

U. S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-293/83-09

Docket No. 50-293

License No. DPR-35 Priority -- Category C

Licensee: Boston Edison Company  
800 Boylston Street  
Boston, Massachusetts 02199

Facility Name: Pilgrim Nuclear Power Station

Inspection At: Plymouth, Massachusetts

Inspection Conducted: April 4, 1983 - May 3, 1983

Inspectors: Jon R. Johnson  
J. Johnson, Senior Resident Inspector  
Jon R. Johnson, for.  
H. Eichenholz, Resident Inspector

5/9/83  
date

5/9/83  
date

Approved by: T.C. Elsasser  
T. Elsasser, Chief, Reactor Projects Section  
No. 1B, Projects Branch No. 1

date

5/23/83  
date

Inspection Summary:

Inspection on April 4, - May 3, 1983 (Report No. 50-293/83-09)

Areas Inspected: Special unannounced safety inspection of plant operations including review of activities involving an Anticipated Transient Without Scram-Recirculation Pump Trip equipment failure. The inspection involved 142 inspector hours by two resident inspectors.

Results: Three violations and one deviation were identified (Accepting, in receipt inspection, material not in conformance with the purchase order requirements, Paragraph 2.C; Failure to maintain the Q-list, Paragraph 2.C; Failure to update the FSAR, Paragraph 2.D; and Failure to perform preventive maintenance as committed to the NRC, Paragraph 3).

## DETAILS

### 1. Persons Contacted

J. Ballentine, Vice President - Operations  
H. Brannan, QA Manager  
N. Brosee, Assistant Chief Maintenance Engineer  
J. Clifford, Stores Supervisor  
W. Deacon, Performance Improvement Program Manager  
R. DeLoach, Group Leader - Operations QC  
E. Hegerich, QC Inspector  
J. Howard, Vice President Engineering and QA  
G. LaFond, I&C Supervisor  
M. Maguire, Maintenance Supervisor  
P. Mastrangelo, Chief Operating Engineer  
C. Mathis, Station Manager  
L. Oxsen, Director of Nuclear Operations Review  
E. Ringer, Sr. Systems Analysis Engineer  
K. Roberts, Chief Maintenance Engineer  
E. Ziemianski, Management Services Group Leader

The inspector also interviewed other members of the operations, maintenance and technical staffs.

## 2. Anticipated Transient Without Scram - Recirculation Pump Trip (ATWS-RPT) Equipment Failure

### A. Background/Scope

On April 3, 1983, the licensee discovered that the Recirculation Pump Motor Generator Set "B" field breaker failed to open following manual trip. This breaker (G.E. AK-F-2-25) is required to automatically open on ATWS initiated conditions as a result of modifications installed and declared operable in May, 1980. As a result of recent events at other licensed power reactor facilities involving ATWS conditions and equipment failures associated with G.E. Type AK-2 circuit breakers utilized in safety related systems, a detailed review of the licensee's actions and equipment performance was conducted to provide assurance that appropriate safety implications of this event are addressed by the licensee and the NRC. In addition to a review of the event, the inspector reviewed the equipment design, classification, modification, maintenance, procurement, receipt inspection, and surveillance activities performed by the licensee. Generic implications were also reviewed by the inspector.

### B. Event Details

At 3:48 pm on April 2, 1983, the reactor scrammed due to a main turbine runback caused by main generator stator cooling temperature problems.

The licensee decided to perform preventative maintenance on the Recirculation Motor Generator (MG) Set generator brushes while the reactor was shutdown. At 00:40 am on April 3, 1983, the 'B' MG Set was secured by the control room operators (this should have tripped the generator field breaker). About 1:00 am on April 3, 1983, plant personnel smelled smoke in the MG Set room and noted that the 'B' MG Set generator field breaker had not opened and the the normal breaker trip coil had burned out. During investigation, maintenance personnel found mechanical binding of the breaker unit which required partial disassembly in order to free the breaker. The licensee replaced the trip coil, lubricated the breaker, and exercised it numerous times during bench testing and following reinstallation. The breaker had functioned satisfactorily during a manual trip on February 13, 1983.

Following discussions with NRC:Region I personnel on the afternoon of April 3, 1983, the licensee suspended a reactor startup in progress and conducted further evaluations. The licensee's Onsite Review Committee (ORC) was convened and reviewed the event. No definitive cause for the original mechanical binding was identified but the ORC determined that repairs and testing were adequate to insure proper breaker function. The reactor startup was continued and the reactor taken critical at 6:37 pm on April 3, 1983.

The NRC was notified of this event by the licensee at approximately 12:40 p.m., April 3, 1983 via the ENS system. The licensee issued a prompt (24 hour) report, LER 83-013/01X-0, on April 4, 1983, and a followup (14 day) report LER 83-013-01T, on April 13, 1983. No root cause was identified for the mechanical binding.

C. Design Requirements; Classification of Equipment and Quality Assurance Program Requirements

(1) Routine Followup of Trip Coil Maintenance

A routine inspection was conducted in the area of maintenance associated with the burned out trip coil.

Following the licensee's discovery on April 3, 1983 that the Recirculation MG Set 'B' field breaker trip coil had burned up, Maintenance Request (MR) No. 83-91 was issued for repairs. The inspector reviewed this MR and noted, that: 1) the Maintenance Department Staff Engineer classified the repair as not safety related, and 2) the cognizant QC inspector specified that no quality control requirements applied (it was non-Q work and no QC hold points were required).

Based upon a review of Station Procedure 1.5.3, Revision 16, Maintenance Requests, the Boston Edison Co. (BECO) Operations Quality Assurance Manual and the Pilgrim Nuclear Power Station (PNPS) Q-list for Quality Control of Safety Related Systems, Structures, and Components, the inspector determined that the actions of the station maintenance and QC personnel in this MR classification process were appropriate.

(2) Detailed Design Review

Because the Recirculation MG Set A&B field breakers trip open as a function of an ATWS-RPT initiation signal (as required by the Limiting Condition for Operation Specified in TS Section 3.2.G), the inspector determined that a detailed review should be performed to determine if the classification guidance and designation provided in applicable licensee documents (e.g., Q-list and QA Manual) was appropriate. This review consisted of discussions with licensee personnel and examination of documents associated with design, procurement, installation, and testing as described below.

On January 8, 1979, the NRC transmitted by letter a copy of NUREG 0460, Volume 3, dated December, 1978 (ATWS for Light Water Reactors), and provided a modified description of ATWS design requirements (Appendix A). Additionally, it was requested that the licensee provide a schedule for implementation of its commitment to install an RPT system at the station which would conform to the systems described in the letter. Both the Appendix A to the January 8, 1979 letter and Appendix C to NUREG 0460, specify (for ATWS equipment) that a quality assurance program in conformance with the requirements of 10 CFR 50, Appendix B shall be applied to the system design and equipment. On January 30, 1979, BECO requested from General Electric Co., a summary description and bid quotation for equipment and related engineering services required for implementation of an ATWS-RPT system.

GE responded on March 7, 1979 with a proposal and quotation (416-4208-HK1) and, as one of its design objectives, indicated the hardware should be of high quality and environmentally qualified. Furthermore, GE proposed for Quality Assurance the following:

- Equipment and Services shall be provided in accordance with the General Electric BWR quality assurance program as described in Topical Report NEDO-11209-04A.
- The provisions of 10 CFR Part 21 apply.
- A Product Quality Certification (PQC) shall be provided by General Electric as the primary quality assurance record for Equipment classified as "important to safety."
- BWR owner access requirements for audits and/or witness of inspection points for supplied Equipment and Services shall be arranged upon request at mutually agreed terms.
- All General Electric Nuclear Energy Divisions' work at the BWR owner's plant site shall be under the cognizance of the BWR owner quality assurance program.

A BECo memorandum NED 79-371, dated April 23, 1979, requested funding for procurement in accordance with the GE quotation. Subsequently, in a letter from BECo to NRC:NRR, dated April 10, 1979, the licensee committed to install an ATWS-RPT/ARI, and to treat the installation as a Class IE Modification.

Class IE is defined in Regulatory Guide 1.75, Physical Independence of Electrical Systems, as..."The safety classification of the electrical equipment and systems that are essential to emergency reactor shutdown, containment isolation and reactor heat removal or are otherwise essential in preventing significant release of radioactive material to the environment."

### (3) Procurement/Receipt Inspection

An inspection of the procurement process determined that the licensee had received equipment that was designed to a high level of quality even though a discrepancy was identified in receipt inspection.

The licensee issued Purchase Order (P.O.) No. 62102 on May 3, 1979 to GE in accordance with its quotation No. 416-4208-HK1. The following requirements were specified on the O.P.:

"Quality Assurance Program Requirements: Materials, equipment, or services (whichever is applicable) shall be in accordance with the GE BWR QA Program as described in Topical Report NEDO-11209.



5.

Documentation Requirements:

A Product Quality Checklist and a Product Quality Certification shall be submitted for items manufactured by GE, a Product Quality Certification with an index of required documents and copies of those required documents shall be submitted to Boston Edison.

Identification Requirements:

This item is classified as safety related and/or 10 CFR 50, Appendix B applicable and as such must be identified (either on the item or tagged) with "Boston Edison Q Item No. \_\_\_\_\_". Boston Edison shall establish Q numbers and notify GE prior to Equipment Shipment.

Other Requirements:

The provisions of 10 CFR Part 21 apply to this procurement.

On May 23, 1979, G.E. transmitted a letter, G-HK-9-60, taking exception to the documentation and identification requirements section of BECO. P.O. 62102. (Since they were beyond the scope of the GE BWR QA Program described in Topical Report NEDO-11209-04A and the standard quality documentation and identification practices committed to in GE Quotation 416-4208-HK-1). The licensee had apparently agreed to these changes but did not revise the original Purchase Order.

Subsequently, on March 15, 1980, the licensee's quality control personnel performed a receipt inspection of miscellaneous equipment for the ATWS-RPT system received at the plant. A Material Receipt Inspection Report (MRIR) No. 80-960 was issued specifying that a visual inspection for identification and damage, and review of documentation was performed with the required quality documentation being a Product Quality Certification (PQC). The PQC states, that, "This is to certify that the products identified herein are being supplied in conformance with the procurement quality requirements, including applicable codes, standards, and specifications as identified in the referenced documents, unless noted below. Any supporting documentation will be forwarded or retained in accordance with purchase order requirements." MRIR 80-960 includes the receipt of safety related components.

Although the licensee performed a receipt inspection, deviations from P.O. 62102 were not identified. The documents referenced in the PQC were not supplied and the equipment was not identified with the Q item numbers.

Accepting safety related material during MRIR 80-960 without assuring that the documentation and identification requirements of the P.O. were met, is a violation (83-09-01).

#### (4) Installation and Licensing Actions

While the licensee was proceeding with installation, licensing actions were being taken by the NRC to impose operability requirements.

The design, installation, and testing of the ATWS-RPT/ARI system was performed in accordance with Plant Design Change Request (PDCR) 79-25, (cover sheet designated 'Q') and its associated Field Revision Notices (FRNs). The installation and wiring/rewiring of two shunt trip devices in each of the Recirculation MG Set A&B field breakers was performed in accordance with FRN 79-25-26. One new shunt trip assembly was installed in each MG Set field breaker, and, when used with the existing shunt trip, would provide a one-out-of-two shunt trip for the ATWS-RPT function. This FRN includes Nuclear Engineering Department Work Instruction (NEDWI) No. 236 and provides the designation that it is "Q-listed" with specified responsibilities assigned to the Quality Control Group.

On February 21, 1980, the NRC issued an Order requiring the installation of a recirculation pump trip by December 31, 1980.

During the design and installation activities for the ATWS-RPT/ARI system at PNPS additional licensing action was taking place involving proposed changes to the station Technical Specifications. This included the generation of licensee Safety Evaluation No. 892 on March 14, 1980 which specifies, that, even though the BECo ATWS-RPT/ARI is essentially identical to the prior NRC approved Monticello Nuclear Generating Station ATWS-RPT/ARI system, any differences do not impair the safety function provided by these systems. Subsequently on May 12, 1980, the licensee received Amendment No. 42 to its Facility Operating License. This amendment provided ATWS-RPT/ARI Technical Specification Limiting Conditions for Operation and Surveillance requirements. Additionally the attached NRC safety evaluation notes that qualified DC power supplies and the DC to AC inverter specified for the ATWS RPT/ARI systems are not currently available. In order to maintain the diversity of the original design, provisions for installation of inverters at a later date have been made and the ATWS cabinets include non-safety qualified power supplies to be replaced or qualified later. Subsequently on February 19, 1981, NRC:NRR issued a safety evaluation that documents discussions between NRR and BECo. regarding installation/testing of the qualified DC power supplies and DC to AC inverters. It was specified that the installation would take place during the first seven-day outage after April 1, 1981 and not later than the scheduled October, 1981 refueling outage.

The licensee issued FRN 79-25-48, dated July 14, 1981, to PDRC 79-25 that provides the design and installation instructions for the qualified power supplies and inverter. This FRN, in Section 7.1, General System Characteristics, states that the ATWS-RPT/ARI is "Safety-Related (Q)."

(5) Licensee Clarification - Inspector Findings Relating to Classification

Even with the above guidance, the inspector had questions relating to the system's design and classification, since none of the ATWS equipment was currently listed on the Q-list. This resulted in a submission to the licensee on April 19, 1983 of written questions to ascertain the appropriateness of the licensee's activities as a result of its commitment to install the system. Subsequently, a meeting was held at the corporate office in Braintree, Ma. on April 27, 1983, between the inspectors and various licensee personnel (including the Vice President of Operations and the Vice President of Engineering - Quality Assurance) to discuss these questions.

The inspector was informed that the licensee considered the classification of the ATWS-RPT/ARI system to be non-safety related. This was due to their consideration that the system does not perform a safety-related function. However, the licensee indicated that the system included some safety related components due to considerations of pressure boundary, seismic criteria, and/or interfaces with existing Class IE electrical equipment. The licensee provided the following safety related component descriptions:

125v DC Distribution Panels D36 and D37 are classified seismic Class IE, safety related. Downstream of the breaker is non-safety related non-seismic Class I.

125v AC Distribution Panels Y3 and Y4 are safety related seismic Class IE. Downstream of the breakers are not.

Instrument Racks Nos. 2275 and 2276. The pressure retaining components (pressure and level switches with interconnecting piping) are safety related seismic Class I, as is the rack itself. The electrical portion of the end devices are non-seismic Class IE.

The licensee indicated that the above noted components not being on the Q-list at this time was in accordance with the Nuclear Engineering Department (NED) procedures, which specify that the safety related components installed by a PDCR are added to the list when the PDCR is closed-out. The licensee indicated that an update to the Q-list was being prepared to include the components described above. When questioned about how the station was supposed to treat operations/maintenance including repairs or replacements from a classification standpoint



if the Q-list is not updated at the "front end" of a modification, the licensee indicated that, in the future, a preliminary update of the Q-list will be implemented on the front end of the modification.

The administrative controls to be established by the licensee to provide for preliminary updating of the Q-list for modifications will be followed in a future inspection (83-09-02).

The BECo. Operations Quality Assurance Manual in Section 1.2.13, dated January 31, 1983, requires, that, the Nuclear Engineering Department is responsible to maintain the Q-list and supporting documents which identify the safety related structures, systems and components to which the quality assurance program applies.

The existence, as of April 28, 1983, of safety related components not identified on the Q-list is a failure to maintain the Q-list and considered a violation (83-09-03).

As a result of the discussion with the licensee relative to the application of QA program requirements, the licensee was asked what quality requirements applied and are appropriate to the ATWS components/activities. Their response indicated that 10 CFR 50 Appendix B controls were applied to the design, procurement and installation processes for the new RPT installation. Other than the specific components identified above as safety related, and therefore requiring the application of the QA program, the licensee has considered from a classification viewpoint, that, the ATWS RPT/ARI will not have QA applied. This includes the Recirculation MG Set field breakers. With regard to concerns expressed by the inspector relative to future replacement of parts procured with quality requirements when in the future the QA program does not apply, the licensee indicated that in accordance with station procedures they are required to replace in kind per the original purchase specification. In general, the licensee agreed with the inspector, that it does not appear to be logical to apply a 10 CFR 50, Appendix B, program to design, procurement and installation for a system but not to future operations, maintenance, and testing, etc.

The inspector, in reviewing all applicable regulatory requirements and commitments made by the licensee relating to ATWS equipment did not identify any violations associated with the licensee's determination that ATWS as a system function, is non safety related and that 10 CFR 50, Appendix B, applies currently, to only the aforementioned safety related components.

This information pertaining to ATWS system classification will be provided to NRC management for additional review in light of recent events at other power plants and an ongoing NRC evaluation of ATWS equipment.

D. Final Safety Analysis Report (FSAR)

The inspector reviewed the Pilgrim Nuclear Power Station (PNPS) Updated FSAR in order to evaluate the ATWS RPT/ARI system description including design bases, and system classification.

The inspector noted that, as of April 28, 1983, the Updated FSAR (initially submitted to the NRC on July 21, 1982) did not provide a description of the ATWS RPT/ARI system.

The inspector questioned the licensee as to why the Updated FSAR did not include this system. The ATWS RPT/ARI system was installed and declared operable in May, 1980. In addition, Technical Specification changes required this system operable since May, 1980, and an NRC Order required installation of the ATWS RPT portion.

The licensee stated that this system had been incorporated into the Updated FSAR on page 7.9-2. The inspector noted that one sentence in paragraph 7.9.4.2, Motor Generator Set (Recirculation Flow Control System) was provided as follows: "Contacts are provided to trip the recirculation pump MG set field breakers upon high reactor pressure or reactor low low level."

This one sentence was an inadequate description of the system. 10 CFR 50, Statements of Consideration, dated May 9, 1980 (45 FR 30614), specifies that the level of detail of descriptions of physical changes are to be at least the same as originally provided. Analyses or program type material were allowed to be incorporated in the Update as an appendix or by reference but not physical descriptions.

10 CFR 50.71(e) required that an Updated FSAR be submitted to the NRC by July, 1982, and that this submittal shall bring the FSAR up to date as of a maximum of 6 months prior to the date of filing. The failure to adequately bring the FSAR up to date in July, 1982 by not providing a description of the ATWS RPT/AIR system installed in May, 1980, is a violation (83-09-04).

## E. Corrective and Preventive Maintenance Activities

### (1) Corrective Maintenance Performed on April 3, 1983

The licensee issued MR 83-91 on April 3, 1983 for repairs to the field breaker on the "B" Recirculation MG set. The repairs consisted of lubrication and replacement of both shunt trip coils in accordance with Station Procedure 3.M.1-11, Revision 2, Routine Maintenance.

Even though only one of the two ATWS shunt trip coils burned up, the licensee replaced both trip coils installed in the field breaker. This was due to the relative proximity of both coils and the concern that this might result in reduced reliability for the trip coil that had not failed. As indicated on LER 83-013/01T, dated April 13, 1983, the cause of the trip coil burnup was the result of a bound up mechanism that prevented the breaker from opening.

The licensee's investigation into the as-found conditions of the field breaker resulted in the following information (as documented in the LER and Operations Review Committee Meeting 83-27 Minutes of April 3, 1983):

- The main contacts were partially tripped and bound up indicating that a trip signal had been sent to the breaker.
- The shunt trip device had a failed trip coil and the mechanism was partially in trip.
- The breaker would not mechanically trip via the mechanical push button on the front of the breaker, and
- The breaker was found to be slightly dirty and dry.

The corrective actions taken by the licensee consisted of the following:

- The breaker was removed from the cubicle, the arc chutes were removed, and the trip latch mechanism was manually pushed. Phase one, two and three then tripped.
- The main and shunt trip linkage was lubricated with "LPS" penetrating oil (a non-greasy lubricant). The breaker was cycled approximately twenty times and then reinstalled.
- Applicable sections of the Technical Manual were consulted and specified actions were taken.
- The redundant ("A") MG set breaker was operated and no signs of similar binding were found, and
- The General Electric Company was contacted to assist in the resolution of the problem. Specifically, GE was requested to specify if additional immediate corrective measures were in order and, for nuclear application, should the breaker have different adjustments, lubricants, or linkage/bushing tolerances.

As indicated above, MR 83-91 specified use of Station Procedure 3.M.1-11. This procedure provides guidelines for maintenance personnel to perform routine maintenance activities which do not require a specific procedure. The use of this station procedure was not inappropriate for equipment designated not safety related and non-Q.

The inspector determined that the licensee's procedure 3.M.3-6, Revision 3, Inspection and Overhaul of 480V Load Center Breakers was the type of procedure that would have been appropriate to use if the field breaker had been classified as safety related or Q work (i.e., work performed under the provisions of the Licensee's QA program).

Procedure 3.M.3-6 provides reference to G.E. manuals for AK-2 type breakers. Because the field breaker is not a 480V load center breaker it is not covered by this procedure. Some of the technical manuals listed in this procedure are applicable to the AK-F-2-25 field breaker used by the licensee. Additionally, this procedure is utilized by the licensee as part of its preventive maintenance (PM) program for 480V load center breakers, both safety and non-safety related. (The performance of the PM program on 480V load center breakers is discussed in paragraph 3 below due to the identification of a problem by the inspector in the course of inspecting the ATWS-RPT equipment failure).

(2) Maintenance History

In the area of corrective and preventive maintenance for the field breakers, as well as the rest of the ATWS system, the inspector reviewed the licensee's records and developed the attached summary history tabulation.

MAINTENANCE HISTORY SUMMARY ATWS

<u>MR No.</u>	<u>Initiation Date</u>	<u>Equipment</u>	<u>Item</u>	<u>QC Requirements Specified</u>	<u>Comments</u>
81-2-22	4/28/81	Recirc MG Set A	Refuel Outage Inspection & Testing	Installation inspection Required	Generator field breaker Inspected. No procedure for breaker specified or exists. Inspection not recorded on maint. history card (visirecord). Work completed 1/7/82.
81-2-23	4/28/81	Recirc MG Set B	Refuel Outage Inspection & Testing	Installation inspection required	Generator field breaker overhauled, returned to cubicle discharged & cycled 6 times. Note written at top MR states "safety note! Bkr will not discharge" - Under description of work performed it states "calibrated relays, metering, checked alarms, inspected brushes and gen. field breaker according to procedures 3.M.3-11,12&13 and other various". The MR is not listed on the "B" MG set maintenance history card. Work completed on 12/22/81.
82-45-76 (82-45-100)	5/12/82	ATWS 263-121B Rosemount Trip Unit	Trip Unit failed in tripped position	Notify QC prior to replacing parts	Initially issued MR 82-45-76, which was cancelled, with work and repairs performed under 82-45-100. Replaced transistor Q8, MRIR No. 82-709 and performed 8.M.1-29 & 30 applicable sections. Unit returned to service on 6/14/82.
82-45-102	6/14/82	Atws Calibration Unit	Broken switch & transistor replaced	Installation inspection required & notify Q.C. prior to replace parts	Post work testing performed using procedure 8.M.1-29. MR completed 8/18/82.
82-45-172	10/13/82	ATWS inverter "B"	Tripped after loss of offsite power	Same as above.	MR still open.



<u>MR No.</u>	<u>Initiation Date</u>	<u>Equipment</u>	<u>Item</u>	<u>QC Requirements Specified</u>	<u>Comments</u>
83-79	3/10/83	ATWS "A" Trip Unit	False half trip indication on status indicator	Installation inspection required & notify Q.C. if repairing or replacing parts.	Staff engineer designated MR as safety related. No Q-list number listed. No parts replaced. 8.M.1-29 used for post work testing. LER 83-012/03L covers equipment malfunction.
83-91	4/3/83	Recirc MG Set "B"	Field breaker trip coil burn-up	None specified. <u>Non Q work, no QC hold</u> <u>points specified.</u>	Staff engineer designated work as non safety. Work specified: lubricated and replaced shunt trip coil. Repair performed in accordance with 3.M.1-11. No MRIR number listed. LPS spray lubricant used. New shunt trip unit coil. Maint. dept. staff engineer recorded on work log a material conformance transfer tag (MCTT) listing trip coil as: BECo. code no. 521458, MRIR 79-361 and Q-list # 42.1. The MCTT did not list the MR number.

From a review of this tabulation, the inspector observed that the licensee's personnel were inconsistently applying classification and quality assurance criteria to maintenance of ATWS system equipment. To some degree, the inspector attributes this to be caused by the improper classification process described in Paragraph 2.C above. Even though the ATWS trip logic units are not safety-related, as recently as March 10, 1983, the staff engineer involved with ATWS equipment problem designated the work as "Safety-Related" on MR-83-79.

(3) Preventive Maintenance and Vendor Supplied Information

In the area of PM on the recirculation pump field breakers, the only programmatic information that the licensee has is covered in Station Procedure 3.M.1-1.2. This procedure was generated, in part, for the purpose of establishing the guidelines of preventative maintenance to be performed on electrical equipment and stipulates that most of the work is scheduled during refueling outages. It further indicates that the procedures and work instructions to be used will be delineated by the Electrical Engineer on individual Maintenance Requests.

Under Section K, Recirculation Motor Generator Sets A&B, the 3.M.1-1.2 procedure indicates that one of the appropriate tests is that the generator field breaker is overhauled. The prior referenced maintenance summary tabulation shows that the "B" recirc MG Set field breaker (but not the "A") was overhauled in the last refueling outage which ended in late March, 1982.

The inspector held discussions with the licensee's cognizant personnel to ascertain:

- What is the nature and extent of existing vendor information and recommendations associated with PM on the field breaker?
- Is this information current, and if not, what actions are required by the licensee to correct current maintenance practices?
- Do the plant practices, in terms of lubrication schedule, extent, and type, conform to the manufacturer's recommendations?
- With regard to vendor recommendations, what interface or policies exist to assure that PM on plant equipment is updated to reflect the latest manufacturer recommendations?
- How does the licensee ensure that the latest manufacturer manuals, instructions/letters, etc. are properly referenced, translated and used?

It is important to note, that, even though the field breakers are classified as "non-safety related", the very fact that they are Type AK-2 breakers resulted in the inspector viewing the area of PM as having applicability to

to 480V safety related breakers at the station. Many of the concerns of the inspector were shared by the appropriate plant personnel, who were actively performing their own detail review to assure themselves that appropriate corrective actions would be taken, if required.

The licensee contacted various groups and service organizations of the G.E. Co. to obtain information that would answer many of the questions posed above. The licensee determined that additional technical information was available. Some of this information was verbal and some was in written form. Depending on the vendor group or person contacted, the licensee was receiving contradictory advice in some cases. Due to this situation, the cognizant maintenance personnel at the plant were reluctant and, in fact, did not institute any changes or directives associated with use of lubricants on the breakers other than what their normal practices called for.

The existing information at the station, basically consisted of maintenance instruction manuals issued by the vendor. Subsequently revised and updated vendor manuals were received by the licensee based upon it's recent contacts and requests. These new manuals did not materially change the on-file information. All the technical manuals recommend a periodic inspection of the circuit breaker be performed at least once per year. More frequent inspections are recommended, if severe load conditions, dust, moisture, or other unfavorable conditions exist. The manuals state, that, in general, the circuit breaker requires very little lubrication. Bearing points and sliding surfaces should be lubricated very lightly at the regular inspection periods with a thin film of extreme temperature, high pressure, light grease, similar to G.E. Spec. No. D50H15 or RPM No. 5. The inspector verified that the above noted lubricants were not used or even existed in stock at the plant. The inspector learned that the D50H15 lubricant is a high grade, general purpose lubricating grease compounded with a lithium soap base with a rust inhibitor and antioxidant added.

The nature of the lubrication was described in a Switchgear Maintenance Information (SMI) document No. 15-79, dated October 5, 1979, and issued by the G.E. Apparatus Service Div. This document, which the licensee received for the first time in April, 1983, as part of its request for information from the vendor, specifies that the AK/AKR low voltage breakers produced by the GE Circuit Protective Devices Department (CPDD) should apply GE #193A1751P1 (Mobil #28) to the breaker operating and racking mechanism. Furthermore it describes Mobil grease #28 (additionally known as GE #D6B15) as a high quality U.S. Military specification grease (Mil. Spec. MIL-G-81322A and Amend. 1) designated primarily for aviation purposes. It has however, certain properties and performance characteristics that make it a desirable lubricant for special industrial applications as well.

The SMI included the following application recommendations:

- Always remove all dirt and old grease from the surface(s) before applying new lubricant.
- When re-lubricating breaker operating, racking/elevating mechanisms, after thoroughly cleaning - spray the mechanism with a lubricant-moisture dispellant such as WD-40, CRC-6-66 or equivalent, paying particular attention to the rollers, bearings and pivot-hinge points, then operate the breaker manually or electrically to "work in" the lube.
- Re-lubricate with the proper grease, apply it sparingly, excess grease is not necessary and in fact, is detrimental as airborne contaminants will adhere and cause the lubricant to rapidly deteriorate.

Close/open the breaker several more times to assure proper operation.

It concludes with the statement ... "Proper lubrication is critical to proper operation."

As part of the recent information obtained from the vendor, the licensee received an Installation and Service Engineering Service Advice letter (SAL) Tab 175 (CPDD) - No. 9.3, dated April 2, 1979. (Note: This is the GE Service Advice Letter No. 175 (CPDD) 9.3 referred to in IE Bulletin 79-09, dated April 17, 1979.) This document reports on knowledge recently gained regarding the possible malfunctioning of AK breakers when equipped with undervoltage devices. It indicates that reports have been received which indicate that after the breaker has been in service for several years without adequate maintenance, the undervoltage device fails to trip the breaker when voltage is removed. Additionally, it relates the equipment problem to the potential for hardened grease on the trip shaft and/or latch bearing, or the potential that dirt may have accumulated on the trip latch surface. Hardened grease must be replaced or revitalized with a suitable solvent such as WD-40 or CRC5-56 or the bearings must be replaced. It continues by recommending, that the frequency of inspection of the involved breakers should be increased until it can be verified that the revitalization of the grease is effective for the normal maintenance interval. Thereafter, the grease in the bearing should be revitalized at the normal maintenance intervals.

The inspector was informed by a licensee representative, that SAL No. 175 (CPDD) 9.3 was sent to the licensee's Corporate and Engineering Offices as well as to the attention of the Plant Superintendent in 1979. The licensee does not utilize undervoltage trip devices on the field breaker or on any AK-2 series breakers at the plant. It is for this reason that when the licensee responded on May 23, 1979 to IE Bulletin 79-09, "Failures of GE Type AK-2 Circuit Breaker in Safety Related Systems", received April 17, 1979, it

stipulated that the SAL's recommendations are not deemed necessary. Based upon indications of grease hardening observed on the "B" Recirculation MG Set field breaker, the licensee is reappraising the potential for equipment failure to be attributable to hardened grease independent of whether or not an undervoltage device is used. This appraisal will be reflected in a PM program that includes the 480V safety-related breakers utilized at the station.

When questioned about the plant's PM practice for these type breakers, with respect to frequency, type and nature of lubrication, the inspector was informed that the lubrication is generally done during each refueling outage, that a lubricant spray LPS-1 (a greaseless lubricant that forms a thin dry lubricating film - won't attract dust and penetrates and displaces water - does not contain silicones or chlorinated solvents) is used by the maintenance personnel to lubricate the linkages of the breaker mechanism. The inspector noted that the use of this lubricant spray is not specified in the vendor maintenance manuals but, is sanctioned to some degree in the other vendor documents described above. The actual personnel performing the work at the station are BECo. system wide employees who service the station switchgear and breakers at all the plant's operated by BECo.

During the early contacts made with the various organizations of the vendor in April, 1983, many of the recommendations and much of the above described information was received by the licensee via telecons. One of these contacts recommended that the plant should use Molycote Type G lubricant on the roller and cam of the middle pole of the field breaker. The inspector relayed to the maintenance personnel information described in NRC IEB 83-01 which states that, as a result of lubrication related breaker problems on Westinghouse DB-50 style breakers, this particular lubricant should not be utilized. This recommendation to use Molycote Type G came from a GE Co. field service engineer and not the result of the applicable Product Department. Due to this fact, the vendor has instructed the licensee via a telecon on April 14, 1983 to use PM information "only" from the Product Department. Furthermore, in this telecon, the licensee was informed that the vendor has no pending revisions to the maintenance/PM instructions or new guidelines in this area.

The licensee is currently reviewing all information related to a PM program for Type AK-2 breakers. When the inspector questioned the licensee relative to what PM program will be put in place for the recirculation MG Set field breakers, it was stipulated that procedures similar to 3.M.3-2, 3.M.3-4 and 3.M.3-6 will be placed on the PM list to be performed once per refueling cycle. Procedure 3.M.3-6, will be modified to include the AKF field breaker as well as reflect the licensee's PM program for the Type AK-2 breakers being developed at this time.



The inspector informed the licensee that this commitment will be reviewed during a subsequent inspection (83-09-05).

In regard to the question relating to what BECo/vendor interfaces or policies exist to assure that PM on plant equipment is updated to reflect the latest manufacturer recommendations, the licensee responded by stipulating the following:

The BECo/GE interface will be described in a Nuclear Operations Procedure to be issued titled "Distribution and Policies for Correspondence with GE." Other vendor interfaces are handled by review of the correspondence and by industry experience inputs from nuclear utilities, INPO, and others.

With respect to inspector concerns on a procedure review process to ensure that the latest manufacture manuals, instructions, letters, etc. are properly referenced, translated and used, the licensee responded by stipulating the following:

The Procedure Update Program (PUP) will update vendor manuals and a Nuclear Operations Procedure will be prepared to assure future vendor information is received, reviewed and properly incorporated in plant procedures.

#### F. Surveillance Testing

Boston Edison Co. was requested on January 8, 1979, by NRC:NRR, to install at ATWS-RPT system at the station. Appendix A to this letter provides the NRC staff acceptable systems requirements, and in part, describes periodic surveillance and preventive maintenance testing and calibrations as follows:

"Periodic surveillance and preventative maintenance tests and calibration requirements shall be identified to provide continuing assurance that the RPT system, including sensors and actuated equipment, is capable of functioning as designed and that system accuracy and performance have not deteriorated with time and usage. These requirements shall be particularly directed toward the detection of those failures or degradation of accuracy and performance which would not otherwise be likely to be detected during the course of normal operations. Integrated system testing shall also be performed to verify overall system performance."

When the licensee submitted and received approval for ATWS related Technical Specifications (Amendment No. 42 to the facility operating license) no requirements were developed for Integrated Systems Testing. The licensee was questioned by the inspector as to what actions would be taken to provide Technical Specifications for integrated systems surveillance tests that include the field breaker and ARI trips. Furthermore, the licensee established a procedure 8.M.1-30, ATWS System Calibration Test, which has the integrated system testing criteria incorporated (in October 1982) but, no frequency was specified in the Master Surveillance List (MSL). The licensee was requested by the inspector to provide an answer as to when this test will be performed next and at what frequency.

The licensee stated that there were no plans to provide Technical Specification changes to add requirements for a once per refueling cycle integrated system test of the ATWS system that included actuated equipment. They did stipulate, that, procedure 8.M.1-30, including Step E (i.e., the full system test) will be performed at the next refueling outage and once-per-cycle thereafter. Additionally, the licensee stated that the frequency will be incorporated in the MSL. The inspector will follow in a future inspection the licensee's commitment to perform ATWS system integrated testing in accordance with procedure 8.M.1-30 at the next refueling outage and to include the test on the MSL as a once-per-cycle frequency (83-09-06).

The inspector noted that integrated system testing, which included the functional performance of the ARI valves and the RPT field breakers, was first done via the May 1980 startup from Refuel Outage No. 4. Inadvertently, on May 12, 1982, (from 98 percent power), the licensee experienced an ATWS-RPT/ARI trip from one of the two logic systems. This was repeated on May 13, 1983 during startup from the first trip on May 12, 1983. This is described in NRC Report 82-16. As of April 28, 1983, one of the two ATWS RPT/ARI equipment divisions has not had an integrated systems surveillance test since May, 1980.

With regard to surveillance testing of the ATWS-RPT/ARI system by the licensee, the inspector identified no violations. However, the inspector will address the apparent inconsistency in the existing T.S. (instrument test requirements but no integrated system testing requirements) with the NRC:NRR project manager.

G. Procurement/Quality of Recirculation Pump MG Set Breaker Replacement Parts

A review was performed in the area of replacement parts associated with the two shunt trip coils replaced in connection with MR 83-91. This review consisted of tracing the parts back to their original purchase order(s) (P.O.) using the Material Receipt Inspection Report (MRIR) number, and comparing the technical/quality requirements to that provided by the ATWS equipment P.O. 62102.

Some difficulty in the parts' traceability to procurement documents was experienced by the inspector due to the BECo. procurement practice of reusing P.O. numbers after a series of numbers has been exceeded. This confusion has been brought to the attention of the responsible licensee personnel, and as a result, the inspector was informed that the described P.O. numbering practice will be modified. Subsequently the inspector was provided the requested procurement documents.

These documents (i.e., P.O. Nos. 31008, 65313, and 21633) that reflected the purchasing of the coils (that could be used on shunt trip devices for installation in 480V low voltage breakers and field breakers of the Recirculation MG Sets), did not specify any technical or quality requirements. The P.O.s in question specified a G.E. Co. part number and an Edison Code number. Furthermore, the inspector became aware of the fact that the replacement coils in stock were purchased in 1971, 1973 and 1976, although the material receipt inspection process, as reflected on MRIR No. 79-361, was performed in October 13, 1979.

The licensee was requested to provide the details that resulted in the aforementioned receipt inspection process. From this request, the inspector was informed about a stock upgrading program that took place in 1979 for existing procured material. For these specific coils, the QC receipt inspection consisted of a visual inspection for identification and physical damage because other requirements to ensure technical and quality adequacy were not specified on the purchase orders. The inspector indicated to a licensee QC representative that concern existed in the area of parts upgrading, whereby, an MRIR issued appears to lend a legitimacy to parts in terms of "Quality" when in fact, this may not be the case. Also in question, was the determining factors used, and the technical level of personnel involved that prescribed the acceptability of the activities performed as part of receipt inspection.

The inspector informed the licensee, that the acceptability of the receipt inspection process applied to existing stock purchased in the 1971-1979 time frame as a method of upgrading to "Q" status will be followed in a future inspection as unresolved (83-09-07).

When questioned about the quality of the replacement coil as compared to the ATWS purchased components, the licensee indicated that the G.E. Co. part numbers were the same, and it was the licensee's understanding that this assures the same quality requirements are applied and in fact exist for the components. The inspector requested that the licensee verify their understanding of the part number/quality relationship and provide documentary evidence of this relationship from the vendor. This item is considered unresolved (83-09-08).

The licensee was requested to explain what future purchasing requirements on shunt trip assemblies/coils or other field breaker components would be applied when consideration is given to the 1980 ATWS installation quality and technical requirements. The licensee indicated that they require themselves to replace in kind per the original specifications.

### 3. General Electric Co. Type AK-2 Breakers - 480V Low Voltage Load Centers

The licensee's existing PM program for 480V load center breakers includes inspection and overhaul performed in accordance with station procedure 3.M.3-6.

IE Bulletin No. 79-09 dated April 17, 1979, requires licensees using GE type AK-2 breakers in safety related systems to 1) identify the safety system involved, and 2) provide in writing, plans for developing a preventive maintenance program which will assure design performance with the GE type AK-2 circuit breaker. The Bulletin further requires that the licensee's program shall include the establishment and adherences to a preventive maintenance schedule.

In a letter to NRC:Region I, dated May 23, 1979, the licensee identified the safety related 480V load centers B1, B2, and B6 as the safety systems using GE type AK-2, and stipulated that existing station procedures already provide a preventive maintenance program to assure design performance for the subject breakers. The licensee indicated that Procedure 3.M.3-6 was included in the PM program. Furthermore, the licensee specified that the PM procedures are performed each refueling cycle.

In FSAR, Section 8.4.7, Inspection and Testing, the licensee specified that periodic tests, including mechanical inspection, would be provided approximately every two years on the 480V load centers of the Auxiliary Power System. According to the FSAR, this is done, in part, to detect the deterioration of equipment in the system toward an unacceptable condition.

MR's issued in April, 1981 indicated that the licensee planned to perform procedure 3.M.3-6 on all 480V breakers. In October, 1981, subsequent to the start of the refuel outage plans to perform procedure 3.M.3-6 were cancelled. This action, according to internal licensee correspondence, was due to a shortage of technical support personnel at the station. The inspector reviewed procedure 3.M.3-6 and determined that this procedure implements mechanical inspection of the 480V load centers. The licensee last implemented the 3.M.3-6 procedure during the refueling outage that occurred from January to May, 1980.

The failure of the licensee to perform the mechanical inspection on the 480V load centers as required by the FSAR and to provide for the implementation of procedure 3.M.3-6 on safety related 480V breakers in accordance with a commitment made to the NRC in a response to IEB 79-09 is a deviation (83-09-09).

4. Unresolved Items

Areas for which information is required to determine acceptability are considered unresolved. Unresolved items are discussed in Paragraph 2.G.

5. Exit Interview

At periodic intervals during the course of the inspection, meetings were held with senior facility management to discuss the inspection scope and findings.