ATTACHMENT 4

DESIGN IMPLEMENTATION PACKAGE

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P PDR

Bechtel

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March 27, 1992

Mr. R. S. Kundalkar
PTN Engineering Project Manager
Florida Power & Light Company
Post Office Box 3088
Florida City, FL 33034

Attention: Mr. P. C. Higgins

Turkey Point Units 3 & 4
REA 87-015 DWA 942808 IS Mod. No. 1341 System 006 PC/M 91-128
480V Undervoltage Protection Scheme Modification
Letter No. N-92-0156 Job No. 21701-523 Files: 0112, S-21701-523

Reference: N/A

Dear Mr. Kundalkar:

Enclosed is the original Engineering Package for PC/M 91-128, Revision 0, 480V Undervoltage Protection Scheme Modification, for Unit 3 which is being issued for JPNS final review and approval.

Implementation/JPN Draft Review comments have been received and resolved as documented on OR/IR Meeting Notes issued on JPNS-PTN-92-0174 and Bechtel transmittal E-6537A.

Issuance of this Engineering Package satisfies Schedule Activity No. 766630E426.

Engineering design activities for this Engineering Package were performed in accordance with the Bechtel Nuclear Quality Assurance Manual.

Action Summary: FPL to provide JPNS final approval, forward approved package to PNSC by March 31, 1992, and advise Bechtel of review date.

Sincerely,

C. L. Weaver
Project Engineer

RRL:mtm

Enclosure: Engineering Package for PC/M 91-128, Revision 0

cc: R. S. Kundalkar w/o
P. C. Higgins w/1 + 1r + 1p
F. P. Schiffley w/1
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DCC w/1 + 1p
DCCC w/o + original DWGs

CORRESPONDENCE COORDINATION
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OTHER
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FLORIDA POWER & LIGHT COMPANY
NUCLEAR ENGINEERING

ENGINEERING PACKAGE

PLANT Turkey Point UNIT 3

TITLE 480V Undervoltage Protection Scheme Modification

PC/M CLASSIFICATION

__X__ Safety Related

_____ Quality Related

_____ Not Nuclear Safety

PC/M No. 91-128

Expiration Date 3/31/93

Project No. REA # 87-015

File No. 91-128

RPA/DWA No. 942808

Rev No.	Suppl No.	Date	Revision Description	Civil	Elec	I&C	Nuc	Mech	Projects
	0								

LIST OF EFFECTIVE PAGES

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DESIGN INTERFACE RECORD

PLANT Turkey Point UNIT 3

TITLE 480V Undervoltage Protection Scheme Modification

LEAD DISCIPLINE Electrical

DESIGN INTERFACE	INTERFACE YES/NO	PREPARED BY/DATE	VERIFIED BY/DATE	APPROVED BY/DATE
MECHANICAL	NO	N/A	N/A	3/25/92
ELECTRICAL	YES	3/27/92 F. Jensen / 3/27/92 R. Nunez	3/27/92	3/27/92
I & C	NO	N/A	N/A	3/27/92
CIVIL	YES	3/24/92	3/25/92	3/27/92
NUCLEAR	NO	N/A	N/A	3/27/92
ESI*	NO			
FUEL*	NO			
PLANT DESIGN	NO	N/A	N/A	3/27/92

*No signatures required if no interface

EXTERNAL INTERFACES

FPL Production Engineering Group

BECHTEL Cleaver
ENGINEERING ORGANIZATION

3-27-92
APPROVAL DATE

DESIGN.DEEP

JPN FORM 3B Rev. 10/91

Turkey Point Unit 3
480V Undervoltage Protection Scheme Modification

ABSTRACT

This Engineering Package (EP) modifies the 480V load center non-safety injection degraded voltage schemes. These modifications are required to improve the repeatability of the existing degraded voltage relays to their specified setpoints. This modification also installs a bypass switch which will allow one channel of the degraded voltage scheme to be placed in the trip mode when one or both of the relays of that channel are removed for relay testing or calibration.

Since this EP modifies the 480V load centers degraded voltage protection circuitry, which provides a Safety Related function, this package shall be classified as Safety Related.

PC/M 87-311, for Unit 3, was issued to replace eight General Electric (GE) type CR120BD auxiliary relays, in the 480V degraded voltage schemes, with Agastat EGP relays. This replacement was in response to failures of the GE CR120BD auxiliary relays in the Unit 4 480V degraded voltage schemes. Since PC/M 91-128 provides for removing these GE CR120BD relays, the scope of work for PC/M 87-311 is accommodated by this Engineering Package.

To accommodate the modifications provided by this Engineering Package, provisions for a minor change to the Technical Specification is instituted. This change deletes the specific reference to the inverse time relay. This change is provided for as a proposed license amendment. A HOLD POINT is placed on this EP to restrict any changes to the plant configuration as described in the Technical Specification until NRC approval is received. In addition, a restriction on re-entry into Mode 4 is also imposed pending approval of the seismic test reports for the test and bypass switches.

This EP does not affect plant safety, security or operation. In addition, this modification, as restricted, does not constitute an unreviewed safety question.

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PROJECT SCOPE

The purpose of the 480 Volt load center (non-Safety Injection) degraded voltage protection scheme is to detect a degraded voltage on any of the load center buses and initiate a signal to the sequencers to transfer power from off-site power to on-site power sources. The detection of (non-Safety Injection) degraded voltage for 480 Volt Load Centers 3A, 3B, 3C and 3D presently consists of a set of two General Electric (GE) IAV55C undervoltage relays (one per logic channel) wired across the potential transformers of each load center. The existing trip circuit is in a two-out-of-two trip logic which for each load center scheme, upon degraded voltage, contacts from both IAV55C undervoltage relays must concurrently close to cause energization of two auxiliary relay coils, one per logic channel. A set of contacts from each of these two auxiliary relays, wired in series, initiates a signal to the sequencers. Therefore, for any of the four loads centers, its channel 1 and its channel 2 IAV55C undervoltage relay with their respective logic channel auxiliary relay must change state to initiate the trip signal to the sequencers. However, these IAV relays have exhibited a tendency to drift from the required undervoltage setpoints specified in the Technical Specifications. Furthermore, the existing logic does not provide detection of auxiliary relay coil failures, and does not allow the circuit to be placed in the trip mode under such an event. Redesign of the existing degraded voltage scheme mitigates these conditions.

This modification to the non-safety injection degraded voltage protection scheme installs two additional ITE-27N definite time delay undervoltage relays (one per logic channel) to the existing two IAV55C (one per logic channel) undervoltage relays with the existing auxiliary relays removed from the trip circuit. This mitigates the existing repeatability concerns since the new ITE-27N undervoltage relays have greater repeatability in the undervoltage range that the IAV55C relays tend to drift. In addition, removing the auxiliary relays from the circuit enables the undervoltage relays themselves to actuate the trip circuit and the modified test circuit enables testing for failure of the actuating relay circuitry in the trip circuit. These four protective relays for each load center are interconnected in a two-out-of-two channel trip logic such that the logic trips if degraded voltage is detected by either logic channel 1 IAV55C or ITE-27N relay concurrently with either logic channel 2 IAV55C or ITE-27N relay. The ITE relay protects the 480VAC System for degraded voltage over a long duration while the IAV relay protects the system during a large voltage transient for a short duration.

A bypass switch is installed by this modification. This switch is used to place one undervoltage relay channel in the trip mode when one or both of the relays of that channel are removed from the logic circuitry for relay testing or calibration. With the addition of the bypass switch, the IAV relay's shorting bar, which is used to place the relay channel into the trip mode whenever the relay was removed, can be disconnected. Two new GE HGA111 auxiliary relays are added to the protection scheme. These relays are normally de-energized and are only used to actuate the control room annunciator window, they do not control the trip circuit logic.

The existing three-position test switch is replaced by a five-position test switch. This test switch enables the operator to test either the IAV or ITE relay of either channel. The test switch has two indicating lights (white and amber). The white light is used to indicate normal operation while the amber light indicates a successful relay test.

The new ITE-27N relays, HGA auxiliary relays, bypass switch, test switch and indicating lights are installed in a new sub-panel located across from each of the 480V load centers.

PC/M 87-311 was issued to replace the existing auxiliary relays (GE CR120BD) with Agastat EGP series relays. This replacement was due to failures of the GE CR120BD relays in the Unit 4 protection scheme. However, PC/M 87-311 was never implemented. These auxiliary relays are not required for the new protection scheme modification; therefore, the modifications performed under PC/M 87-311 are no longer required and PC/M 87-311 will be cancelled.

The work associated with this EP, except for any work associated with the re-wiring or removal of any of the existing 480V load center components, may be implemented in any plant mode. By completing these activities, prior to the NRC's approval of the proposed licensing amendment (Reference 6.44), the time frame to complete the remaining activities is reduced since there is a possibility that the amendment may not be approved until after the start of the Unit 3 refueling outage.

A HOLD POINT is placed on the EP before any physical modifications to the existing 480V load center degraded voltage protection circuitry as described in the Technical Specifications can be performed. In addition, the plant must be in Modes 5, 6 or defueled when performing these physical modifications. An EP revision will be issued to remove the HOLD POINTS following NRC approval of the proposed license amendment and approval of the seismic test reports for the test and bypass switches.

ENGINEERING PACKAGE FEEDBACK SHEET

PLANT Turkey Point UNIT 3

TITLE 480V Undervoltage Protection Scheme Modification

INSTRUCTIONS

This feedback sheet is provided as a vehicle to obtain constructive feedback from the users of this EP, to facilitate future improvements. Comments or suggestions to improve this Engineering Package are welcome and appreciated. Engineering Package feedback sheets are evaluated, processed, and distributed to the appropriate group/discipline/individual for information/action. Please copy this blank form leaving the original with the EP for others to use. Return the clearly/legibly completed copy to: Director - Nuclear Engineering (JPN/JB).

Name (optional)_____ Department_____ Date_____

COMMENTS/SUGGESTIONS:

ENGINEERING

1.0 DESIGN BASES

1.1 Safety Classification and Regulatory Requirements

1.1.1 This Engineering Package provides modifications to the 480V load center non-SI degraded voltage protection circuits which provide a safety related function. Therefore, this modification shall be classified as a Safety Related modification.

1.1.2 A Failure Modes and Effects Analysis (FMEA) shall be performed as necessary to assure that no failure modes other than those analyzed in the UFSAR are introduced and that the probability of occurrence and consequences of the UFSAR analyzed failures are not increased. Adequate steps shall be taken to resolve the new failure modes or increases in the probability of occurrence or consequences of previously analyzed failures, prior to issuing this EP.

The modifications provided by this Engineering Package shall be such that no design bases single active or passive failure, as provided in Section XI of Reference 6.4, Single Failure Criteria, shall result in an unanalyzed condition or create an unreviewed safety question.

1.1.3 The design shall be in compliance with design bases and FPL licensing commitments in regards to fire protection and safe shutdown capability as specified in Section XII of Reference 6.4, Fire Protection Criteria, and as delineated in Appendix 9.6A of Reference 6.1, Fire Protection Program Report. Changes to the Safe Shutdown Analysis shall be documented in a Change Package.

1.1.4 The design shall be in compliance with Human Factors Engineering in accordance with FPL licensing commitments associated with NUREG-0700 as outlined in Section 7.7.3 of Reference 6.1.

1.1.5 The design shall be evaluated using the guidelines of IE Bulletin 79-18 (Reference 6.5), and shall not adversely affect the performance of the Plant Paging System, or produce any reduction in audible dispersion.

1.1.6 New equipment required for this modification shall be qualified for its respective environmental conditions or in accordance with Reference 6.4 Section VII, External Environmental Criteria, and Section XIV, Environmental Qualification of Equipment.

1.1.7 Modifications performed inside the Radiation Controlled Area (RCA) shall consider design features that will ensure occupational exposures are kept ALARA per JPN-QI 3.13 (Reference 6.6). Dose potential to plant personnel shall also be addressed.

1.1.8 This modification shall address potential interaction with existing Safety Evaluations and Justifications for Continued Operations (JCOs).

1.1.9 The applicable original design bases established in the UFSAR shall not be altered by this modification unless the revised bases are adequately addressed in the design analysis. If necessary, appropriate changes to the UFSAR or DBD shall be documented in FSAR and DBD Change Packages.

1.1.10 This modification shall address postulated high energy line breaks (HELB), as defined in Section IV of Reference 6.4, Pipe Break Criteria, for new effects on facilities and equipment qualification as well as for impact on existing HELB analyses.

1.1.11 The design shall not compromise the design bases flooding as specified in Sections VIII and IX of Reference 6.4, Internal and External Flooding Criteria respectively.

1.1.12 The modification shall be in compliance with the General Design Criteria and commitments to Regulatory Guidance as prescribed in Reference 6.4, Sections I and XV respectively.

1.1.13 The modification shall not increase release rates to the environment of radioactive liquids, gases, chemicals, biocide or sanitary waste discharges. In addition, the modification shall address thermal cycle design, effluent heat dissipation rate to the ultimate heat sink, and other potential environmental interfaces identified in Reference 6.8.

1.1.14 This Engineering Package shall address the compliance of this modification on Technical Specifications.

1.1.15 New or modified equipment and associated components shall not be in proximity or attached to masonry block walls unless the structural adequacy of the block wall has been demonstrated or the interaction effects have been evaluated and found to be acceptable.

1.1.16 The effects of this modification on the Plant Security Plan shall be evaluated (Reference 6.7).

1.2 System Performance Requirements

1.2.1 The design shall consider accessibility and laydown areas for removal, installation, operation, and maintenance for existing components and allow adequate clearances for inservice inspections and future equipment removal as necessary.

1.2.2 Existing structures shall be evaluated to ensure that they are structurally adequate for any additional loads imposed by this modification.

1.2.3 The modifications provided by this Engineering Package shall not adversely affect the safety related functions and performance requirements of the 480VAC Degraded Voltage Protection System.

1.2.4 This Engineering Package shall address any impact on the Plant electrical system including Emergency Diesel Generator (EDG) loading and Battery loading.

1.3 Component Design Conditions and Constraints

1.3.1 Electrical raceways and associated components installed or modified by this Engineering Package shall be designed and supported in accordance with the applicable requirements of Section II of Reference 6.4, Seismic Criteria. In addition, installation shall be in accordance with the requirements of Section VI of Reference 6.4, Electrical Separation Criteria.

1.3.2 Components specified in the Engineering Package shall be selected/designed to ensure performance as required under continuous normal plant operating conditions, and to minimize plant maintenance and operations activities.

1.3.3 The system design shall consider other outstanding Engineering Packages and designs-in-progress for effect on this design to ensure this EP addresses the "Reference Plant."

1.3.4 Emergency lighting illumination shall be reviewed to insure adequate illumination of safe shutdown components. Structures or components added or modified by this Engineering Package shall not adversely affect the illumination provided by the emergency lighting.

1.3.5 This modification shall address potential interaction with safety related snubbers.

1.3.6 Power cable shall be sized with regard to ampacity in accordance with Bechtel Generic Calculation 5177-EF-01 (Reference 6.17). Power cable short circuit capability shall be documented in accordance with JPN-PTP-90-2413 (Reference 6.18).

1.3.7 Voltage drop shall be considered in the design of new and modified electric circuits to insure operation of the components in all conditions.

1.3.8 Electrical equipment shall be adequately grounded for personnel safety.

1.3.9 A setpoint calculation shall be performed for the undervoltage relays to establish the relay settings in the repeatable zone of the relay operating characteristics.

1.3.10 A spare parts assessment shall be made for new components and purchase documentation for spare parts shall be issued as appropriate.

1.3.11 The Electrical components and instrumentation added shall be of adequate rating to provide proper operation; specifically, voltage and contact ratings of the devices shall be addressed.

1.3.12 This Engineering Package shall address the effects of this modification on the Radioactive Waste Treatment System and ability to cool spent fuel.

1.3.13 This Engineering Package shall address the additional heat load in the 480V Load Center Rooms due to the addition of the sub-panels and associated equipment.

1.3.14 The mounting of the sub-panels shall be in accordance with Seismic Class I requirements as defined in UFSAR, Appendix 5A (Reference 6.1) and Section II of Reference 6.4, Seismic Criteria.

1.3.15 All new electrical components shall be appropriately specified, procured and qualified for their intended application.

1.3.16 This Engineering Package shall address the effect on Load Centers 3A, 3B, 3C, 3D structural adequacy and seismic qualification in accordance with the UFSAR, Appendix 5A and Reference 6.4.

2.0 DESIGN ANALYSIS

2.1 Safety Classification and Regulatory Requirements

2.1.1 The safety classification associated with this modification is as follows:

This EP modifies the Safety Related 480V non-SI degraded voltage protection scheme by installing an additional undervoltage relay to each channel of the existing 480V protection scheme. Therefore, this EP and its associated work are classified as Safety Related.

2.1.2 The potential failure modes were reviewed to determine any impact on nuclear safety.

This change to the 480V degraded voltage scheme is an enhancement of the existing degraded voltage protection scheme by providing an additional undervoltage relay which improves the repeatability of the degraded voltage relays to the required setpoints. With the implementation of this modification, the probability of the degraded voltage relays drifting outside of the setpoint acceptance range is greatly reduced.

The new degraded voltage relay characteristic curves are lower than the existing characteristic curves. However, a motor safe heating calculation (Reference 6.46) was performed to verify that the new degraded voltage protection maintains the necessary level of protection for the 4160V and 480V motors. In addition, this calculation verifies that the degraded voltage relays will operate prior to the motor overcurrent protection devices.

The existing degraded voltage protection scheme utilizes undervoltage relays and auxiliary relays to actuate the sequencer trip circuit. The auxiliary relays are connected such that a two-out-of-two relay actuation logic is required to actuate the sequencer. This modification utilizes only the undervoltage relays themselves to actuate the sequencer trip circuit. Therefore, the probability of failure of a single auxiliary relay affecting the trip circuit is reduced. In addition, the modified test circuit enables testing of all the actuating relay circuitry in the trip circuit. The new modification, however, maintains the two-out-of-two relay actuation logic to initiate a trip signal to the sequencer.

The auxiliary relays added by this modification are normally de-energized and are used for annunciation only. Therefore, no new failure modes are added by these relays.

A bypass switch is also added to the protection circuit which will enable one of the two undervoltage logic channels to be placed in the bypass (tripped) mode during removal of one or both of the relays in one channel for testing and calibration. This switch does not add any new failure modes since this bypass switch replaces the existing relay shorting bar which was used to place a removed IAV relay in the trip mode. In addition, this switch is keylocked with key removable in all positions to preclude operator error.

This modification replaces the existing 3-position test switch with a new 5-position test switch. This new switch does not change the existing functional requirements of the existing test switch. Therefore, no new failure modes are added as a result of the replacement test switch.

Based on the preceding, no new failure modes are created that could impact nuclear safety, and the probability of occurrence and consequences of previously analyzed failures are not increased by this modification.

2.1.3 This EP modifies the load center undervoltage relay circuitry for 480V Load Centers 3A, 3B, 3C and 3D. The 480V load center undervoltage relays are on the Essential Equipment List and are required for safe shutdown. Various cables associated with this modification are required to be added to the Essential Cable List (ECL) and Safe Shutdown Analysis (SSA). This is documented by the Safe Shutdown Analysis Change Package (Attachment 5)

and the Fire Protection Review Checklist (Attachment 1). All equipment and cables added to each load center by this EP are installed inside the same fire area where the load centers are located. These fire areas were previously analyzed by the existing safe shutdown analysis.

Furthermore, the additional equipment and cables added by this EP does not add any significant amounts of combustibles.

Implementation of this EP will require removal of existing fireproofing material on beams in the Load Center Rooms. However, DEEP 89-491 (Reference 6.55) and Plant Procedure 0-SMM-016.3 (Reference 6.56) indicate these fire zones do not require structural steel fireproofing. Therefore, there is no effect on the existing requirements for the Plant structural steel fireproofing system. However, for aesthetic purposes, repairs will be made.

Based on the above, the safe shutdown capability as specified in Section XII of Reference 6.4, Fire Protection Program as described in the UFSAR, Appendix 9.6A of Reference 6.1 and fire fighting strategies are not adversely affected by this EP.

2.1.4 Implementation of this modification alters the operation of the annunciator window in the Control Room and requires changes to operator actions during off-normal or emergency conditions. This modification does not alter any equipment on the Alternate Shutdown Panel. Therefore, NUREG-0700 Guidelines are applicable to this EP.

The existing engraving on Annunciator Window F35 is revised to reflect the new operation of this window. The engraving is changed from "UNDERVOLTAGE SCHEME TEST" to "UNDERVOLTAGE TEST/BYPASS". The existing window will annunciate whenever the test switch is placed in the test position and the tested undervoltage relay operates successfully, which is consistent with the new design. The new design also actuates the alarm whenever the bypass switch is placed in the bypass mode.

For each 480 Volt load center there are two types of degraded voltage circuitry, a degraded voltage circuit without a safety injection (non-SI) and a degraded voltage circuit with a safety injection (SI). Presently, both these circuits have a separate but operationally identical set of test switches and amber indicating

lights. Furthermore, for each 480 Volt Load Center 3A, 3B, 3C and 3D, both sets of these non-SI and SI degraded voltage test switches and indicating lights are located adjacent to each other on their respective load center transition panel doors. However, this modification to the non-SI degraded voltage circuitry results in replacing the existing three position test switch with a new five position test switch, and two amber indicating lights with an amber and a white light. This modification also adds a new bypass switch and two new definite time-delay degraded voltage relays. Therefore, as a result of this modification the non-SI degraded voltage circuit will be different from the SI degraded voltage circuitry in terms of test switch operation and indications. Therefore, to preclude potential operator error and due to space limitations in the load center transition panels and to invoke human factor requirements, the new 480 Volt Load Center 3A, 3B, 3C and 3D non-SI degraded voltage circuitry, installed by this modification, will be located on a new separate 480 Volt load center non-SI degraded voltage sub-panel located across from the load centers. Each new sub-panel consists of a test switch and two indicating lights, a bypass switch and two definite time-delay degraded voltage relays.

The new sub-panels are designed to conform to the human factor principles required by NUREG-0700 (Reference 6.25) and outlined in Human Factors Engineering (HFE) Guidance Manual for Turkey Point Nuclear Power Plant, Units 3 & 4 (Reference 6.24).

Due to physical space limitations, the sub-panel height is restricted. Due to this height restriction the test and bypass switches can not be located in the optimum viewing area for operation. Per Reference 6.30, this lower than usual height has been approved by the Control Room Engineering Design Integration Team (CREDIT).

Per Reference 6.25 a keylock control switch minimum displacement should be 80°; however, the 5 position keylock test switch, installed by this EP, has a displacement of 45°. This is acceptable since the operator will notice when the switch is turned to the next switch position. Furthermore, the nameplate of the switch shows where this switch position is located. In addition, Reference 6.25 states that the key should be removable in only the normal position. The key for the bypass switch can be removed in any position. This enables one undervoltage channel to remain in the bypass position while one or both of the relays of that channel

are removed for relay testing or calibration. Since this switch is key removable in any position, inadvertent bypass switch operation is precluded.

Plant operating procedures must be revised to incorporate the changes required by the addition of the new relays, test switches and bypass switches. The applicable procedures are discussed in Section 14.0 of this EP. In addition, this new equipment must be integrated into the operator training program and the simulator must be modified as appropriate to incorporate the implementation of this EP.

2.1.5 This modification does not create any new or relocate any existing barrier walls, relocate plant page speakers, or add new sources of high noise levels. Therefore, the audible dispersion of the Plant Paging System is not affected.

2.1.6 Equipment associated with this modification is located in Unit 3 480V Load Center Rooms and the Control Room. This modification is not in an area that is considered a harsh environment during post-accident conditions in accordance with EQ Doc. Pac. 1001. The environmental qualification requirements of EQ Doc. Pac. 1001 and 10CFR50.49 with respect to qualification for harsh environments are not applicable.

Also, the materials for this modification are suitable for the environment in which they are located and equipment service conditions are appropriately specified in procurement documents.

2.1.7 This modification does not add or modify equipment in the Radiation Controlled Area and does not impose any new post-accident operator actions. Therefore, this modification is considered acceptable with respect to ALARA concerns.

2.1.8 The Safety Evaluation List (Reference 6.15) and Active Safety Evaluation List (Reference 6.22) were reviewed to identify potential interactions with this modification. It was determined that this modification will interact with the following Safety Evaluations or JCOs:

- JPE-L-86-099 — Substantial Safety Hazards Evaluation Relative to HGA Relays
- JPN-PTN-SEEP-91-002 — Safety Evaluation for IAV Undervoltage Relay Setpoints

[illegible]

Safety Evaluation JPE-L-86-099 deals with the seismic qualification of GE HGA11 and HGA111 relays. Contact chatter may be present during a seismic event if the normally closed contact is utilized when the relay is in the deenergized state. This EP adds two normally deenergized GE HGA111 style auxiliary relays to each undervoltage protection channel. However, the contacts that are being utilized are normally open contacts; therefore, the contact chatter concern addressed in the above safety evaluation does not apply to this modification.

Safety Evaluation JPN-PTN-SEEP-91-002 deals with the repeatability of the GE IAV undervoltage relays. Since this EP modifies the undervoltage protection scheme to provide repeatability of the relays to their relay settings, then upon implementation of this PC/M, this Safety Evaluation is no longer required to be active for Unit 3.

2.1.9 The applicable system design bases presented in the Design Basis Document (References 6.4, 6.19 and 6.34) have been reviewed. The Component Design Requirements section of the Emergency Power System, DBD 5610-023-DB-002, is affected by this EP. The UFSAR (Reference 6.1) is also affected by this Engineering Package. Refer to Attachments 6 & 7 for the revisions to the FSAR and DBD, respectively.

2.1.10 This modification was reviewed with respect to the high energy pipe breaks postulated in the design bases (Reference 6.4). The results of the review have determined that this EP does not create any new high energy lines and does not create any new exposure to postulated high energy break locations. Therefore, the facilities and equipment qualifications are not adversely affected.

2.1.11 This modification does not install any non-seismic systems that could be considered a potential new source of flooding and does not adversely affect existing plant internal or external flood protection or mitigation features. This modification will be performed outside the containment; therefore, it has no effect on the Containment Flooding Analysis.

2.1.12 This modification is consistent with the Turkey Point design bases for General Design Criteria and Regulatory Guide commitments as prescribed in Reference 6.4, Sections I and XV.

2.1.13 This modification does not result in increased releases to the environment of radioactivity, chemicals, biocides or sanitary waste.

This modification has also been reviewed with respect to the systems and areas of regulatory concern identified in Reference 6.8 and determined that no environmental regulatory requirements are compromised.

2.1.14 Review of these modifications has confirmed compliance with the requirements of applicable Technical Specifications and applicable proposed license amendments.

During hardware modifications, the degraded voltage tripping channels will be inoperable. Technical Specification 3/4.3.2 states that an inoperable channel shall be placed in the trip mode within one hour, if the unit is to remain in operation. Since modifications cannot be performed in the trip mode or in one hour, Unit 3 must be in cold shutdown Mode 5, refueling Mode 6 or defueled during hardware modifications. For purposes of this modification, Mode 6 limiting conditions for operation are considered to apply in the defueled condition. When implementing this modification with both units in Mode 5 or 6 or with Unit 3 in Mode 5 or 6 and Unit 4 on line, the limiting conditions for operation are presented in Technical Specification 3.8.3.2. For conservatism, the following evaluates implementation with Unit 3 in cold shutdown and Unit 4 on line as the most restrictive condition.

During the brief period when isolating the dc power supply to the undervoltage protection circuit, the associated sequencer is taken out of service. This interruption of power ultimately affects the operability of the associated Residual Heat Removal Pump. Therefore, when Unit 3 is in Mode 5, dc power isolation is restricted to when the reactor coolant loops are filled. This is consistent with the limiting conditions for operation for Technical Specification Sections 3.4.1.4.1 and 3.4.1.4.2. When Unit 3 is in Mode 6, dc power isolation is restricted to when the water level above the top of the reactor vessel flange is greater than or equal to 23 feet. This is consistent with the limiting conditions for operation for Technical Specification Sections 3.9.8.1 and 3.9.8.2. There are no restrictions on Residual Heat Removal Pump operability during a defueled condition.

Each degraded voltage circuit provides protection to its respective load center, upstream Switchgear, downstream MCC's and connected loads. By applying the definition of "operable" given in Technical Specification 1.17, the above equipment is considered inoperable during the time the degraded voltage circuit is out of service. Inoperability of this electrical equipment is governed by Technical Specifications 3/4.8.1, 3/4.8.2 and 3/4.8.3.

Technical Specification 3.8.1.2 specifies that at least one Emergency Diesel Generator must be operable. Section 3.8.2.2 specifies that at least three battery banks and their associated battery chargers must be operable. Per Section 3.8.3.2, one train of AC Emergency busses associated with the shutdown unit must be operable. This includes transferring Load Center 3H to the energized train in order to keep the Unit 4 backup battery chargers operable. In addition, two 120V AC vital busses from the shutdown unit must be operable. Furthermore, three 125V DC busses energized from their associated battery banks must be operable.

Per Table 3.8-2 there is no outage time limitations in Modes 5 and 6 due to the deenergization of one train of the 480V Electrical System, if the remaining 480V trains (i.e., one Unit 3 train and both Unit 4 trains) are available. Therefore, these modifications can be implemented in compliance with the requirements of the above Technical Specifications.

Existing Technical Specification requirements can be upheld during and as a result of this modification. However, a minor Technical Specification change is required for clarification of how requirements are met. Table 3.3-2, Item 7c, refers to the 480V Load Centers 3A, 3B, 3C, 3D and 4A, 4B, 4C, 4D (2 inverse time relays per load center) degraded voltage. Table 3.3-3, Item 7c, refers to the 480V load centers (inverse time relays) degraded voltage undervoltage relay setpoints. Table 4.3-2, Item 7c, also refers to the 480V Load Centers 3A, 3B, 3C, 3D and 4A, 4B, 4C, 4D (inverse time relay) degraded voltage. This modification utilizes two relays (per channel), one GE IAV and one ITE 27N relay, instead of just the IAV inverse time relay as indicated in the Technical Specification for the degraded voltage protection. Therefore, to eliminate reference to a specific type of relay, the words "2 inverse time relays per load center" and "Inverse Time Relays" will be deleted from the applicable tables. To provide consistency with the SI degraded voltage scheme, the description of the relays provided in Functional Unit

Item 7b of Tables 3.3-2, 3.3-3 and 4.3-2 will also be revised to delete the words "2 instantaneous relays per load center" from Table 3.3-2 and "Instantaneous Relays" from Tables 3.3-3 and 4.3-2. Accordingly, this Technical Specification change is provided for via proposed license amendment (Reference 6.44) and a HOLD POINT is imposed to restrict hardware modifications that change the functional configuration as described in the Technical Specifications. This HOLD POINT will be removed following the approval of the proposed license amendment.

An NRC letter was issued to FPL that requested additional information regarding the degraded grid protection (Reference 6.50). In response, FPL submitted letter L-83-1 (Reference 6.51). This information contained additional setpoints which are not listed in the Technical Specifications. Although the new degraded voltage relay setting curves are lower than the additional values listed in Reference 6.51, a Calculation was performed (Reference 6.46) which demonstrated that the new relay setting curves would protect the 4160V and 480V motors during a degraded voltage condition.

2.1.15 The components in this modification that are attached to or in proximity to block walls have been reviewed and the structural adequacy of the wall has been evaluated and found to be acceptable (References 6.37, 6.38, 6.40, 6.41 and 6.43). Furthermore, the new sub-panel supports are seismically designed (see Section 2.3.14). Therefore, this modification will not interact with any masonry block walls.

2.1.16 This modification does not adversely affect the integrity of the protected area barriers or vital area barriers, either by direct or indirect penetration (e.g., underground structures, HVAC ducts, etc.). There will be no adverse effect on intrusion detection hardware and associated power and/or signal connections. Physical obstructions and power supply modifications do not affect the security lighting or surveillance cameras. There are no additional requirements for security facilities and no additional administrative controls are required for security reasons.

2.2 <u>System Performance Requirements</u>

2.2.1 The (24"x24"x12") sub-panels are located adjacent to the South wall of Load Center 3A/3B and 3C/3D Rooms. The accessibility for removal, installation, operation, and maintenance of new and existing components has been

evaluated and found to be acceptable. This modification provides adequate clearances for installation, operation, maintenance, inservice inspection, and future equipment removal as necessary. In addition, the sub-panels will not interfere with replacement of the load center transformers, if ever required.

2.2.2 The effect of additional loads on existing structures has been evaluated and it is concluded that the adequacy of these structures will be maintained (References 6.39, 6.42 and 6.43).

2.2.3 The effects of this modification on the safety related functions of the 480V Degraded Voltage Protection System have been reviewed and no adverse effects will result from the implementation of this modification. This modification is an enhancement of the existing degraded voltage protection scheme. The addition of the ITE-27N relay will improve the repeatability of the degraded voltage setpoints as stated in the Technical Specifications.

In addition, a Calculation (Reference 6.46) was performed to verify that the revised Degraded Voltage Protection System operates before motor damage occurs for 4160V and 480V motors and coordinates with overcurrent protection so as not to cause spurious overcurrent trips.

2.2.4 This modification removes three GE CR120 relays and adds two ITE-27N (10-100 sec. time delay) undervoltage relays and two GE HGA auxiliary relays to each 480V LC bus protection scheme. Vital DC power is supplied through 15A fuses from panels 3D01 breaker 4 and 3D23 breaker 5 for the above devices.

During normal operation this modification adds approximately .20A to each fuse and during an undervoltage and relay test condition the loads to be added are .11A and .07A, respectively. Since the existing load on each 15A fuse is only approximately 0.3A (not including indicating lights), and since the existing load on each breaker is only approximately 3A (Reference 6.49), there will be no adverse effect on the Vital DC Power System.

The Station Battery Sizing Calculation (Reference 6.16) has been reviewed for the effects of this modification and it is concluded that the results will remain unchanged, since the additional load is negligible.

[illegible]

The new ITE relays also add additional burden to the 480/120V, 200VA potential transformers (PTs). The burden for the ITE relay is less than 0.5VA each. This will add approximately 0.5VA per each PT or 1VA per load center. Per Reference 6.20 this additional load on the PT will have no adverse affects on the operation of the transformers since they are only partially loaded.

The additional load of approximately 2VA on each Unit 3 Emergency Diesel Generator is negligible compared to the overall rating of the diesels. Therefore, this modification will have no adverse affect on the operation of the EDGs.

2.3 Component Design Conditions and Constraints

2.3.1 The electrical raceways and components installed or altered by this modification have their applicable supports designed and installed in accordance with the support drawings listed in Section 11.4, which in turn complies with design bases seismic and wind load requirements (Reference 6.43). In addition, all cables, boxes, equipment installed or modified by this EP will be separated in their respective channels consistent with design bases electrical separation criteria.

2.3.2 Components specified in this Engineering Package have been evaluated during the selection/design process to confirm performance objectives are met as required and maintenance and operation activities are minimized.

2.3.3 The FPL PTN-PC/M Status Systems Report, dated January 23, 1992 and the "Drawings Change Tracking System" (DCTS), dated January 15, 1992, were reviewed for determination of other outstanding Engineering Packages and designs-in-progress affected by this modification. The following PC/Ms interact with this modification:

PC/M 87-311 (Reference 6.33) was issued to replace the existing auxiliary relays (GE CR120BD) with Agastat EGP series relays. This replacement was due to failures of the GE CR120BD relays in the Unit 4 protection scheme. However, PC/M 87-311 was never implemented. These auxiliary relays are not required for the new protection scheme modification; therefore, the modifications performed under PC/M 87-311 are no longer required. Any drawing changes that were required for PC/M 87-311 will be incorporated into PC/M 91-128.

PC/M 87-264 (Reference 6.34) revised the FSAR and Design Basis Document to incorporate the recent EPS project. This EP affects some of the areas that PC/M 87-264 has revised. Refer to Attachments 6 and 7 for the UFSAR and DBD change packages.

PC/M 91-036 (Reference 6.36) was issued to create the protective relay setting drawings. This EP revises the non-SI degraded voltage relay setting drawings to include the new ITE-27N relays and change the relay setpoints and check points to agree with the values obtained from Reference 6.20.

2.3.4 The existing emergency lighting in the area of modification is not affected by this modification and does not require any changes as a result of the implementation of this Engineering Package.

2.3.5 The modifications provided by this Engineering Package are not in proximity to any safety related snubbers. Therefore, interaction with any safety related snubbers is not applicable.

2.3.6 Power Cable selections meet the sizing requirements of Bechtel Generic Calculation 5177-EF-01 (Reference 6.17) in regards to ampacity.

New cables added in this PC/M were reviewed against Calculation 5177-265-EG-22 (Reference 6.23) figures 10 and 15. The short circuit current characteristics of a 15A fuse is sufficient to protect the #12AWG cable installed in the DC circuit. The short circuit current characteristics of a 3A fuse is also sufficient to protect the #12AWG cable installed in the AC circuit.

2.3.7 The undervoltage relay protection scheme is required to operate upon a degraded voltage at the 480V load centers and DC control power is required for its operation. The existing DC control power source to these undervoltage schemes are from 3D01 breaker 4 to sequencer 3C23A to both Load Centers 3A(3B01) and 3C(3B03) circuits and from 3D23-05 to sequencer 3C23B to both Load Centers 3B(3B02) and 3D(3B04) circuits and remains unchanged as a result of this modification. However, for each existing load center undervoltage circuit, this modification installs in each load center sub-panel (located directly across from the existing load centers) two ITE-27N undervoltage relays and two G.E. HGA111 auxiliary relays and removes two existing GE CR120BD auxiliary relays from each load center transition panel.

The auxiliary relays HGA111 installed by this EP are rated for 100-140VDC operation (References 6.21, 6.32 and 6.45). These auxiliary relays are only required when testing and annunciation of the degraded voltage protection scheme; therefore, a evaluation of voltage drops for these relays is not required. However, the ITE-27N relays installed by this modification are rated for 100-140V DC operation and have a 6.25W load each and are required to operate (Reference 6.27).

The voltage drop for the existing circuits, prior to this modification was calculated and found acceptable for these circuits (Reference 6.58). This previous calculation (Reference 6.58) determined the voltage drop from 3D01-4 to sequencer 3C23A and from 3D23-5 to sequencer 3C23B and determined that the allowable maximum cable lengths from sequencers 3C23A and 3C23B to their worst case loads are 9,460 ft. and 11,016 ft., respectively. These lengths were based on a required 100V minimum operating voltage for the loads. These lengths were determined using conservative worst case current draws from each of these breakers to the sequencer panels. In addition, to determine these allowable cable lengths, the worst case existing loads for a circuit fed from 3C23A was 15.6W and the worst case existing loads for a circuit fed from 3C23B was 12W. The worst case load added as a result of this modification is the two ITE-27N in parallel for a total 12.5 W load, and the worst case distance from either of the sequencers to a load center sub-panel is approximately 185 ft. Therefore, the loads for these new relays is close to the worst case loads used in the previous calculation and the worst case cable distance for these relays is only 185 ft. from the sequencer which is much less than 9,460 ft. allowable.

Therefore, based on the above, it can be concluded that the required operating voltage of 100V for these relays in each load center sub-panel is acceptable and voltage drop is of no concern for these modifications.

2.3.8 Electrical equipment installed by this Engineering Package is grounded in accordance with Drawing 5610-E-301 to ensure personnel safety. The new sub-panels are equipped with a grounding lug to facilitate connection of a grounding wire to the plant ground.

2.3.9 A setpoint calculation (Reference 6.20) was performed to determine the undervoltage relays setpoints. This calculation also determined the relay check points.

2.3.10 A spare parts assessment has been performed during procurement activities for the material required for implementation of this Engineering Package. There are no spare parts required for this modification. Any failed switches or relays shall be completely replaced in lieu of part replacements. Refer to Section 10.3 for a listing of the spare devices obtained, under the original purchase orders, for this modification.

2.3.11 The electrical components and instrumentation have been reviewed for proper capacity and operation. Specific items are addressed as follows:

The ITE-27N relay tripping duty contact rating is 30A and the break contact rating is 1A while the continuous contact rating is 5A at 125VDC (Reference 6.27).

The contact rating of the Electroswitch test and bypass switches is 120A make at 125VDC, 40A momentary (60 sec.) with a 20A continuous rating at 600VAC (Reference 6.31).

The GE HGA111 auxiliary relay has a 30A current-closing contact rating, a 12A continuous, 30A momentary (60 sec.), and an interrupting rating of 1.5A at 125VDC (Reference 6.32).

These contact ratings are well above the expected load of the DC and AC circuits; therefore, the contact ratings are acceptable with respect to the circuit loading.

2.3.12 Implementation of this modification does not affect the Radioactive Waste Treatment System or the ability to cool spent fuel.

2.3.13 The equipment added by this modification will have negligible affect on the 480V load center heat loading.

2.3.14 The new sub-panels are designed to be installed in accordance with Reference 6.4 and Appendix 5A of the UFSAR (Reference 6.1), as documented in Calculation C-SJ523-01 (Reference 6.39).

2.3.15 The electrical components have been procured to Safety Related, Quality Level 1 requirements. The components are qualified for their intended application and for the Class I requirements as defined in Reference 6.4 and Appendix 5A of the UFSAR. These consist of the bypass switches, test switches, undervoltage relays, and auxiliary relays. These components have been supplied QL-1 and seismically qualified by the equipment supplier

or purchased commercial grade and dedicated QL-1 by the equipment supplier (References 6.52, 6.57 and 6.59).

Per Section 9.19, Special Instructions, a HOLD POINT is imposed until the seismic test reports for the test and bypass switches have been approved.

2.3.16 This modification removes one test switch, two indicator lights, and three auxiliary relays from each of Load Centers 3A, 3B, 3C, and 3D. This Engineering Package does not modify the structural system of the load centers. Since the total mass removed is insignificant when compared to the overall mass of each load center and the structural system has not been altered, the structural adequacy and seismic qualification of Load Centers 3A, 3B, 3C, and 3D will not be degraded.

3.0 SAFETY EVALUATION

3.1 Description and Purpose

This EP adds one ITE-27N definite time delay undervoltage relay per channel and removes the auxiliary relays on the 480V load center non-safety injection degraded voltage schemes. These modifications are required to improve the repeatability of the existing degraded voltage relay settings. This modification also installs a bypass switch which will allow one channel of the undervoltage scheme to be placed in the trip mode in the event that a relay is removed for testing or calibration.

Since this EP modifies the Safety Related 480V load centers degraded voltage protection schemes, this package is classified as Safety Related.

The facilities as described in the SAR are affected by these modifications. In particular, the FCP (Attachment 6) appropriately reflects these modifications to the facility description provided in UFSAR Section 8.2. In addition, Section 2.1.8 herein appropriately addresses related engineering evaluations and that Safety Evaluation JPN-PTN-SEEP-91-002 is no longer required to be active on Unit 3 upon implementation by this Engineering Package.

3.2 Analysis of the Effects on Safety

As detailed in Section 2.1, "Safety Classification and Regulatory Requirements", the modification described in this Engineering Package does not alter or adversely affect the plant licensing basis, and this section provides adequate justification for a safety classification of "Safety Related."

This modification is not in a harsh environment during post-accident conditions; therefore, EQ Doc. Pac. 1001 and 10CFR50.49 with respect to qualifications for a harsh environment are not applicable.

This modification does not affect the radioactive waste treatment or radioactive area or process monitoring systems, does not create any new sources of radioactive contamination or radiation and does not require access to any high radiation or contaminated areas. Therefore, the bulk inventory of radwaste material and effluent discharges are not impacted, and personnel exposures are maintained ALARA.

In addition, the work does not impact any block walls, does not affect safety related snubbers, does not create or modify any barriers that could compromise plant paging system audibility, does not change or require access through any vital equipment security barriers and is outside containment so that containment bulk material inventory is not changed.

The hardware modifications associated with the 480V load centers themselves can only be implemented when Unit 3 is in Mode 5, Mode 6 or a defueled condition. The remaining work (i.e., sub-panel assembly and conduit routing) can be performed in any mode. There are no restrictions on Unit 4 operation during implementation on Unit 3. The Technical Specification limiting conditions of operation are appropriately addressed in Section 2.1.14 and restricted in Sections 9.18 and 9.19 herein and assure that plant safety and safe operation is not compromised. Also, the ability to satisfy design basis requirements and the capability of performing safety related functions is not compromised.

This modification does not adversely impact the Plant Paging System operation or audible dispersion.

In addition, the capability of performing safety related functions is not compromised during implementation because these and other instructions and restrictions are imposed in Section 9.0 to assure that plant safety and safe operation is not compromised.

Based on the preceding, the activity does not adversely impact nuclear safety or safe plant operation.

3.3 Failure Modes and Effects Analysis

Potential failure modes were reviewed to determine their impact on nuclear safety. The results of this review are presented in Section 2.1.2. In conclusion, no new failure modes are created that could impact nuclear safety since undervoltage relays are still used for sequencer trip circuitry and the functional failure of the relays (i.e., failure to detect degraded voltage and actuate the sequencer trip logic) is unchanged. Also, the two-out-of-two relay actuation logic required to actuate the sequencer trip circuit is maintained as well as the ability to place a channel in the bypass (tripped) mode during relay testing and calibration reduce the potential for any single component failure to cause inadvertent actuation of the sequencer trip logic. Therefore, the probability of spurious sequencer actuation and inadvertent transfer to the onsite emergency power source is not increased.

3.4 Effect on Technical Specifications

This modification and associated implementation activities are consistent with and uphold existing Technical Specification requirements.

Although existing Technical Specification requirements are upheld by this modification, a minor change to the Technical Specification is required for clarity. This change will delete the reference to the specific type of relay. This change is provided for as a proposed license amendment (Reference 6.44) for which appropriate restrictions are imposed on this modification. Therefore, this modification has no adverse effect on plant safety but requires a minor change to the Technical Specifications. The Technical Specification change must be approved by the NRC prior to performing any work that changes the functional configuration of the degraded voltage protection scheme.

3.5 Unreviewed Safety Question Determination

As defined in 10CFR50.59, an unreviewed safety question exists; (i) if the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the Safety Analysis Report (SAR) may be increased; or (ii) if a possibility of an accident or malfunction of a different type than any previously evaluated in the SAR may be created; or (iii) if the margin of safety as defined in the basis of any Technical Specification is reduced.

In accordance with 10CFR50.59, the following evaluation serves to determine whether this modification constitutes an unreviewed safety question or requires a change to the Technical Specifications:

3.5.1 Does the proposed activity increase the probability of occurrence of an accident previously evaluated in the SAR?

This activity does not affect any equipment whose malfunction is postulated in the SAR to initiate an accident or prevent an accident from occurring. Also, this modification does not change the frequency of occurrence of postulated accidents or events. Therefore, the probability of occurrence of an accident previously evaluated in the SAR is not increased.

3.5.2 Does the proposed activity increase the consequences of an accident previously evaluated in the SAR?

The consequences of an accident previously evaluated in the SAR is not increased because this activity does not adversely affect the response or performance capability of any structures, systems or components that function to mitigate the consequences of an accident. With the new relays, the ability of the undervoltage detection scheme to provide the necessary level of motor protection is maintained. Also, the degraded voltage protection system does not contain or detect the release of radioactivity or to provide post-accident shielding.

3.5.3 Does the proposed activity increase the probability of an occurrence of a malfunction of equipment important to safety previously evaluated in the SAR?

This modification improves the accuracy and repeatability of the degraded voltage relay settings. Only the undervoltage relays themselves are used to actuate the sequencer trip circuit and two-out-of-two logic channels

are still required to function before actuating the sequencer trip circuit. Also, the removal of the auxiliary relays reduces the potential for a spurious or lack of an undervoltage signal from being sent to the sequencer and addition of the new bypass switches enhances the availability of the load centers during maintenance and testing such that system performance capability is not degraded. Therefore, the probability of occurrence of any malfunction of equipment important to safety previously evaluated in the SAR is not increased.

3.5.4 Does the proposed activity increase the consequences of a malfunction of equipment important to safety previously evaluated in the SAR?

The ultimate effect of any credible failure or spurious operation of components in the modified scheme would be opening the load center breaker, leading to either loss of associated bus or transfer of power from an offsite to onsite source. The effect of this condition does not adversely affect the response or performance capability of any structures, systems or components that function to mitigate the consequences of an accident, to contain or detect the release of radioactivity or to provide post-accident shielding. Therefore, the consequence of a malfunction of equipment important to safety previously evaluated in the SAR is not increased.

3.5.5 Does the proposed activity create the possibility of an accident of a different type than any previously evaluated in the SAR?

This activity does not change the operation, function or design bases of any structure, system or component important to safety as described in the SAR. In particular, the undervoltage protection scheme still uses relays to detect a degraded voltage condition and to actuate sequencer trip using a two-out-of-two logic. However, removing the auxiliary relays does change the method by which the function is accomplished in that only the undervoltage detection relays themselves can actuate the sequencer trip logic. No new hazards are created that can be postulated to cause an accident different from those previously analyzed in the SAR. Therefore, there is no possibility that an accident may be created that is different from any already evaluated in the SAR.

3.5.6 Does the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in the SAR?

The ultimate effect of any credible failure or spurious operation of components in the modified scheme would be opening the load center breaker, leading to either loss of associated bus or transfer of power from an offsite to onsite source. These effects are bounded by other analyzed accidents, such as loss of AC power, and application of the single failure criterion. Also, no new hazards are created that can be postulated to cause a malfunction of equipment important to safety different from those previously analyzed in the SAR. Therefore, the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in the SAR is not created.

3.5.7 Does the proposed activity reduce the margin of safety as defined in the basis for any Technical Specification?

This activity does not change the design bases, functions or operations of any equipment important to safety and does not adversely affect any other structures, systems or components important to safety. The Technical Specification requirements applicable to this modification are not affected. However, the method of satisfying the Technical Specification requirements is affected. While the setpoint values are unchanged, the means of satisfying these setpoint requirements is accomplished by the new definite time delay undervoltage relay. The analysis performed to support this circuit modification (Reference 6.46) confirms that the new relays, at the existing setpoints, provide the necessary degraded voltage protection. Therefore, this activity does not reduce the margin of safety as defined in the bases for the Technical Specifications once the Proposed Licensing Amendment has been approved.

Based on the preceding, this activity does not constitute an unreviewed safety question and is considered acceptable.

3.6 Plant Restrictions

Plant restrictions are designated in Section 9.0.

3.7 Conclusions

This modification does not impact safe operation of the plant and does not constitute an unreviewed safety question. A minor change to the Technical Specification is required to delete reference to the specific type of relay, thus changing the method by which the relay setpoint requirements are satisfied. This Technical

Specification change is being processed as a proposed license amendment (Reference 6.44). NRC approval of this proposed amendment is required prior to system acceptance and turnover.

4.0 DESIGN AND SAFETY VERIFICATION

4.1 Method of Verification

The design basis was reviewed to ensure that the overall design concept meets the applicable DBD, UFSAR, Regulatory Guides and 10CFR50 requirements.

The design analysis for the 480V Undervoltage Protection Scheme Modification was verified by review of the calculations and the analytical techniques utilized. Additionally, adequate justification was demonstrated to classify this modification as Safety Related.

The safety analysis was verified by review of each conclusion statement required to satisfy 10CFR50.59 criteria for establishing whether an unreviewed safety question does or does not exist and whether or not a change to the Technical Specifications is required.

4.2 Conclusions

4.2.1 Design Inputs

The assumptions and design inputs required to perform the design of the 480V Undervoltage Protection Scheme Modification were adequately described, reasonable, and appropriately identified for subsequent reverification as required. The design inputs were correctly selected and incorporated, and applicable operating and construction experience were considered.

4.2.2 Design Process

The drawings and specifications used in this design were checked to ensure the latest revisions were utilized. The design codes used for this modification were checked to ensure that the applicable revisions were utilized and that the codes were appropriate to the proposed design. The codes, standards, design bases and regulatory requirements were properly identified and the design of the 480V Undervoltage Protection Scheme Modification was shown to meet those requirements. Interface requirements were demonstrated to be satisfied. All specified equipment, parts, and materials were shown to be suitable

for the required application and for the environment to which the system will be exposed. Environment qualification, and preparation and periodic test requirements were verified to be correct. The Design Analysis correctly concludes that this modification is classified as Safety Related. The Safety Evaluation has been properly documented and correctly concludes that no unreviewed safety questions exist and a minor change to the Technical Specifications is appropriate to support this modification.

4.2.3 Results and Records

The output provided by this design is reasonable when compared to the inputs. The acceptance criteria for the design of the 480V Undervoltage Protection Scheme Modification was adequately incorporated in the design documents to allow verification that the design requirements have been satisfactorily accomplished.

5.0 AFFECTED DOCUMENT CHECKLIST

Affected? Yes	No	Document	Reference Section/Page
X		FSAR	Attachment 6
X		Technical Specifications	Section 2.1.14
X		TEDB (attach input sheets)	Attachment 4
	X	EQ Doc Pac (include in EP Section 11.0)	
	X	Welding Manual	
	X	Snubber List	
	X	Stress Analysis of Record	
	X	Block Wall Loading	
	X	Support & Restraint Calc. of Record	
	X	Cut Rebar List	
	X	ILRT/LLRT	
	X	ISI/IST	
X		Plant Procedures	Section 14.0
	X	D/G Load Calc.	
	X	Battery Load/Profile Calc.	
	X	Voltage Drop/Short Circuit Calc.	
	X	Relay/Breaker/Fuse Coord. Study	
	X	Security Plan	
X		Design Basis Document	Attachment 7
	X	Standard/Specifications	
	X	Essential Equipment List	
X		Safe Shutdown Analysis	Attachment 5
X		Existing Structure Evaluation	Section 2.2.2

6.0 REFERENCES

6.1 Updated Final Safety Analysis Report (UFSAR), Revision 9, dated July 1991.

6.2 Technical Specifications, Amendment 151/146, Sections 3/4.3.2, 3/4.8.1, 3/4.8.2, 3/4.8.3, 3.9.8.1., 3.9.8.2, 3.4.1.4.1 and 3.4.1.4.2, including related proposed license Amendments, "Operating License Expiration Date", per L-92-31, dated February 25, 1992.

6.3 FPL Vendor and Non-Vendor Drawing Log, dated December 10, 1991.

6.4 Design Bases Document 5610-000-DB-001, Revision 4, "Selected Licensing Issues."

6.5 IE Bulletin 79-18, Audibility Problems Encountered on Evacuation of Personnel in High Noise Areas, dated August 7, 1979.

6.6 JPN-QI 3.13, Revision 1, ALARA Design Requirements.

6.7 FPL Letter JPE-PTP-88-922, Plant Security Design Considerations, dated June 7, 1988.

6.8 FPL Letter JPNS-PTN-90-6625, Identification of Environmental Impact from Plant Modifications, issued November 1990.

6.9 IEEE 323-1974, Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations.

6.10 IEEE 344-1975, Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.

6.11 Civil - Structural Design Criteria, 5177-C-000, Rev. 5.

6.12 JPN-QI 2.3, Revision 4, "Safety Classifications".

6.13 FPL PTN-PC/M Status System Report, dated January 23, 1992.

6.14 Turkey Point Units 3 & 4 Drawing Change Tracking System (DCTS) dated January 15, 1992.

6.15 Listing of Turkey Point/St. Lucie Nuclear Units Safety Evaluations transmitted with FPL letter JPN-ST-91-388, dated November 22, 1991.

6.16 Ebasco Calculation EC-136, Revision 3, Existing Station Battery Cell Sizing and Voltage Drop Calculation.

6.17 Bechtel Calculation 5177-EF-01, Revision 2, Cable Ampacity in Duct Bank. Maintained Space Tray, Conduit and Free Air.

6.18 FPL letter JPN-PTP-90-2413, Power Cable Sizing for Short Circuit, dated January 12, 1990.

6.19 Design Basis Document 5610-023-DB-001, Revision 4, "Emergency Power System".

6.20 Bechtel Calculation 21701-523-E-01, Revision 0, Unit 3 Load Center Undervoltage Relay Set Points.

6.21 General Electric Apparatus Handbook, Section 7293, Type HGA100 Century Series Hinged Armature Auxiliary Relays, dated April 20, 1981.

6.22 Turkey Point Active Safety Evaluation List, transmitted with FPL letter JPNS-PTN-91-4942, dated October 24, 1991.

6.23 Circuit Breaker/Fuse Coordination Study for Turkey Point Units 3&4, Calculation No. 5177-265-EG-22, Revision 2.

6.24 Human Factors Engineering Guidance Manual, Turkey Point Nuclear Power Plants 3&4, no revision date.

6.25 NUREG-0700, Guidelines for Control Room Design Reviews, Published September 1981.

6.26 General Electric Instruction Bulletin GEH-1768E, "Undervoltage Relays".

6.27 Asea Brown Boveri Instruction Bulletin 7.4.1.7-7, Issue D, "Single Phase Voltage Relays".

6.28 Document No. JPN-PTN-SEEP-91-002, Revision 1, Safety Evaluation for IAV Undervoltage Relay Setpoints.

6.29 Document No. JPE-L-86-099, Revision 0, Substantial Safety Hazards Evaluation Relative to HGA Relays.

6.30 FPL letter JPN-PTN-92-5241, Credit Review of Switch Location, dated March 10, 1992.

6.31 ElectroSwitch Technical Publication, MIN-1, "Instrument & Control Switch", dated February 1, 1985.

6.32 General Electric Relay Instructions, GEK-45487A, "Instantaneous Auxiliary Relay, Type HGA111".

6.33 PC/M 87-311, Revision 1, "Replacement of General Electric (GE) CR120BD Relays - Unit 3".

6.34 PC/M 87-264, Revision 17, "EDG 3B/4B, EDG 3A/4A and New EDG Building Tie-ins", FSAR and DBD Change Packages.

6.35 FPL Transmittal JPNS-PTN-92-5177, Requisition on Stores (ROS), dated February 7, 1992.

6.36 PC/M 91-036, Revision 0, "Protective Relay Settings".

6.37 Bechtel Calculation C-133-69, Revision 9, Blockwall Check T-31-1A.

6.38 Bechtel Calculation C-133-71, Revision 4, Blockwall Check T-31-3A.

6.39 Bechtel Calculation C-SJ523-01, Revision 0, Evaluation of Sub-panels 3C467, 3C468, 3C469 & 3C470 and its support.

6.40 Bechtel Calculation C-133-33, Revision 11, Blockwall Check T-18-6A.

6.41 Bechtel Calculation C-133-31, Revision 12, Blockwall Check T-18-5A & T-31-2A.

6.42 Bechtel Calculation C-SJ492-27, Revision 0, Structural Adequacy Check for Girder 3G2-28.

6.43 FPL Calculation PTN-3FJC-92-004, Revision 0, Conduit Supports for 480V Undervoltage Protection Modification.

6.44 No Significant Hazards Evaluation, JPN-PTN-SEEP-92-003, Revision 0, 480 Volt Load Center Undervoltage Relay Addition.

6.45 ANSI/IEEE Standard C37.90-1978, Relays and Relay Systems Associated with Electric Power Apparatus, Section 6.3.4.

6.46 Bechtel Calculation 21701-523-E-02, Revision 0, "Verification of Degraded Voltage Relay Protection for Safety Related Equipment (Coordination between U/V and Overcurrent Protection)".

6.47 Report No. FLO 53-20.5004, "Emergency Power System Enhancement Project, Relay Coordination Study", Revision 11.

6.48 Ebasco Calculation EC-145, Revision 5, "PSB-1 Voltage Analysis for Electrical Auxiliary System".

6.49 Ebasco Calculation IC-TP.0003, Revision 1, "EDG Enhancement Project - Sequencer Load Calculation".

6.50 NRC letter (S. A. Vargo) to FPL (R. E. Uhrig), "Degraded Grid Protection for Class IE Power Systems", dated October 28, 1982.

6.51 FPL letter, JPE-PTPO-82-1854, "NRC Request for Additional Information", dated November 22, 1982, submitted to NRC under FPL letter L-83-1, "Adequacy of Station Electric Distribution System Voltages", dated January 3, 1983.

6.52 Report MIL 82-12, "Nuclear Qualified Devices Relays, Control Switches & Accessories", General Electric, dated July 26, 1982.

6.53 FPL letter JPN-PTN-92-5233, "PEG Design Input for 480V Load Center Degraded Voltage Scheme Modification", dated March 10, 1992.

6.54 FPL letter JPNS-PTN-92-0265, "New Coating Specification SPEC-C-004", dated March 9, 1992.

6.55 PC/M 89-491, Revision 2, "Structural Steel Attachment Fireproofing Requirements".

6.56 Plant Procedure 0-SMM-016.3, "Fire Barriers and Structural Steel Fireproofing Inspection", dated August 22, 1991.

6.57 Bechtel Vendor Document 21701-523-E-0817-001-02, "ABB Class 1E Electrical Equipment Qualification 27N Undervoltage Relay", ABB Report No. RC-5139-A.

6.58 Bechtel Calculation 18712-473-E-01, Rev. 1, "DC Voltage Drop Calculation for Safe Shutdown Components".

6.59 Bechtel Vendor Document 21701-523-E-0817-003-01, "27N Undervoltage Relay Qualification Report" - Additional Information.

7.0 ATTACHMENTS

ATTACHMENT NUMBER	TITLE	PAGES	REV/DATE
1	Fire Protection Review Checklist	3	0
2	Environmental Qualification (EQ) Checklist	1	0
3	ALARA Screening	1	0
4	Total Equipment Data Base (TEDB) Change Package	69	0
5	Safe Shutdown Analyses Change Package	18	0
6	UFSAR Change Package	3	0
7	DBD Change Package	2	0

CONSTRUCTION

8.0 CONSTRUCTION/IMPLEMENTATION SCOPE

The constructor's work scope includes the following:

8.1 The following work can be performed in any Plant Operating Mode:

8.1.1 Procurement of material required for this modification in accordance with Section 10.

8.1.2 On the inside of the new sub-panel doors fabricate and install the door stiffener and remove the print pocket in accordance with design drawings.

8.1.3 On the door of each new 480V Load Center sub-panel 3C467, 3C468, 3C469 & 3C470 mount two new ITE undervoltage relays, one new bypass switch and one new test switch per design drawings and special instructions.

8.1.4 Inside each 480V load center sub-panel 3C467, 3C468, 3C469 and 3C470, on its rear mounting panel, mount two new auxiliary relays and two new terminal blocks per design drawings.

8.1.5 Install and terminate internal wiring in each new 480V Load Center sub-panel 3C467, 3C468, 3C469 and 3C470 per design drawings and special instructions. The wiring for the indicating lights will be terminated per Section 8.2.6 after the HOLD POINTS are removed and the indicating lights are relocated to the subpanels.

8.1.6 Install new 480V load center sub-panels, 3C467 & 3C468 by the south wall of the 480V Load Center Room 3A/3B per design drawings.

8.1.7 Install new 480V load center sub-panels, 3C469 & 3C470 by the south wall of the 480V Load Center Room 3C/3D per design drawings.

8.1.8 Route and install new conduits, supports and field cables from the 480V Load Centers 3A, 3B, 3C and 3D to the new 480V load center sub-panels 3C467, 3C468, 3C469 and 3C470, in accordance with design drawings.

8.2 The following work shall be performed in Plant Operating Modes 5, 6 or defueled, once all hold points have been removed:

8.2.1 Inside 480V Load Centers 3A, 3B, 3C & 3D disconnect and remove all internal wiring for Undervoltage Test Switches 327TTC/3A12, 327TTC/3B12, 327TTC/3C12 and 327TTC/3D12 and their red, green and white indicating lights per design drawings.

8.2.2 Remove from each 480V Load Centers 3A, 3B, 3C & 3D transition panel door the undervoltage test switches and indicating lights disconnected in Section 8.2.1 and fill in the spaces vacated per design drawings and special instructions.

8.2.3 Disconnect the internal wiring and remove the two amber indicating lights "AE" and "AF" that are located directly above the switches removed in Section 8.2.2 and fill in the spaces vacated per design drawings and special instructions. (Note: These lights will be relocated on new 480 Volt load center sub-panel door.)

8.2.4 Disconnect all internal wiring and remove the General Electric CR120BD auxiliary relays from LC 3A, 3B, 3C and 3D transition panel doors and fill in bolt holes per design drawings and special instructions.

8.2.5 Install two indicating lights (that were removed per Section 8.2.3) per design drawings and special instructions. (Note one of the two indicating light's amber lens must be replaced by a white lens for each sub-panel.)

8.2.6 Terminate the internal wiring installed per Section 8.1.5 for the indicating lights in each new 480V Load Center sub-panel 3C467, 3C468, 3C469 and 3C470 per design drawings and special instructions.

8.2.7 Disconnect and remove or reterminate wiring in 480V load center panels replacing any short wires as required per design drawings and special instructions.

8.2.8 Terminate new field cables in the new 480V load center sub-panels 3C467, 3C468, 3C469 and 3C470,and in the 480V Load Centers 3A, 3B, 3C and 3D in accordance with design drawings.

8.2.9 On panel 3C04 revise engraving for annunciator window F35 per design drawings.

9.0 SPECIAL INSTRUCTIONS

9.1 All work/clearances shall be coordinated with Plant Operations. Extreme caution shall be used to prevent personnel injury damage, spurious operation or malfunction of energized equipment.

9.2 Hardware modifications to the 480V load centers degraded voltage protection circuitry shall be performed during the scheduled 1992 Unit 3 refueling outage when Unit 3 is in Mode 5 (cold shutdown), Mode 6 (refueling) or defueled. Preparatory work may be performed during any operating mode provided no functional configuration changes are made. To satisfy the Technical Specification requirements discussed in Section 2.1.14, this modification must be implemented as described below.

This modification performs work on load center degraded voltage relay circuits. This involves work on circuits receiving load center AC and DC power. Therefore, both AC and DC power circuits must be isolated to perform this modification. Only one 480 Volt load center degraded voltage circuit will be worked at a time to implement this modification. Therefore, only one load center at a time will be deenergized. Swing Load Center 3H shall remain energized at all times. Therefore, when Load Center 3C is deenergized, Load Center 3H will be aligned to receive Load Center 3D power and when Load Center 3D is deenergized, Load Center 3H shall be aligned to receive Load Center 3C power.

DC UV Circuit Power Isolation

Prior to performing any work on a given load center's degraded voltage circuitry, the DC control power for the circuit must be isolated to perform the work required by this modification.

The pulling of the DC fuses in the sequencers to provide isolation of the DC power supply for the undervoltage protection circuit affects the associated sequencer, which affects the operability of the associated Residual Heat Removal Pump and is therefore to be restricted as follows (see Section 2.1.14 herein):

- When Unit 3 is in Mode 5, the removal of the sequencer power fuses to provide DC power isolation is restricted to when the reactor coolant loops are filled.

- When Unit 3 is in Mode 6, the removal of the sequencer power fuses to provide DC power isolation is restricted to when the water level above the top of the reactor vessel flange is greater than or equal to 23 feet.

Table 1 lists the DC control power fuses in the respective sequencers 3C23A or 3C23B that will be pulled only long enough to isolate a single 480 Volt load center degraded voltage circuit and then the fuses will be reconnected as quickly as possible. Since only one load center will be de-energized at a time, this reconnection of fuses will enable the load center undervoltage DC control power for the other energized load center on its bus to remain operable in addition to its sequencer. Therefore, after the fuses are pulled, the isolation of one load centers undervoltage scheme DC control power will be performed by lifting four conductors from the field cable shown on the Table 2 below and then the fuses will be reconnected as quickly as possible. These four field cable conductors shall be taped to avoid shorting while lifted. Once the conductors have been lifted and taped, the fuses shall be reinstalled and then the RHR restrictions specified above are no longer required.

Table 1

Load Center	Fuse Location	Fuse to be pulled	Internal Wiring Drawing	Elementary
3A-3C	3C23A	FU-2(+) FU-2(-)	5613-E-27A-12	5613-28,Sh.9A
3B-3D	3C23B	FU-2(+) FU-2(-)	5613-E-27A-19	5613-28,SH.9B

Table 2

Load Center	Location	Cable	Conductors to be Lifted	Elementary	Connection DWG
3A	3B01	3E9/B	P1, N1, 21, 41	5613-E-28, SH 9A	5613-E-340
3B	3B02	3E9A/B	P1, N1, 21, 41	5613-E-28, SH 9B	5613-E-340
3C	3B03	3E9/C	P1, N1, 22, 71	5613-E-28, SH 9A	5613-E-341
3D	3B04	3E9A/C	P1, N1, 22, 71	5613-E-28, SH 9B	5613-E-341

AC UV Circuit Power Isolation

Subsequent to performing the load center DC power isolation described above for each load center, the AC power going to each load center must be deenergized to isolate the potential transformer which feeds its undervoltage relay sensing coils and test switch circuits. This isolation is to be performed by deenergizing the load center 480V AC bus and pulling the fuses on the primary side of the potential transformer that feeds its undervoltage relays.

9.3 Electrical raceways and associated components shall be installed, modified and/or supported in accordance with Specification CN-2.29, Drawing 5610-E-302, and the routing and support drawings listed in Section 11.4.

9.4 Electrical equipment installed or modified by this Engineering Package shall be grounded in accordance with Drawing 5610-E-301.

9.5 There shall be no attachments to any block walls unless prior engineering approval is obtained via a CRN.

9.6 Tag new equipment installed by this modification in accordance with Plant Procedure O-ADM-209.

9.7 A pre-implementation visual inspection shall be performed to verify the as-built electrical connections as shown on the drawings listed in Section 11.3 of this Engineering Package. Any deviation between the as-built condition and the design drawing shall be documented on a CRN for engineering evaluation.

A post-implementation inspection shall be performed to confirm that the final installation of electrical commodities conforms to the approved design. Any deviation between the as-installed configuration and the approved design shall be corrected or forwarded to engineering on a CRN for disposition.

9.8 The degraded voltage undervoltage relays shall be set and tested in accordance with Section 13.3.

9.9 For each 480V load center transition panel, disconnect wiring, remove three auxiliary relays, one test switch and two indicating lights, including all mounting bolts, retag relays and test switches as spare and return to the warehouse. Abandoned bolt, light, and switch holes shall be filled with Devcon Plastic Steel Liquid in accordance with manufacturer's instructions. Finish panel face

smooth and paint in accordance with Specification 5177-A-130 or SPEC-C-004.

9.10 Should any reterminated existing wires in the 480V load centers be too short to reach their new termination points, such wires shall be replaced with qualified wires in accordance with Drawing 5610-E-756.

9.11 All internal wiring inside the new 480V load center sub-panels 3C467, 3C468, 3C469 and 3C470 shall be extra-flexible #12 SIS nuclear qualified wires as specified per M&S #001-28906-3. In addition, enough slack shall be allowed in the wires to enable the subpanel door to be opened.

9.12 From each 480V load center transition panel door, two amber GE ET-16 indicating lights "AE" and "AF" are to be removed and relocated on each 480V load center sub-panel. One amber lens from each pair is required to be replaced with a white lens obtained from plant stores.

9.13 The shorting bar associated with the IAV relays shall be disconnected by the Protection and Control group, in accordance with the design drawings. These shorting bars are no longer required since the new bypass switch will be utilized whenever a relay is removed from service.

9.14 Construction shall ensure the door stop for Fire Door 096-2 (door between Load Center Rooms 3A/3B and 3C/3D) is securely fastened to the floor.

9.15 All welding shall be in accordance with the FPL Weld Control Manual.

9.16 As discussed in Section 2.1.3 structural steel fireproofing is technically not required for fire protection. However, for aesthetic purposes, repair fireproofing in accordance with Drawing 5610-A-181. No Fire Protection Impairment (FPI) Tags are required.

9.17 All painting and touch up painting shall be done in accordance with Specification 5177-A-130 or SPEC-C-004. Specification 5177-A-130 for painting may be substituted for Specification SPEC-C-004 as identified on the drawings in Section 11.4.

9.18 A minor Technical Specification change is in process as a proposed license amendment by FPL to NRC, as described in Section 2.1.14. The work associated with the 480V load centers that changes the functional configuration of the degraded voltage protection circuitry is restricted until the HOLD POINT has been removed.

9.19 A HOLD POINT is placed on re-entry into Mode 4 until the seismic qualification test reports for the test and bypass switches are reviewed and approved by engineering.

9.20 If this EP is only partially implemented, Project Engineering shall be notified via Change Request Notice (CRN) and concurrence obtained prior to Unit 3 re-entry to Mode 4. If EP revision is required, it will be revised to reflect and support the partial implementation.

10.0 EQUIPMENT AND MATERIAL

10.1 Equipment and Material Pre-Purchased by Engineering

Item	Quantity	Technical Description	Reference
1	8	Undervoltage Relay Asea Brown Boveri Model ITE-27N	P.O. C91679 90247
2	4	Bypass Switch Electroswitch Model 20K-908C8-2	P.O. C92679 90028
3	4	Test Switch Electroswitch Model 20K-909C8-1	P.O. C91679 90245

10.2 Equipment and Material to be Field Procured with Engineering Specifications or Requirements

Item	Quantity	Technical Description	Reference
1	4	Terminal Box Hoffman (24 x 24 x 12) with Rear 12 Gauge Mounting Plate	M&S 057-07900-5 *
2	8	Terminal Block Buchanan 12 pt.	M&S 057-03917-8 *
3	8	Auxiliary Relay GE 12HGA111J2	M&S 005-44152-8 *
4	As Req'd	Control Cable 5/C #12 AWG	M&S 001-17105-4 *
5	As Req'd	Jumper Wire #12 SIS-Flexible	M&S 001-28906-3
6	As Req'd	Jumper Wire #12 SIS	5610-E-756
7	As Req'd	Flexible Steel Conduit	5610-E-302
8	As Req'd	Rigid Steel Conduit and Fittings	5610-E-302

Item	Quantity	Technical Description	Reference
9	As Req'd	Conduit/Tray Support Materials	CN-2.29
10	As Req'd	Paint (Outside CNTMT)	5177-A-130 or SPEC-C-004 **
11	As Req'd	Concrete Expansion Bolts	CN-2.24
12	As Req'd	Misc Steel	5177-074-C-131
13	As Req'd	Grout	CN-2.12

* These items were requisitioned from Plant Stores as noted on FPL transmittal JPNS-PTN-92-5177 (Reference 6.35).

** See Special Instructions, Section 9.17, for explanation of painting specification references.

All other material required for this modification not specified in this section shall be requisitioned by the installer and procured by the owner, or obtained from Plant Stores.

10.3 Spare Parts

There are no recommended spare parts for this modification. If any of the equipment installed by this modification fail, they should be replaced in their entirety. The following spare devices were procured:

Tag Number	Vendor	Make/Model	Reference
327I/Spare	Asea Brown Boveri	27N/411T7375	P.O. C91679 90247
327BYP/ Spare	Nutherm	Electroswitch/ 20K-908C8-2	P.O. C92679 90028
327TTC/ Spare	NTS/Acton	Electroswitch/ 20K-908C8-1	P.O. C91679 90245

AFFECTED DRAWINGS LIST

11.0 DRAWINGS AND VENDOR MANUALS

11.1 INCLUDED DRAWINGS

PC/M DRAWING NO.	REV	DESCRIPTION/TITLE	(1) DISC	AFFECTED DRAWINGS NO(S)	(2) REV	(3) PRIOR	EP (4) REV
5613-E-28,SH.9A/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Loss of Voltage Bus 3A	E	5613-E-28,SH.9A	1	No	0
5613-E-28,SH.9A2/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Loss of Voltage Bus 3A	E	5613-E-28,SH.9A2 5613-E-28,SH.1A1 5613-E-28,SH.8A1 5613-E-18,SH.1	2 2 2 3	No No No No	0 N/A N/A N/A
5613-E-28,SH.9A3/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Loss of Voltage Bus 3A Relay Development	E	5613-E-28,SH.9A3	2	No	0
-E-28,SH.9B/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Loss of Voltage Bus 3B	E	5613-E-28,SH.9B	1	No	0
5613-E-28,SH.9B2/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Loss of Voltage Bus 3B	E	5613-E-28,SH.9B2 5613-E-28,SH.1B1 5613-E-28,SH.8B1 5613-E-18,SH.2	2 2 2 3	No No No No	0 N/A N/A N/A
5613-E-28,SH.9B3/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Loss of Voltage Bus 3B Relay Development	E	5613-E-28,SH.9B3	1	No	0
5613-E-28,SH.9C/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Relay Test Annunciation	E	5613-E-28,SH.9C	0	No	0
5613-E-28,SH.13A/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3A	E	5613-E-28,SH.13A	2	No	0
5613-E-28,SH.13A1/ 91-128	0 ✓	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3A	E	5613-E-28,SH.13A1	1	No	0

PC/M DRAWING NO.	REV	DESCRIPTION/TITLE	(1) DISC	AFFECTED DRAWINGS NO(S)	(2) REV	(3) PRIOR	EP (4) REV
5613-E-28,SH.13B/ 91-128	0	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3B	E	5613-E-28,SH.13B	2	No	0
5613-E-28,SH.13B1/ 91-128	0	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3B	E	5613-E-28,SH.13B1	1	No	0
5613-E-28,SH.13C/ 91-128	0	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3C	E	5613-E-28,SH.13C	2	No	0
5613-E-28,SH.13C1/ 91-128	0	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3C	E	5613-E-28,SH.13C1	1	No	0
5613-E-28,SH.13D/ 91-128	0	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3D	E	5613-E-28,Sh.13D	2	No	0
5613-E-28,SH.13D1/ 91-128	0	Elementary Diagram Electrical Auxiliaries Metering and Relaying 480V Load Center 3D	E	5613-E-28,SH.13D1	1	No	0
5613-E-340/91-128	0	Connection Diagram 480V Load Center 3A & 3B	E	5613-E-340	1	No	0
5613-E-341/91-128	0	Connection Diagram 480V Load Center 3C & 3D	E	5613-E-341	1	No	0
5610-E-9-16,SH.1/ 91-128	0	Internal Wiring Diagram 480V Load Center 3A	E	5610-E-9-16,SH.1	12	No	0
5610-E-9-16,SH.2/ 91-128	0	Internal Wiring Diagram 480V Load Center 3B	E	5610-E-9-16,SH.2	11	No	0
5610-E-9-16,SH.3/ 91-128	0	Internal Wiring Diagram 480V Load Center 3A	E	5610-E-9-16,SH.3	1	No	0
5610-E-9-11,SH.1/ 91-128	0	Internal Wiring Diagram 480V Load Center 3C	E	5610-E-9-11,SH.1	11	No	0
5610-E-9-11,SH.1A/ 91-128	0	Internal Wiring Diagram 480V Load Center 3C	E	5610-E-9-11,SH.1A	0	No	0

PC/M DRAWING NO.	REV	DESCRIPTION/TITLE	(1) DISC	AFFECTED DRAWINGS NO(S)	(2) REV	(3) PRIOR	EP (4) REV
5610-E-9-11,SH.2/ 91-128	0	Internal Wiring Diagram 480V Load Center 3D	E	5610-E-9-11,SH.2	15	No	0
5610-E-9-11,SH.2A/ 91-128	0	Internal Wiring Diagram 480V Load Center 3D	E	5610-E-9-11,SH.2A	0	No	0
5610-E-9-5/91-128	0	Panel Layout Drawing Load Center 3A,B,C,D & 4A,B,C,D	E	5610-E-9-5	15	No	0
5610-T-L1,SH.13/ 91-128	0	Logic Diagram Loss of Voltage and Bus Stripping	I	5610-T-L1,SH.13	9	Yes	0
5613-E-320, Page iii/ 91-128	0	Vital DC Bus 3D23 Load List	E	5613-E-320	0	No	0
5613-E-320, Page 13/ 91-128	0	Vital DC Bus 3D23 Load List	E	5613-E-320	0	No	0
5613-E-321, Page iii/ 91-128	0	Vital DC Bus 3D01 Load List	E	5613-E-321	1	No	0
5613-E-321, Page 7/ 91-128	0	Vital DC Bus 3D01 Load List	E	5613-E-321	1	No	0
5613-E-321, Page 8/ 91-128	0	Vital DC Bus 3D01 Load List	E	5613-E-321	1	No	0
5613-E-315,SH.80/ 91-128	0	Relay Setting Drawing 480V Load Center 3A Engineered Safety Factors	E	5613-E-315/91-036, Sh. 80	0	No	0
5613-E-315,SH.81/ 91-128	0	Relay Setting Drawing 480V Load Center 3B Engineering Safety Factors	E	5613-E-315/91-036 Sh. 81	0	No	0
5613-E-315,SH.82/ 91-128	0	Relay Setting Drawing 480V Load Center 3C Engineering Safety Factors	E	5613-E-315/91-036 Sh. 82	0	No	0
5613-E-315,SH.83/ 91-128	0	Relay Setting Drawing 480V Load Center 3D Engineering Safety Factors	E	5613-E-315/91-036 Sh. 83	0	No	0
5610-E-151/91-128	0	Tray Conduit & Grounding EL 30'-0" & 31"-0"	E	5610-E-151	21	No	0
5613-E-1745/91-128	0	Connection Drawing 3C467,3C468,3C469 & 3C470	E	5613-E-1745	New	No	0

PC/M DRAWING NO.	REV	DESCRIPTION/TITLE	(1) DISC	AFFECTED DRAWINGS NO(S)	(2) REV	(3) PRIOR	EP (4) REV
5177-E-45A/91-128	0	Circuit and Raceway Schedule	E	5610-E-305	37	No	0
5613-E-5/91-128	0	Single Line Diagram 480 Volt System Load Centers 3A,3B,3C,3D & 3H	E	5613-E-5	0	No	0
5613-E-39/91-128	0	Panel Layout Annunciator Panels, A,B,C,D,E,F,H & I	E	5613-E-39	0	No	0
5613-C-1786/91-128	0	Mounting Details for Load Center Sub-Panels	C	New	0	No	0

11.2 VENDOR MANUALS

PLANT DOCUMENT NUMBER	(2) REV	VENDOR/EQUIPMENT	(1) DISC	REMARKS	EP (4) REV
V00554	New	ABB/Voltage Relays Types 27N and 59N	E	ABB Instruction Book 7.4.1.7-7	N/A
AA1449	New	Addendum to V00554	E	Addendum to 7.4.1.7-7	N/A

11.3 PRE-IMPLEMENTATION DRAWINGS

DRAWING NUMBER	REV	DESCRIPTION/TITLE	(1) DISC	EP (4) REV
PTN-E-91-128-001	0	Internal Wiring Diagram 480V Load Center 3C	E	0
PTN-E-91-128-002	0	Internal Wiring Diagram 480V Load Center 3C	E	0
PTN-E-91-128-003	0	Internal Wiring Diagram 480V Load Center 3D	E	0
PTN-E-91-128-004	0	Internal Wiring Diagram 480V Load Center 3D	E	0
PTN-E-91-128-005	0	Internal Wiring Diagram 480V Load Center 3A	E	0
PTN-E-91-128-006	0	Internal Wiring Diagram 480V Load Center 3B	E	0

DRAWING NUMBER	REV	DESCRIPTION/TITLE	(1) DISC	EP (4) REV
PTN-E-91-128-007	0	Internal Wiring Diagram 480V Load Center 3A	E	0
PTN-E-91-128-008	0	Connection Diagram 480V Load Center 3A & 3B	E	0
PTN-E-91-128-009	0	Connection Diagram 480V Load Center 3C &3D	E	0

11.4 PTN DRAWINGS

DRAWING NUMBER	REV	DESCRIPTION/TITLE	(1) DISC	EP (4) REV
PTN-E-91-128-010	0	Device Cutout and Mounting Details Load Center Sub-Panels 3C467, 3C368, 3C469 and 3C470	E	0
PTN-E-91-128-11	0	Conduit Routing	E	0
[redacted]E-91-128-12	0	Conduit Routing	E	0
PTN-C-91-128-11/Sh. 1	0	Conduit Supports Cover Sheet and Notes	C	0
PTN-C-91-128-11/Sh. 2	0	Conduit Support Drawing Index	C	0
PTN-C-91-128-11/Sh. 3	0	Conduit Support H001	C	0
PTN-C-91-128-11/Sh. 4	0	Conduit Support H002	C	0
PTN-C-91-128-11/Sh. 5	0	Conduit Supports H003, H004	C	0
PTN-C-91-128-11/Sh. 6	0	Conduit Support H005	C	0
PTN-C-91-128-12/Sh. 1	0	Conduit Supports Cover Sheet and Notes	C	0
PTN-C-91-128-12/Sh. 2	0	Conduit Support Drawing Index	C	0
PTN-C-91-128-12/Sh. 3	0	Conduit Support H006	C	0
PTN-C-91-128-12/Sh. 4	0	Conduit Support H007	C	0
PTN-C-91-128-12/Sh. 5	0	Conduit Supports H008, H009, H010, H011	C	0
[redacted]C-91-128-12/Sh. 6	0	Conduit Supports H012, H013, H014	C	0

11.5 VENDOR DOCUMENTS

SUPPLIER CONTROL NUMBER	DESCRIPTION/TITLE	FPL DRAWING NUMBER
21701-523-E-0817-001	Qualification Report 27N Undervoltage Relay	N/A
To be issued later	Seismic Test Report for Bypass Switch	N/A
To be issued later	Seismic Test Report for Test Switch	N/A

(1) DISCIPLINE: C - CIVIL; E - ELECT; I - I&C; M - MECH; N - NUCLEAR
(2) REVISION of affected drawing/vendor manual. Indicate "new" if drawing/vendor manual is created. The engineer is accountable for reserving the new drawing/vendor manual number.
(3) PRIORITY: Indicate (Yes/No) if SRD (PSL) or POD (PTN). The engineer is accountable for indicating the incremental (1-5) update priority (PTN only) when reserving the drawing number.
(4) EP REVISION under which last drawing change was made.

12.0 SPECIFICATION FOR IMPLEMENTATION

NUMBER	REV.	TITLE	ATTACHED OR CONTROLLED	USE CODES
5610-E-301	1	Grounding Notes, Symbols and Details	C	C, P
5610-E-302	7	Raceway Notes, Symbols and Details	C	C, P
5610-E-303	26	Lighting Notes, Symbols and Details	C	C, P
5610-E-756	9	Installation Inspection and Testing Details for Electrical Equipment and Cable	C	C, P
CN-2.29	0	Specification for Electrical Conduit and Cable Tray Supports, Turkey Point Units 3 and 4	C	C, P
5177-A-130	8	Technical Spec. for Furnishing and Application of Field Painting	C	C, P
SPEC-C-004	0	Technical Spec. for Furnishing and Application of Service Level II and Balance of Plant Maintenance Coatings	C	C, P
(N/A)	(N/A)	FPL Weld Control Manual	C	C
CN-2.24	6	Drilled In Expansion Type Anchors in Concrete NNS Class, Seismic Category I, Seismically Designed and Non Seismic Category	C	C, P
5177-074-C-131	8	Technical Specifications for Purchase of Miscellaneous Steel	C	P
5177-074-C-132	4	Performance Specification for Erecting Misc. Metals	C	C
CN-2.12	1	Specification for Grout	C	C, P

NUMBER	REV.	TITLE	ATTACHED OR CONTROLLED	USE CODES
5177-074-C-122	4	Erection of Structural Steel	C	C
5610-A-181, SH1	8	Fireproofing Details &	C	C, P
SH2	2	Installation Guidelines	C	C, P

* LEGEND

A - Attached
C - Controlled (available through FPL Document Control)

SPECIFICATION USE CODES

P - Procurement
C - Construction
S - Startup
O - Operation
M - Maintenance

STARTUP/OPERATION/MAINTENANCE

13.0 STARTUP TESTING

13.1 Plant shall perform the following activities in accordance with the approved Startup Testing Program.

13.2 The following verification activities shall be performed:

13.2.1 A post-implementation visual inspection shall be performed on electrical components that are in physical proximity to those modified by this Engineering Package to ensure that incidental damage has not occurred.

13.2.2 All terminal blocks, and 480V load center undervoltage relay circuits modified by this Engineering Package shall be verified for correct configuration and termination in accordance with issued design documents.

13.2.3 Power and control cables shall be tested for insulation integrity.

13.2.4 Point-to-point continuity checks shall be performed as required.

13.2.5 New equipment installed by this modification has been tagged in accordance with Plant Procedure O-ADM-209.

13.3 The following functional testing shall be performed by startup:

13.3.1 Verify logic as shown on drawings 5610-T-L1,Sh.13/91-128

13.3.2 Protection and Control shall set and check the undervoltage relays in accordance with the Relay Setting Drawings 5613-E-315, Sheets 80/91-128 through 83/91-128 and vendor curves (Reference 6.26).

Due to the voltage margin between the Technical Specifications and the setpoint verification values, HP34401A voltmeter must be used. Furthermore, two Doble F-2200 AC voltage sources must be utilized. Both of the voltage sources will be set at the 75V scale. This will allow the appropriate voltage increments to be used when setting the relays. At the 75 scale the voltage can be adjusted by $\pm$ .01V. In addition, the F-2010 attachment shall be used as a timer.

13.4 The following documents shall be applied to the Startup testing:

Document No.	Title
5610-T-L1,Sh.13/91-128	Logic Diagram Loss of Voltage and Bus Stripping
5613-E-28,Sh.9A/91-128	Elementary Diagram Loss of Voltage Bus 3A
5613-E-28,Sh.9A2/91-128	Elementary Diagram Loss of Voltage Bus 3A
5613-E-28,Sh.9A3/91-128	Elementary Diagram Loss of Voltage Bus 3A Relay Development
5613-E-28,Sh.9B/91-128	Elementary Diagram Loss of Voltage Bus 3B
5613-E-28,SH.9B2/91-128	Elementary Diagram Loss of Voltage Bus 3B
5613-E-28,Sh.9B3/91-128	Elementary Diagram Loss of Voltage Bus 3B Relay Development
5613-E-28,Sh.9C/91-128	Elementary Diagram Relay Test Annunciation
5613-E-28,Sh.13A/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3A
5613-E-28,Sh.13A1/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3A
5613-E-28,Sh.13B/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3B
5613-E-28,Sh.13B1/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3B
5613-E-28,Sh.13C/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3C

Document No.	Title
5613-E-28,Sh.13C1/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3C
5613-E-28,Sh.13D/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3D
5613-E-28,Sh.13D1/91-128	Elementary Diagram Metering and Relaying 480V Load Center 3D
5613-E-315,Sh.80/91-128	Relay Setting Drawing 480V Load Center 3A Engineered Safety Features
5613-E-315,Sh.81/91-128	Relay Setting Drawing 480V Load Center 3B Engineered Safety Features
5613-E-315,Sh.82/91-128	Relay Setting Drawing 480V Load Center 3C Engineered Safety Features
5613-E-315,Sh.83/91-128	Relay Setting Drawing 480V Load Center 3D Engineered Safety Features

14.0 OPERATION AND MAINTENANCE

14.1 Operations and Maintenance Recommendations/Information

14.1.1 This modification should be reviewed by Operations and Training for impact on the simulator as it changes annunciator window F35 on control room Panel 3C04.

14.1.2 The requirement of 12 month calibration of IAV relay settings, imposed by Safety Evaluation JPN-PTN-SEEP-91-002 is superseded by implementation of this PC/M. Appropriate plant procedures should be revised to reflect this modification.

14.1.3 The equipment listing in Section 10.0 shall be reviewed by the appropriate maintenance personnel. From this review, generate the appropriate RPAs for the purchase of new spare relays or test switches or adjust minimum/maximum stocking levels as applicable.

14.1.4 The 480V inverse time and definite time delay undervoltage relays have a key-locked bypass switch located directly above the 480V definite time delay undervoltage relays on each of the 480V load center sub-panels. This switch will be used to place one undervoltage relay logic channel in the trip mode when one or both of the relays of that channel are removed from the logic circuitry for relay testing or calibration. However, a relay from channel 1 and a relay from channel 2 cannot be removed at the same time.

14.1.5 The degraded voltage relay testing will be performed by testing the ITE definite time delay relays first followed by the IAV inverse time relays. When moving the test switch back through the ITE test position from the IAV test position, the switch should not be left in the ITE test position for more than 53.5 seconds to prevent possible retesting of the ITE relay.

14.2 Operating and Maintenance Mandatory Requirements

The following existing plant procedures must be revised to reflect changes required due to these modifications.

14.2.1 The 480 Volt Switchgear - Undervoltage Test Operating Procedure 9404.2 must be revised to reflect the new location for the Non-SI degraded voltage test panel, changes in indicating light functions, changes in the function of test switch 327TTC and deletion of the test switch lights. Refer to Drawing 5610-T-L1, Sh. 13/91-128 for the applicable changes to the test procedure.

14.2.2 The "Load Center ITE and IAV Undervoltage Relay Calibration Procedure" 3-PMR-006.1 must be revised to address the new ITE-27N 327I relays installed under this modification. The relay setting values and the check points need to be revised to agree with this EP and Reference 6.20. Safety Evaluation JPN-PTN-SEEP-91-002 (Reference 6.28) needs to be deleted from Section 2.16, of the procedure, since this Safety Evaluation is no longer required. In addition, a note should be added stating that only the M&TE specified in QTI-5-PS/PTN-2.11 and QTI-5-PS/PTN-2.18 shall be utilized when setting and testing the IAV and the new ITE-27N relays.

14.2.3 The "Instructions for Tests and Independent Verification of General Electric Type IAV Relays" QTI-5-PS/PTN-2.11 must be revised to reflect these modifications. When setting and testing the degraded voltage IAV relays, only the M&TE specified by Reference 6.20 can be utilized. Also, revise the "Timing Test" sections to agree with this EP and Reference 6.20. In addition, state that when the relay is removed from the circuit, the bypass switch must be used.

14.2.4 The "Instructions for Testing and Independent Verification of ITE-27 Undervoltage Relays" QTI-5-PS/PTN-2.18 must be revised to reflect these modifications. When setting and testing the ITE-27N relays installed by the PC/M, only the M&TE specified by Reference 6.20 can be utilized. In addition, when the relay is removed from the circuit the bypass switch should be utilized.

14.2.5 Procedure ONOP-208.8, "Annunciator List-Panel F - Electrical", must be revised as a result of the addition of a bypass switch to the existing undervoltage test annunciator circuit and revised window F35 engraving.

14.2.6 The engraving plate on each 480V load center transition panel door that provides instructions pertaining to when the IAV undervoltage relay is operable shall be revised accordingly to reflect the changes to the undervoltage relay circuitry implemented by this EP.