowchart symbols and line weight 6 (thick) for flow lines. However, line weights may vary as required to improve clarity.

NRC Review and ConclusionLimerick:

The inspector reviewed the guidance in Procedure NG-001, Section 7.4.7. The new procedure contains appropriate guidance concerning line intensity. The licensee's corrective action satisfies the inspection finding for this item.

Peach Bottom:

This item does not apply to Peach Bottom. The Peach Bottom TRIP procedures adhere to the NUREG/CR-5228 recommendations for line weight.

3.6.5 Inspection Finding (Item 5)

A-94 does not provide guidance on the method of verification, i.e., it does not say what will be done to verify a procedure or procedure revision. A-94 also provides no guidance on how problems identified during this verification will be resolved.

Licensee Actions and Response

The V&V Guideline, NG-002, divides verification into two categories; technical verification and PSWG verification. There are technical verification checklists for the T-100 and T-200 series procedures which check the technical accuracy of the procedure. The checklists from Guideline NG-002 ensure that the guidance from the PSWG is incorporated into the procedures. All checklists have a "Discrepancies Identified" section, and a "Discrepancy Resolution" section. The V&V guideline requires that the TRIP Procedure Program Manager develop resolutions to any discrepancies, and present them to the identifier. The identifier must approve of the resolutions, or the discrepancy must be presented to the responsible senior staff member.

NRC Review and ConclusionLimerick:

The inspector reviewed Procedure NG-002, "Verification and Validation Program for Peach Bottom and Limerick TRIP Procedures." Procedure NG-002 contains appropriate guidance for proper verification and validation. The licensee corrective action satisfies the inspection finding for this item.

Peach Bottom:

The resolution for this item is identical to Limerick.

3.6.6 Inspection Finding (Items 6 and 7)

A-94 does not provide guidelines for determining when verification is required and when validation is required. These decisions are left to the discretion of the procedure writer who makes recommendations to the Plant Operations Review Committee (PORC). Additionally, A-94 does not make it completely clear that verification and validation apply to satellite procedures (T-200 Series) as well as to the flowcharts. Of particular concern is the need to make sure that satellite procedures are walked down in sufficient detail to make sure that they are accurate, feasible, and appropriate for the emergency situation; that the in-plant components involved can be readily located; and that the tools, materials, and equipment needed to perform the tasks are available.

Licensee Actions and Response

NGAP NA-11T001 specifies that V&V shall be performed on all new TRIP procedures, as well as significant revisions to all T-100 and T-200 series procedures. The V&V guideline, NG-002, specifies that V&V is not required for minor revisions as determined by the responsible senior staff member. Minor revisions are defined in Guideline NG-002.

NRC Review and ConclusionLimerick:

The inspector reviewed the guidance in procedures NG-001 and NG-002. The new procedures contain appropriate guidance for determining when verification and validation are required. The satellite procedures (T-200 Series) were included in the new procedure guidelines. The licensee corrective actions satisfy the inspection finding for this item.

Peach Bottom:

The resolution for this item is identical to Limerick.

3.7 Review of the PBAPS TRIP Procedures Regarding the LGS Inspection Findings

Inspection Finding

The NRC letter dated September 28, 1990 in response to the licensee's letter dated August 10, 1990 requested that the licensee provide the status of its plan to review the PBAPS TRIP procedures as a result of inspection findings at LGS.

Licensee Actions and Response

Since the inspection in May 1990, the PBAPS TRIP Upgrade Program included consideration of concerns expressed by the NRC staff in the inspection report. A review of the generic and applicable specific findings of the inspection report was made and the PBAPS TRIP procedures were revised by November 19, 1990, to address the concerns in technical content, support, implementation, and development process. One minor revision to the TRIP procedure bases and an Operator Aid are left to be completed and are expected to be completed by April 30, 1991 to alert operators to the effective level range of the SPOTMOS instruments.

NRC Review and Conclusion

The NRC review and conclusions on licensee's actions and response on each item as applicable to Peach Bottom are separately discussed in Section 3.1 through 3.6 of this report. In general, the licensee's actions were found acceptable.

3.8 Incorporation of the LGS Inspection Findings into the Nuclear Group Administrative Procedures

Inspection Finding

The NRC letter dated September 28, 1990 requested that the licensee provide the status of its plan to incorporate the inspection findings into the Nuclear Group Administrative procedures.

Licensee Actions and Response

Nuclear Group Administrative Procedure (NGAP) NA-11T001, "TRIP Procedures Program for Limerick and Peach Bottom," Nuclear Guideline NG-001, "Peach Bottom and Limerick TRIP Procedures Writer's Guide," and NG-002, "Verification and Validation (V&V) Program for Peach Bottom and Limerick TRIP Procedures," were approved by PBAPS and LGS by November 9, 1990, which incorporate the inspection findings.

NRC Review and Conclusion

Limerick and Peach Bottom:

The inspector reviewed the Nuclear Group Administrative Procedures, NG-001 and NG-002. The new procedures establish clear guidance to prepare, revise, and control the TRIP procedures. The NGAPs are written to satisfactorily address the TRIP procedures in detail at Limerick and Peach Bottom. The guidance in the new procedures is much improved when compared to the previous guidance in administrative procedure, A-94. The NGAPs should result in improved TRIP procedures for operator implementation.

4.0 NRC Observation of Facility Administered Regualification Simulator Examinations

After the NRC administered requalification examination in January 1991, NRC management determined that observation of the facility administered simulator exams might provide additional insights into the operator performance problems. Also, an NRC administered examination would be given to operators who failed the facility administered examination. On February 5th and 11th, an NRC examiner observed the facility administered simulator examinations. An operating crew and a staff crew were observed.

Generally, the NRC observations confirmed the findings in Combined Inspection Report 50-352/91-01 and 50-353/91-01 (OL). The facility training staff was found to be thorough in their evaluations of crew and individual performance.

During the examination cycle, two licensed operators failed the exam (one RO and one SRO). The facility is evaluating each failure to determine the need for an NRC license and what remedial training would be required before re-examination. In both cases, the facility training personnel indicated that near-term re-examination was inappropriate.

5.0 Exit Meeting

At the conclusion of the inspection on March 1, 1991, an exit meeting was conducted with those persons indicated in Section 2. The inspection scope and findings were summarized. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during the inspection.