Station Support Department

10 CFR 50.90

PECO ENERGY

PECO Energy Company
Nuclear Group Headquarters
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

April 6, 1994

Docket No. 50-277
License No. DPR-44

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

Subject: Peach Bottom Atomic Power Station, Unit 2
Technical Specification Change Request 93-02

Dear Sir:

PECO Energy Company hereby submits Technical Specifications Change Request (TSCR) No. 93-02, in accordance with 10 CFR 50.90, requesting changes to Appendix A of the Peach Bottom Facility Operating License. The proposed changes reflect the incorporation of the end-of-cycle Minimum Critical Power Ratio Recirculation Pump Trip (MCPR-RPT) System for Peach Bottom Atomic Power Station (PBAPS), Unit 2. Additionally, this TSCR will reflect the replacement of the Motor-Generator Sets with Adjustable Speed Drives (ASDs).

Attachment 1 to this letter describes the proposed changes, and provides justification for the changes. Attachment 2 contains the revised Technical Specification pages. Attachment 3 contains an analysis prepared by General Electric to support implementation of the end-of-cycle MCPR-RPT System.

Attachment 3 contains information proprietary to General Electric. General Electric requests that the document be withheld from public disclosure in accordance with 10 CFR 2.790(a)(4). An affidavit supporting this request in accordance with 10 CFR 2.790(b)(1) is provided in Attachment 3.

Very truly yours,

G. A. Hunger, Jr.

G. A. Hunger, Jr., Director
Licensing

Enclosures: PECO Affidavit, Attachment 1, Attachment 2, and Attachment 3

Ltr & Encl w/Just Prop
A001
NRC FOR
4/11

cc: T. T. Martin, Administrator, Region I, USNRC
W. L. Schmidt, USNRC Senior Resident Inspector, PBAPS
W. P. Dornsife, Commonwealth of Pennsylvania

COMMONWEALTH OF PENNSYLVANIA :

: ss.

COUNTY OF CHESTER :

W. H. Smith, III, being first duly sworn, deposes and says:

That he is Vice President of PECO Energy Company; the Applicant herein; that he has read the attached Attachment 1 and Attachment 2 of the Technical Specifications Change Request (Number 93-02) for Peach Bottom Facility Operating License DPR-44, and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.

Vice President

Subscribed and sworn to
before me this 6th day
of April 1994.

Notary Public

Notarial Seal
Erica A. Santon, Notary Public
Township, Chester County
My Commission Expires July 10, 1995

ATTACHMENT 1

PEACH BOTTOM ATOMIC POWER STATION
UNIT 2

Docket No. 50-277

License No. DPR-44

TECHNICAL SPECIFICATIONS CHANGE REQUEST
93-02

"Incorporation of End-of-Cycle Minimum Critical Power
Ratio Recirculation Pump Trip (MCPR-RPT)
System and Replacement of the Motor-Generator Sets With
Adjustable Speed Drives"

Supporting Information for Changes 10 Pages

Introduction

PECO Energy Company (PECO Energy), Licensee under Facility Operating License DPR-44 for the Peach Bottom Atomic Power Station (PBAPS), Unit 2, requests that the Technical Specifications (TS) contained in Appendix A of Operating License No. DPR-44 be amended. This amendment is necessary to reflect the incorporation of the end-of-cycle Minimum Critical Power Ratio Recirculation Pump Trip (MCPR-RPT) System and the replacement of the Reactor Recirculation System (RRS) Motor Generator (M-G) Sets with solid state Adjustable Speed Drives (ASDs) at PBAPS, Unit 2. Proposed changes to the TS are shown in Attachment 2 for PBAPS, Unit 2. The proposed change pages are: 60a (new page), 93b (new page), 141a, 213, 240k, 240m, 240n, 240o, and 240r.

Technical analysis supporting the addition of the end-of-cycle MCPR-RPT System at PBAPS, Unit 2 is provided in the Attachment 3 General Electric document NEDC-32165P, Revision 2, "End-of-Cycle Recirculation Pump Trip Analysis for Peach Bottom Atomic Power Station Units 2 and 3", dated February, 1994.

We request that the proposed changes be issued on or before August 1, 1994 for PBAPS, Unit 2, and the changes be made effective upon completion of the modification during the upcoming 2R10 refueling outage.

This TS change request provides a discussion and description of the proposed TS changes, a safety discussion of the proposed TS changes, information supporting a finding of No Significant Hazards Consideration, and information supporting an Environmental Assessment.

Discussion

The purpose of the end-of-cycle MCPR-RPT System is to reduce the challenge to the integrity of the fuel barrier resulting from reactor pressurization events. For PBAPS, Unit 2, these events include a turbine generator trip and a generator load rejection event. As a part of this modification, a nonsafety-related breaker will be installed and the nonsafety-related M-G set will be replaced with a nonsafety-related Adjustable Speed Drive (ASD) for each recirculation pump in the RRS. Each recirculation loop pump will contain an ASD in series with a breaker as a part of the end-of-cycle MCPR-RPT System.

The end-of-cycle MCPR-RPT System will be composed of two separate and independent trip systems. One trip system will trip both ASDs, and the other trip system will trip both breakers. The breaker or ASD will be tripped upon the receipt of a Turbine Stop Valve (TSV) (turbine trip) signal or Turbine Control Valve (TCV) Fast Closure (generator load rejection) signal. The severity of the turbine generator trip or load rejection event is reduced with the end-of-cycle MCPR-RPT System due to the quick trip of

the recirculation pumps which results in a more rapid pump coastdown. The rapid core flow coastdown increases the insertion of negative void reactivity that suppresses a power increase during pressure transients.

Additionally, the end-of-cycle MCPR-RPT System will improve the thermal response to plant scrams during the latter portion of a typical fuel cycle when slower negative scram reactivity insertion rates are encountered.

The end-of-cycle MCPR-RPT System will enhance operating efficiency of the reactor by providing an improvement in the Critical Power Ratio (CPR) operating limit which protects the integrity of the fuel barrier. This improvement of the CPR margin is gained by reducing the severity of the postulated limiting pressurization transients which set the CPR operating limit (Minimum Critical Power Ratio).

Description of the Proposed Changes

The design of the end-of-cycle MCPR-RPT System has been compared against the design of the Recirculation Pump Trip System provided in GENE-770-06-01, "Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times for Selected Instrumentation Technical Specifications." General Electric has concluded that the design of the PECO Energy end-of-cycle MCPR-RPT System is similar to the design provided in the GENE-770-06-01 analysis such that the surveillance test intervals and allowed out-of-service times provided in NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4" can be applied. Therefore, the Limiting Conditions for Operation (LCO), Surveillance Requirements (SR), and Bases for the end-of-cycle MCPR-RPT System have been developed utilizing the guidance of NUREG-1433 as follows:

1) New LCO 3.2.H.1.a states that when Thermal Power is greater than 30% of Rated Thermal Power, two channels per trip system for each MCPR-RPT instrumentation function shall be operable. These instrument functions, as defined in the Bases, are the Turbine Stop Valve (TSV) Closure with trip level setting $\leq$ 10% closed, and the Turbine Control Valve (TCV) Fast Closure trip level setting of 500<P<850 psig.

   The setpoints of 10% for the TSV and 500<P<850 psig for the TCV have been established as current values utilized for the Reactor Protection System (RPS) as shown in current TS Table 3.1.1.

2) LCO's 3.2.H.1.a, 3.2.H.1.b, and 3.2.H.1.c have been established in conformance with the guidance of NUREG-1433 to define actions for inoperable channels or functions.

   LCO 3.2.H.1.b has been altered by an asterisk to identify that the action of placing the channel in trip is not

applicable if the inoperable channel is the result of an inoperable breaker or ASD. Both the ASD and breaker, and the channel must be operable to consider the function operable.

3) LCO 3.2.H.2 requires that if the requirements of LCO 3.2.H.1 cannot be met, the associated recirculation pump will be removed from service within 4 hours, or Thermal Power will be reduced to less than 30% of Rated Thermal Power within 4 hours.

4) New SR 4.2.H.1 allows delayed entry into LCO 3.2.H.2 for up to 6 hours provided that the associated function, as defined in the Bases, maintains the MCPR-RPT trip capability.

5) New SR 4.2.H.2.a establishes a requirement for the channel functional test to be performed once per 92 days. PECO Energy has confirmed that the setpoint drift for the end-of-cycle MCPR-RPT System instrumentation will remain within allowance for the 92 day period.

6) New SR's 4.2.H.2.b and 4.2.H.2.c establish requirements for the channel calibration and the logic system functional test of the system. This testing frequency has been established based on conclusions provided by General Electric regarding the performance on the ASDs.

7) New SR 4.2.H.2.d requires the verification of the TSV and TCV Fast Closure functions.

Additional changes not impacted by NUREG-1433 are as follows:

1) Current PBAPS, Unit 2 Bases 4.5.L are being revised to reflect the replacement of the M-G Sets with the ASDs. This page is also being revised as a part of Technical Specification Change Request (TSCR) 93-01 dated April 1, 1993, concerning the implementation of the expanded operation domain for PBAPS, Units 2 and 3. TSCR 93-01 has been approved for PBAPS, Unit 3 (Amendment No. 184). We anticipate that this page will be revised as a part of the approval of TSCR 93-01 for PBAPS, Unit 2, therefore, deleting the need for this revision.

2) LCO 3.14.E and SR 4.14.E are being revised to delete reference to the M-G Set Room and the M-G Set Lube Oil Room. The M-G Set Room is being renamed the ASD Room. The lube oil system, which supported the operation of the M-G Sets, will be removed. Thus, a water suppression system is no longer needed.

3) SR 4.14.E currently refers to the functional test of the system integrity alarm which is actuated on a "low pipe air pressure" alarm. However, the gas utilized for this test, since the licensing of the plant, has been nitrogen. This

change is being made to reflect the use of nitrogen rather than air. The Section 3.14 Bases for the water suppression system are also being revised to reflect these changes.

4) The current Section 3.14 Bases state that "The suppression system is a pre-action type using smoke detector to charge the sprinkler headers with fire water and spray nozzle actuation on high temperature." Additionally, the Section 3.14 Bases states that "The sprinkler header is normally pressurized with air, with a low pressure annunciator to monitor header and nozzle integrity." References to nozzles are being replaced with references to sprinklers to reflect the redesign of the system which will utilize sprinklers instead of spray nozzles. The change to sprinklers is the result of the replacement of the M-G Sets.

5) The current Section 3.14 Bases are also being revised to correct the reference to the fire water flow annunciator which is actuated with a high pipe pressure switch and not a low pipe pressure switch. This change reflects the original design of the plant.

6) Room names identified in Table 3.14.C.1 ("Fire Detectors") and Section 3.8.C, ("Gaseous Effluents") are also being revised to reflect the name changes.

7) Fire protection changes reflected on pages 240k, 240m, 240n, 240o, and 240r of this TSCR are also the subject of TSCR 90-05, dated March 28, 1994, concerning the removal of fire protection requirements from the PBAPS, Units 2 and 3 Technical Specifications. TSCR 90-05 proposes to delete these pages. Approval of TSCR 90-05 will delete the need for the fire protection revisions discussed above.

Response time testing has not been included as a part of this proposed TSCR for the end-of-cycle MCPR-RPT System. The Peach Bottom current licensing bases do not include requirements for response time testing. Given the current industry efforts to justify the deletion of response time testing from the Technical Specifications and the current Peach Bottom licensing bases, response time testing will not be included into the Technical Specifications. However, as a part of the modification acceptance test and as a Routine Test, response time testing will be performed to ensure the system meets design and analysis response time requirements.

Safety Discussion

As stated in the PBAPS, Units 2 and 3 Updated Final Safety Analysis Report (UFSAR), the objective of the thermal and hydraulic design of the core is to achieve power operation of the fuel over the life of the core without sustaining fuel damage. Additionally, the thermal-hydraulic design of the core

establishes actuation limits for nuclear safety systems such that no fuel damage occurs as a result of moderate frequency transient events. Specifically, the MCPR is one limit.

The end-of-cycle MCPR-RPT System will reduce the challenge to the fuel barrier following a postulated transient by improving the Critical Power Ratio (CPR) operating limit. The bounding transients affected by the end-of-cycle MCPR-RPT System are the load rejection with no bypass event, the turbine trip with no bypass event, and the feedwater controller failure - maximum demand event.

Core wide transient analyses results with the end-of-cycle MCPR-RPT for the most limiting transients are shown in Table 2 of the attached General Electric Report NEDC-32165P, Revision 2. Also provided are the corresponding operating limit MCPRs.

As discussed in the General Electric Report NEDC-32165P, Revision 2, the end-of-cycle MCPR-RPT System will reduce the challenge to the integrity of the fuel barrier by tripping the recirculation pumps early in the pressurization phase of the above discussed events which will introduce negative void reactivity thus reducing reactor power. Upon detection of a fast closure of the TCVs or the TSVs at core power above 30% of rated thermal power, the reactor protection system will initiate a reactor scram signal and concurrently a RPT signal to keep the fuel within the design safety limits.

The end-of-cycle MCPR-RPT System will be comprised of two separate and independent trip systems. One trip system will trip both ASDs, and the other will trip both breakers. Each recirculation pump motor will be supplied by an ASD in series with a breaker. The trip will be initiated by either a TSV or TCV Fast Closure. The end-of-cycle MCPR-RPT System will utilize existing Reactor Protection System (RPS) sensors and relays that are arranged in two separate divisions of logic that will generate a trip signal. The redundant sensor circuits in each division are electrically, mechanically, and physically independent to meet single failure criteria. The RPS relay contacts will feed into two separate reactor pump trip relays. One relay will trip both ASDs and the other will trip both breakers. Consequently, trip of either the breaker relay or ASD relay will trip both recirculation pumps. Additionally, electrical separation requirements will apply for the logic.

The RPS relay contacts utilized for the end-of-cycle MCPR-RPT System provide isolation between the safety-related RPS and the nonsafety-related end-of-cycle MCPR-RPT System circuitry.

The current M-G Sets are nonsafety-related and will be replaced with nonsafety-related ASDs as a part of the incorporation of the end-of-cycle MCPR-RPT System.

The ASDs are composed of solid state electronic devices that will

accept the 13kV, 60Hz line input and will convert it to a variable frequency and voltage for the recirculation pump motor. The equipment for each ASD will be installed downstream of the existing 13kV feeder breaker, and will be comprised of a harmonic filter, a dry type isolation transformer, an ASD converter-inverter, a DC link, a filter capacitor and a new 4kV RPT breaker. Each ASD system includes a cooling system with a water to air heat exchanger. The ASD equipment, except for the isolation transformers and harmonic filters, will be mounted on skids and placed in the same location as the current M-G Sets. A normal and alternate auxiliary power feed through an automatic transfer switch will be provided to each ASD to assure continued operation of the systems in the event of a loss of power.

In order to prevent a reactor flow increase transient which could result from the failure of the flow control system or the ASD, several limiters will be provided to the flow control system and ASDs:

Rate Limiters - These limiters prohibit large changes in speed demand per second and prevent increases that are likely to produce a scram. The ASDs will also provide adjustable maximum increase/decrease ramp rates through the ASD microprocessor based control logic.

Signal Limiters - These limiters disallow control signals larger than the setpoint value and are set such that the speeds of the pumps will not result in core flows in excess of licensed values. This function is similar to that performed by the current M-G Set scoop tube electrical and mechanical stops. The ASDs will also provide an adjustable maximum input speed demand in the ASD microprocessor based control logic.

Overspeed ASD Trip - an overspeed trip will be provided independent of the ASDs through a protective relay, located inside the breaker which will monitor the ASD output frequency. On an ASD overspeed, the relay will trip the new 4kV breaker which in turn will trip the ASD and the 13kV feeder breaker.

General Electric has performed a qualitative review of other transients associated with the incorporation of the ASDs. These other non-limiting transients are expected to remain non-limiting transients with the incorporation of the ASDs. General Electric has concluded that based on this qualitative assessment of these transients, all safety limits will be maintained. The quantitative results are currently being performed by General Electric for the purposes of updating the PBAPS, Units 2 and 3 Updated Final Safety Analysis Report (UFSAR). If the results determine that safety limits will not be maintained, PECO Energy will notify the NRC by June 15, 1994.

The software used in the digital system of the ASDs is not

subject to the verification and validation requirements discussed in the NRC memorandum dated July 1, 1991, from A. C. Thadoni (NRC) to S. A. Varga (NRC) and B. A. Bolger (NRC), because this equipment is neither safety-related nor important to safety. However, the software will undergo a rigorous internal verification and validation program by the supplier of the equipment. There is no software used in the trip circuit of the end-of-cycle MCPR-RPT System. The system logic is made up of two electrically and physically separated relays; one will be used to trip both ASDs and the other will be used to trip both breakers. The stop circuit for the ASDs is hard wired.

The design of the modification will assure that the new equipment electromagnetic (EM) emissions will not cause inadvertent operation of existing plant equipment. To minimize EM emissions from the ASDs, all the equipment will be housed in NEMA type metal enclosures. The power cables between enclosures will be run inside metal conduits, and a dedicated shielding ground will be connected to the station ground grid to assure appropriate electrical noise shunting. Radio Frequency Interference (RFI) will not affect the operation of the ASD equipment because the equipment will be housed in metal enclosures. EM field measurements of the M-G Set Rooms have been taken to assure that the EM fields present inside the rooms will not affect the operation of the ASDs. Additionally, to assure that the emitted and conducted EM fields from the ASDs will be acceptable, EM field measurements will be performed.

The input harmonic filters will minimize electrical noise on the 13kV input power buses by minimizing the 5th, 7th, and 11th harmonics. The harmonic filters will be designed to maintain the total harmonic distortion (THD) to less than 3% such that the other equipment connected to the power buses will not be adversely affected by the installation of this modification. This value is less than the IEEE Standard 519-1981, "IEEE Recommended Requirements for Harmonic Control in Electrical Power Systems", recommended value of 5%. Pre and post installation harmonic testing will be performed to assure that THD will be within established limits.

All the electrical equipment including the input isolation transformers, the harmonic filters and the ASD drive will be designed and sized to meet their service conditions.

This modification will not affect the current and rerate power flow maps including the ARTS/MELLLA (Average Power Range Monitor, Rod Block Monitor, Technical Specifications Improvements/Maximum Extended Load Line Limit Analysis) features. The replacement of the M-G Sets will not change the plant response due to single loop operation of the RRS. Additionally, the Emergency Operating Procedures (EOPs) will not be effected.

General Electric has performed a review of hardware and soft failures that could be anticipated for the ASDs. A review of the

hardware failures has determined that the ASD failures would result in the shutdown of the ASD or would have no effect on the ASD function. A review of General Electric field data and experience has shown that no soft failures of the ASDs have occurred. A soft failure would be considered an unexplained electrical noise or electrical spike which would not necessarily cause a shutdown of the ASD.

This modification will result in modifications to the Control Room. These modifications have been reviewed to ensure appropriate human factors considerations. The MCPR-RPT System will be included in Licensed Operator Training Requalification.

This modification also affects the fire components as discussed in the "Description of Proposed Changes." Additionally, the amount of materials considered combustibles (oil, cables, hardware, etc.) will be decreased as a result of these modifications. Although changes to the fire protection equipment will be made, the capability to safely shutdown the plant in the event of a fire will be maintained.

Information Supporting a Finding of No Significant Hazards Consideration

We have concluded that the proposed changes to the PBAPS, Unit 2 TS do not constitute a Significant Hazards Consideration. In support of this determination, an evaluation of each of the three standards set forth in 10 CFR 50.92 is provided below.

1) The proposed change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

   The addition of the end-of-cycle MCPR-RPT System, which utilizes ASDs, will not have a significant increase in the probability or consequences of an accident previously evaluated.

   The end-of-cycle MCPR-RPT System has been designed to appropriate standards and specifications to ensure that the ability of the plant to mitigate the effects of accidents is maintained. Additionally, the MCPR-RPT System has been analyzed such that no new accident initiators will be created such that the probability of an accident previously evaluated will not increase.

   No new challenges to the reactor coolant pressure boundary will result from the incorporation of the end-of-cycle MCPR-RPT System which could result in an increase in the consequences of an accident. All engineered safety features will function as described in the PBAPS UFSAR in order to mitigate the consequences of accidents previously evaluated in the PBAPS UFSAR. Additionally, all fission product barriers and safety margins will be maintained.

2) The proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

The end-of-cycle MCPR-RPT System, which utilizes ASDs, has been designed to appropriate standards and specifications to ensure that no new sequence of events or failure modes will occur such that a transient event will escalate into a new or different type of accident.

The software used in the digital system of the ASDs is not subject to the verification and validation requirements discussed in the NRC memorandum dated July 1, 1991, from A. C. Thadoni (NRC) to S. A. Varga (NRC) and B. A. Bolger (NRC), because this equipment is neither safety-related nor important to safety. There is no software used in the trip circuit of the end-of-cycle MCPR-RPT System, except for the ASDs. Additionally, the design of the modification will assure that the new equipment EM emissions will not cause inadvertent operation of existing plant equipment and that harmonic filters have been incorporated to minimize electrical noise on the 13kV input power buses.

3) The proposed change does not result in a significant reduction in the margin of safety.

The incorporation of the end-of-cycle MCPR-RPT System, which utilizes ASDs, will not result in a reduction in the margin of safety. All safety margins will be maintained.

The end-of-cycle MCPR-RPT System will aid in protecting the integrity of the fuel barrier by tripping the recirculation pumps early in the pressurization phase of the load rejection with no bypass event, the turbine trip with no bypass event, and the feedwater controller failure - maximum demand event. The early tripping of the recirculation pumps will introduce negative void reactivity thus reducing reactor power and maintaining safety margins. The end-of-cycle MCPR-RPT System will ensure CPR safety margins which protect fuel barrier integrity.

General Electric has performed a qualitative assessment of transients that would be impacted as a result of replacing the M-G Sets with ASDs. General Electric concluded that the faster coastdown of the recirculation pumps during a Loss of Coolant Accident (LOCA) due to the removal of the M-G Set inertia may slightly increase the peak clad temperature during this event. This increase is expected to be less than 50°F. The small increase will not exceed the 2200°F peak cladding temperature regulatory limit. No design or safety limit will be exceeded.

The replacement of the M-G Sets with the ASDs will not impact the recirculation flow controller failure - increase

flow transient. The UFSAR analysis assumes a 25%/sec rate of increase. The ASD control system will include rate limiters that prevent a pump speed increase greater than 25%/sec in the event of a failure. Thus, the consequences of this transient remain bounded and safety margins will be maintained.

The ASDs will also allow a "soft start" of the recirculation pumps with the recirculation discharge valves closed prior to pump start and a gradual increase in pump speed. This results in a gradual change in core flow. Thus, the response to a startup of an idle recirculation pump remains bounded by the transient analysis and safety margins will be maintained in the transient analyses.

Changes to the fire protection equipment will still maintain the capability to shutdown the plant in the event of a fire.

Information Supporting an Environmental Assessment

An environmental assessment is not required for the changes proposed by this TSCR since the requested changes conform to the criteria for "actions eligible for categorical exclusion" as specified in 10 CFR 51.22(c)(9). The requested changes will have no impact on the environment. The proposed changes do not involve a significant hazards consideration as discussed in the preceding section. The proposed changes do not involve a significant change in the types or significant increase in the amounts of any effluents that may be released offsite. In addition, the proposed changes do not involve a significant increase in individual or cumulative occupational radiation exposure.

Conclusion

The Plant Operations Review Committee and the Nuclear Review Board have reviewed these proposed changes to the PBAPS, Unit 2 TS and have concluded that the changes do not involve an unreviewed safety question and will not endanger the health and safety of the public.