INSPECTION REPORT

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF REACTOR INSPECTION AND SAFEGUARDS

REPORT NO.: 50-213/89-200

DOCKET NO.: 50-213

LICENSEE NO.: DRP-61

LICENSEE: Connecticut Yankee Atomic Power Company
P.O. Box 270
Hartford, Connecticut 06101

FACILITY: Haddam Neck Plant

INSPECTION AT: Haddam Neck, Connecticut

DATES: January 30 through February 10, 1989

INSPECTORS: E. William Brach 5/19/89
Richard P. McIntyre, Team Leader Date
Vendor Inspection Branch (VIB)

S. D. Alexander, Equipment Qualification and
Test Engineer, VIB

J. J. Petrosino, Quality Assurance Specialist, VIB

W. P. Haass, Senior Reactor Engineer, VIB

R. C. Wilson, Senior Reactor Engineer, VIB

A. E. Finkel, Senior Reactor Engineer, Region I

CONSULTANTS: P. R. Farron, Nuclear Energy Consultants, Inc. (NEC)

F. C. Webb, NEC

APPROVED BY: E. William Brach 5/19/89
E. William Brach, Chief Date
Vendor Inspection Branch
Division of Reactor Inspection and
Safeguards

Enclosure 2

Inspection Summary:

Inspection from January 30 through February 10, 1989 (Report No. 50-213/89-200)

Areas Inspected: A special announced inspection was conducted by the NRC Vendor Inspection Branch to review the implementation of the licensee's vendor interface program and the program for the procurement of items for use in safety-related systems at the Northeast Utilities (NU)/Connecticut Atomic Power Company (CY) Haddam Neck Plant (HNP). The inspection team reviewed the documentation of specific vendor-related technical issues including 10 CFR Part 21 notifications received concerning the procurement of items utilized in safety-related applications at HNP.

Results: The NRC inspection team identified the following weaknesses in the HNP procurement program and the interfaces between the licensee and its vendors.

a. The NRC inspectors identified instances in which the licensee installed commercial grade items (CGIs) in safety-related systems without adequately evaluating their suitability for use in such applications. The licensee procured such items without performing documented technical evaluations to identify such attributes as the safety functions and critical characteristics of the items. Verification of design and manufacturing/material changes, or receipt inspection requirements beyond a part number verification and check for physical damage were not evident. Traceability to the original manufacturer was not always documented where applicable and testing would not always have been adequate to verify critical characteristics. This programmatic deficiency resulted in the installation of certain components of unverified quality and capability in safety-related systems.

b. The NRC inspectors identified several instances in which the licensee failed to specify the provisions of 10 CFR Part 21 as being applicable on purchase orders (POs) for items intended for use in safety-related applications, that specified that the components or items purchased must be in accordance with nuclear specifications or quality assurance requirements. Such procurements were not consistent with the definition of commercial grade items in 10 CFR 21.3 and thus did not meet the requirements of 10 CFR 21.31 for specifying the applicability of 10 CFR Part 21 on nuclear safety-related procurement documents.

c. The NRC inspectors determined that until January 25, 1989, the licensee had not established a formal, documented site-level program, for the receipt, evaluation, and implementation of recommended corrective actions for incoming technical information received from vendors. As a result, Power Pointers (PPs) and Maintenance Instructions (MIs) received from the emergency diesel generator (EDG) manufacturer, General Motors/Electro-Motive Division (GM/EMD), did not receive a documented evaluation for their applicability to the HNP. Additionally, the licensee did not maintain the EDG maintenance and operating manuals in an up-to-date condition.

d. The NRC inspectors identified four vendor communications describing potential safety concerns that were received at HNP but were improperly and/or incompletely assessed for their applicability to HNP. In all four cases, the licensee initiated corrective action before completion of the inspection to address NRC concerns.

e. While reviewing procurement activities for services and components provided by Bechtel Power Corporation (BPC) as part of the upgrade and modifications of the vital battery and associated components, the inspectors questioned the adequacy of Bechtel's dispositioning and closing out of deviations identified in procurement activities. Bechtel, acting as designee for Northeast Utilities Service Company (NUSCO), was performing the battery modification for CY at the HNP. The inspectors could not determine if the licensee was adequately controlling the disposition of deviations and nonconformances identified during this HNP battery upgrade and modification; therefore, this issue is unresolved.

Conclusions: The HNP procurement and vendor interface program deficiencies have been classified as Potential Enforcement Findings 50-213/89-200-01, 02, 03, and 04 and Unresolved Item 50-213/89-200-01. These findings will be referred to the NRC Region I office for appropriate action.

I. PROCUREMENT

The NRC inspection team reviewed the licensee's program for the procurement of parts, components, and equipment to be used in safety-related applications at the HNP. This review addressed the procedures that govern the procurement process, as well as the methods used to upgrade commercial grade items (CGIs) for use in safety-related applications. A program description and the results of a review of the HNP procurement procedures are contained in Appendix B to this report. To evaluate the implementation of the program, the NRC inspectors reviewed selected HNP procurements of items to be used in safety-related systems, that were procured both as commercial grade and as nuclear safety grade from approved suppliers having a 10 CFR Part 50, Appendix B, Quality Assurance (QA) Program.

The NRC evaluated the effectiveness of HNP's program as implemented for procurement of materials and services for safety-related systems and equipment by reviewing three types of procurements: nuclear safety grade (HNP procurement levels (PLs) -A and -B) and commercial grade to be dedicated under procurement level C (PL-C). HNP procurement levels are discussed in more detail in Appendix B of this report. The inspectors assessed the program effectiveness for assuring compliance with NRC regulations and its implementation by reviewing selected procurements for items installed, and/or available for installation, in safety-related applications. The inspectors evaluated compliance with regulatory requirements and HNP procedures, with emphasis on the three key issues listed below to determine if the component selection, procurement, receipt, and (for CGIs only) dedication process were appropriate to the circumstances.

- Were appropriate programs implemented to meet the 10 CFR Part 50, Appendix B, Criterion III requirements for selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of systems, components, and structures?

- Were appropriate programs implemented to meet the 10 CFR Part 50, Appendix B, Criterion VII requirements for assuring that equipment conforms to the procurement documents with appropriate provisions to ensure that objective evidence of quality is furnished to the licenesee and evidence produced by licensee actions, such as examination of products upon delivery, is maintained to document that the requirements and specifications are met?

- Were the requirements of 10 CFR Part 21 imposed in procurement documents when required for manufacturers/suppliers to ensure as a minimum that nonconformances or failures to comply with requirements would be reported to the licensee so that the licensee could evaluate such deviations in accordance with § 21.21 of 10 CFR Part 21?

A. Procurement Package Review

A 4-volume master list of safety-related HNP equipment and components entitled, "Connecticut Yankee; Quality Assurance; Material, Equipment, and Parts List" (MEPL) (described in more detail in Appendix B of this report) identifies safety-related, structures, systems, and components controlled under HNP's 10 CFR Part 50, Appendix B, quality assurance (QA) program. During the procurement review, the NRC inspectors refered to Revision 4 of the MEPL, dated, August 26, 1988.

The inspectors selected for review, primarily, examples of procurements of materials actually installed in safety systems and equipment, and secondarily, those materials procured for stores and available for use in such applications. To this end, the inspectors obtained maintenance records for jobs on selected safety systems listed in the "Expanded Work Order Report" computer printout from HNP's "Plant Maintenance Management System" (PMMS), historical database. Among the systems selected were: the Class 1E, 4160-VAC, 480-VAC, 120-VAC, 125-VDC electrical systems (including station batteries, chargers, and inverters); the reactor protection system (RPS); and several mechanical/fluid systems (safety systems and non-safety systems with certain safety-related components) such as the emergency diesel generator (EDG), the residual heat removal (RHR) system, the service water system, the main feedwater system, the high and low pressure safety injection (HPSI and LPSI) systems, the auxiliary feedwater (AFW) system, and the chemical and volume control system (CVCS). From these maintenance records (completed work orders), the inspectors determined which safety-related components (as identified in the MEPL) were actually replaced or which of their parts were replaced. From the associated material issue forms (MIFs) filed with the work orders (WOs), the inspectors identified the numbers of the material receipt inspection reports (MRIRs) on which

the receiving activities for the replacement components and/or parts were documented. The MRIRs referenced the associated purchase requisitions (PRs) and purchase orders (POs) from which the inspectors could determine the suppliers, the procurement levels (PLs), and the conditions of purchase imposed on the suppliers.

The licensee was able to provide the inspectors with documentation review packages consising of WOs, MIFs, MRIRs, PRs, and POs. However, records germane to documentation of traceability, such as invoices, packing slips, and shipping and intermediate receiving documents, were not included in records available on site. In addition to these documents in the review packages, the inspectors reviewed test procedures and results, drawings, and other technical documentation in certain cases. Certificates of comformance or compliance (COCs) and other vendor certifications were reviewed when applicable, and vendors were checked for inclusion on the Approved Suppliers List (ASL) maintained by the NUSCO Quality Services Department (QSD) at NU headquarters in Berlin, Connecticut.

The deficiencies noted during the procurement review fell into two major categories: (1) Those PL-A and PL-B procurements that did not contain the required 10 CFR Part 21 reference and/or adequate QA requirements, and (2) PL-C procurements for which adequate dedication was not accomplished or documented. Dedication deficiencies were predominantly the lack of adequate review for suitability for application (including defining safety functions and critical characteristics), lack of documented, verifiable, traceability of CGIs to their original manufacturers, and lack of adequate inspection and/or testing to verify critical characteristics. In most cases of deficient dedications, receipt inspection consisted of no more than part number verification and examination for quantity, damage, cleanliness and appropriate marking. This constituted the standard HNP "minimum receipt inspection," as defined in CY administrative control procedures (ACPs) ACP 1.2-4.1 and 7.1. Although some testing was conducted before and/or after installation (rather than receipt testing), such testing was often inadequate for verifying critical characteristics. A subset of PL-C procurements that generally lacked documentation were those in which parts that had been purchased under PL-D for non-safety applications, for which the original PO's were mostly not available, and which did not receive formal, documented receipt inspection, were "upgraded" to PL-C by performing a receipt inspection and documenting it on an MRIR in accordance with HNP procedure ACP 1.2-2.5.

1. The following are examples of PL-C (commercial grade) procurements of items installed in safety-related systems without adequate dedication:

    a. PO SWEC 1721-1/CY E49969, dated April 14, 1986, for Marathon terminal blocks purchased by Stone & Webster Engineering Company (SWEC) from Allied Electric for NU's Millstone Plant, Unit 3, and later transferred to HNP and installed in safety-related (classified by HNP as "Category I") vent

damper controls under WO number CY 86 06296. HNP minimum receipt inspection was documented on MRIR 86-448. Although the PO stated that this was a PL-B procurement, no QA specifications or invocation of 10 CFR Part 21 appeared on the procurement documents, although both were addressed on the manufacturer's COC for equipment environmental qualification (EEQ). No documentation to establish traceability to the manufacturer or its COC through Allied Electric was evident.

b. PO 848173, dated November 1986, for a Westinghouse (W) "X" relay purchased from W Electric Corporation general sales office in Hartford, Connecticut, was installed in Category I ground device number GND-BKR-1 under WO CY 88 01696. The PO identified the procurement level as PL-C, yet contained QA requirements. A COC from W that addressed QA and even 10 CFR Part 21, was on file, but the wording was not clear and traceablilty for the parts to W and to the COC was not established. Dedication consisted only of HNP minimum receipt inspection which was documented in MRIR 85-183-3. WO number CY 88 01696 indicated that post-installation, functional verification testing had been performed, which consisted of multiple cycling of the ground device (a type of circuit breaker). However, it was not clear from the WO whether or how the X relay was electrically tested.

c. PO 849541, dated April 17, 1986, was issued to Lasher Supply Company for Jenkins, 2-inch, bronze gate valves (with nickel alloy wedge) to replace valves in a safety-related section of the service water system. Since the original manufacturer was no longer in business, the new valves were procured from a different manufacturer as CGIs under PL-C, rather than as nuclear safety-related items. The procurement documentation file did not provide sufficient information to support an appropriate dedication. A short evaluation, included with the PO, concluded that the original and replacement valves were compatible based on the commercial catalog specifications. No other design, material, or quality information was requested or received from the vendor to establish that this substitute valve was a suitable replacement.

d. PO 778152, dated September 8, 1987, was issued to T.F. Cushing, Incorporated of West Springfield, Massachusetts for two Agastat 7012PD 5-to-50-second time delay relays, for use in AFW automatic initiation circuits. The relays were accepted by HNP quality control (QC) on MRIR 87-217-A and -B with only the HNP minimum receipt inspection. The file did contain a CY engineering telephone record, dated June 2, 1987, discussing the shelf life of Agastat 7000-series relays with the manufacturer, Amerace Corporation. The relay was installed in the EDG load shedding sequencer

panel as relay number 1D62-4 where it was located by the NRC inspector during the walkdown conducted in evaluating the HNP actions in response to NRC Information Notice 87-66. A 1987 CY work order showed post installation testing was conducted, but no other design, material, or quality information was requested or received from the vendor to establish that these relays were a suitable replacement.

e. PO 101681, dated November 25, 1987, to Westinghouse Electric Supply Company (WESCO) for four W type A251K1ICA reversing contactors. No special requirements were identified on the PO. The dedication was based on HNP minimum receipt inspection documented on MRIR 87-979 and post-installation testing per the retest section of procedure SUR 5.7-64, "No Flow Test of Core Cooling Systems," Revision 3, dated November 15, 1986. A stated purpose of the procedure was to demonstrate operability of safety injection isolation valves SI-MOV-861A through D and core deluge valves SI-MOV-871A and B under no flow conditions. No COC or testing information from W was evident. The validity of the SUR 5.7-64 test, is questionable under no flow conditions because the test does not duplicate actual operating parameters and, therefore, would not demonstrate contactor operability under all design conditions detailed in the HNP Final Safety Analysis Report (FSAR).

f. PO 681057, dated October 29, 1984, to Raychem Corporation, Woburn, Massachusetts for Raychem type 25-CPK-01-00 cable preparation kits. The PO imposed 10 CFR Part 21 and stated that the purchase was safety-related and that "Product acceptability will be verified during receipt inspection or post installation testing at nuclear plant...." Each kit contains 1 strip of aloxite carborundum 120 grit metal abrasive cloth (emery cloth) and several trichloroethane and perchloroethylene solvent wipes. A Raychem COC, dated November 16, 1984, in the file stated, in part, "...Parts are in compliance with SCD-10032...are commercial grade products as defined in 10 CFR Part 21.3...issued in accordance with AMPAC QA program...Inspection and test Reports are available...." The kits were used in conjunction with Raychem WCSF-N heatshrink splice insulation sleeves procured on CY PO 680631, dated October 24, 1984, and used on the motor electrical cable connections for motor operated valve numbers SI MOV-861A/B/C and D, MOV-200 and MOV-298. Although Raychem is an approved supplier, the supplier of the solvents was not; therefore, the unsubstantiated assertions of this subtier supplier without other objective evidence was found to be an insufficient basis to demonstrate that the kits would be suitable for use on the particular plant wiring for which they were intended.

g. PO 857232, dated February 6, 1987, was placed with O'Keefe Controls for 12 commercial grade ASCO solenoid operated valves (SOVs) for use in the feedwater control system as SOV numbers FRV-1301 through 1304. The currently installed SOVs (ASCO model 200925-2RF) are a different model from the SOVs originally installed (ASCO 8300 series). Documented dedication beyond HNP minimum receipt inspection and a post-installation test of valve cycling upon energization was not evident. No evaluation was documented to determine whether the substitute SOV was a suitable replacement. During the inspection, HNP contacted the manufacturer to obtain information with which to evalutate the similarity between the two models of SOVs to verify suitability. Although HNP did confirm that neither environmental nor seismic qualification requirements applied to these SOVs, basic suitability for the HNP system application was not established.

h. PO 243601, was placed with Lasher Supply Company in 1972, according to receipt records, for four, commercial grade valve discs for 3-inch, 900-psi Powell check valves used in the AFW system. Two of these valve discs were installed in valves FW-CV-135-2 and -135-3 in 1986. The licensee could not produce a copy of PO 243601, thus traceability of the installed discs to the manufacturer as well as to any certified material test reports (CMTRs) for pressure retaining components could not be established. The dedication consisted of HNP minimum receipt inspection and a leak test in November 1987, to verify functional performance. However, since not all critical characteristics were verified, HNP opened a controlled routing (CR) and committed to refit the affected valves with discs that have documented traceability during the next refueling outage.

i. PO 779266, dated September 24, 1987, was issued to Lasher Supply Company for gaskets and pressure seals for 3-inch, 900-psi, Powell check valves in the AFW system. The materials were purchased as CGIs (PL-C) and dedicated for this safety-related application based on HNP minimum receipt inspection only.

j. PO 747822, dated August 25, 1986, was placed with Koppers Company for a commercial grade flex coupling replacement for the Terry turbine-driven AFW pump "A." No documented evaluation was performed to determine whether this coupling was a suitable replacement. Dedication consisted of minimum receipt inspection and post-installation operational testing of the AFW pump and turbine. During the inspection, HNP contacted the turbine and coupling vendors to determine if the installed coupling is the recommended replacement. Although HNP had received telephone confirmation from the vendor that the installed coupling was a

suitable replacement, they had not received documented confirmation by the end of the inspection.

k. PO 064292, dated August 12, 1987, to WESCO, East Hartford, Connecticut, for W type EH2015 molded case circuit breakers in panel number DC-PNL-A for circuit MSR/MCB-F. Traceablility was not documented. Dedication was based on HNP minimum receipt inspection. A potential operability concern was that the breakers may not isolate the 125-VDC vital bus from fault on the non-vital moisture separator reheater condenser air ejector steam control valve bus supplied by one of these breakers. The post installation test shown on WO number CY 88 01512 was to verify no trip under normal load instead of the instantaneous overload trip. These breakers were listed in the supplements to NRC Information Notice 88-46.

l. PO 851466, dated June 12, 1986, to WESCO East Hartford, for W type A250-MICAC, 3-phase reversing starters (contactors), installed in panel C4CR. HNP minimum receipt inspection was shown on MRIR 86-479, but traceability was not established. Adequate testing was not documented. The potential existed for failure of these starters to jeopardize the ability to isolate feedwater to the steam generators. The starters were installed in circuits FW ISOL-SG-1, through -4, for motor operated valves FW-MOV-11B, -12B, -13B, and -14B under WOs CY 86 06354, 5, 6, and 06358. These starters were also listed in NRC Information Notice 88-46 supplements.

m. PO 325328 (believed to be correct PO) to GE, PSMBD, Malvern, PA, for "HEA" type trip coils installed under WO number CY 87 07611 as auxiliary overvoltage and undervoltage relay numbers 27-Y-5 and MCR-A4(BO) and (BP). Documentation was incomplete. The MIF referenced MRIR 996, but MRIR 996 lists the material received as HGV15A21 undervoltage relay. In this instance, coils of unverified quality could potentially degrade voltage excursion protection capability for Class 1E busses and safety-related equipment.

n. Dedication for the following commercial grade procurements was also found to be inadequately conducted and documented and these procurements were discussed with HNP during the inspection:

Purchase Order	Manufacturer	Items Procured
(1) 685449	General Electric	U/V lockout relay
(2) 763130	Telemechanique	contact block and relays

(3) 616437	Kunkle Valve Co.	EDG relief valves
(4) 719581	Sorrento Electronics	radiation monitoring equipment
(5) 723976	Technology for Energy Corp.	Endevco accelerometers
(6) 555700	Connecticut Piping Co.	EDG drain valve

2. The following are examples of installations in safety-related applications of non-safety-grade material, procured PL-D, for which there was no original documentation (with one exception), and upgraded to PL-C by virtue only of documentation of an HNP minimum receipt inspection on an MRIR, in accordance with HNP procedure ACP 1.2-2.5,"Classifying and Upgrading Spare Parts."

   a. No PO. Upgraded on MRIR 87-767, from unknown source, Mallory type 760Z SOLA transformer capacitors were installed in 125VDC-to-120VAC vital bus inverters IV-1A, C, and B under WOs CY 86 01578, 01580, and 01582 respectively.

   b. No PO, no MRIR, no upgrade, and no testing, were evident for a SOLA transformer installed in 120VAC semi-vital bus power supply output transformer/regulator "T-SVN" under WO CY 86 02109. Transformer T-SVN was listed as Category I equipment in the MEPL, but the Category I block was marked "N/A" on the MIF. Failure of this equipment could degrade the semi-vital power supply.

   c. No PO. Upgraded on MRIR 87-767 were Mallory 860Z SOLA transformer capacitors for semi-vital automatic bus transfer device SV-ABT.

   d. No PO, no upgrade, no MRIR, no traceability, and no testing, were evident for a type 1529458-C closing coil for a DB-50 reactor trip breaker in circuit MCC1MCC4-BUS 4/4C.

   e. Gaskets and pressure seals were purchased under PL-D for 3-inch, 900-psi, Powell check valves similar to those purchased under PL-C on PO 77296 above. Although the file contained PO 736671, dated April 21, 1986, issued to Lasher Supply Company for this material, this procurement was non-QA, PL-D and upgraded to QA-Category I, PL-C, in August 1987, solely on the basis of an HNP minimum receipt inspection.

Section A.1 and A.2 above identify examples of inadequately dedicated CGIs which, at the time of the inspection were considered to be of unverified quality and capability to perform their safety functions under all postulated/design service conditions. These items were installed in safety-related systems

and equipment. The licensee promptly commenced an operability evaluation because no documentation existed to verify suitability for application, and the safety functions and critical characteristics were not identified or verified.

The inspectors reviewed the commercial grade application evaluations and dedication justifications performed by the licensee during inspection and concluded that adequate assurance was provided for continued use of these items in the plant, pending successful completion of dedication activities. At the conclusion of the inspection, HNP still required certain information and documentation from vendors to complete the dedication justification for some of the items. In addition to reviewing the specific examples of inadequate dedication identified during the inspection, HNP committed to review procurement level-C purchases made from January 1985 to July of 1988 on a sample basis. The results of this review will determine if additional evaluations over a longer period need to be conducted.

3. The following are examples of PL-A and PL-B purchase orders on which the licensee failed to specify, as was required, that the provisions of 10 CFR Part 21 were applicable:

	Purchase Order	Date	Manufacturer/Vendor
a.	911285	2/22/87	NAMCO Controls
b.	741436	6/11/86	AMP Special Industries
c.	739354	5/20/86	Morrison-Knudsen
d.	770119		Combustion Engineering
e.	856540	12/19/86	John Fluke Manufacturing Company
f.	739896	5/27/86	Control Products/Amerace Corporation

B. Assessment of Implementation of Procedure ACP 1.2-4.2, "Commercial Grade Procurement, Upgrade, and Dedication Process"

HNP has been introducing commercial grade dedication requirements into its procurement process since Revision 19 of procedure ACP 1.2-4.1, "Procurement Document Review," was issued in September 1987. Refinements were added in Revision 20 of ACP 1.2-4.1; Revisions 0 and Revision 1 of ACP 1.2-4.2; Revision 0 of ACP 1.2-4.3; and most recently in NUSCO procedure NEO 6.11. In addition to reflecting the Electric Power Research Institute (EPRI) NP-5652 guidelines for utilization of commercial grade items in safety-related applications, this sequence of procedures provides a basis for dedication. Training was also initiated, although at the time of the inspection, general training activities were still being conducted.

In order to assess the effectiveness of HNP's implemented commercial grade program, the inspectors reviewed 10 purchase requisition (PR) packages that were prepared after procedure ACP 1.2-4.2, Revision 0 was issued on June 19, 1988. Only two POs had been issued in response to these PRs at the time of the inspection. Each of the 10 PRs did specify procurement requirements including either receipt inspection or post-installation acceptance testing. Each PR was accompanied by a completed form, "Attachment 8.2 Commercial Grade Evaluation." In each case, the licensee determined that the new equipment constituted a like-for-like replacement. Accordingly, the inspectors reviewed a completed Attachment 8.1 form, "Substitute Part/Component Evaluation," dated January 18, 1989.

As might be expected with the beginning of a new program, the 10 new PR packages reflected, in some aspects, an incomplete implementation of the HNP procedural requirements for commercial grade dedication. Also, the requirements were underspecified rather than being overly prescriptive. Documentation was not complete in all cases; however, the inspectors concluded that a reasonable effort has been made to establish an adequate commercial grade dedication program and HNP appears to be well on its way to implementing such a program.

Specific examples of areas where the commercial grade PR packages appeared to be incomplete are as follows:

1. Like-for-like determinations for which the basis was generally not adequately documented:

    a. PRs 10482 and 10486 covered fastener kits and levering-in screws for circuit breakers. The basis for like-for-like determination was stated as Bill of Materials (BOM) package E-063, which contained only parts lists. There were no drawings or other descriptions of the breakers or parts to permit determination of similarity between the list parts and the parts used in the installed breakers. The BOM package did reference manuals that contained further information, however, and the licensee stated his intention of sending a letter to the parts supplier (WESCO), requesting a similarity statement.

    b. PR 10400 covered a plastic cell-locating and separating strip for station batteries. The referenced BOM package (E-062) contained no description of the part except length and generic material ("plastic"); there were no drawings.

2. Critical characteristic evaluations (including identification of safety functions) that were vague and incomplete:

    a. PRs 10482, 10486, and 10400 (all cited above) defined the safety function as "failure of the part could affect the safety-related function of the breaker (or battery)" and the critical characteristics as "part integrity." These statements would have been more nearly adequate if the

specified acceptance tests thoroughly tested the replacement part, but, as is discussed below, that may not always happen. Clearly, definition of safety functions and critical characteristics is a broad-ranging activity requiring some judgment. It is also an area that could benefit from expanded procedural and training guidance.

b. PR 6449 covered ball bearings to be procured for plant spares. The safety function was specified as "to provide shaft support" and the listed critical characteristics were inside diameter, outside diameter, and width. The parts were specified by a particular manufacturer's part number "or equivalent replacement," and the only acceptance testing specified was visual inspection for dimensions. No application information was provided. In this case, the unspecified application and "or equivalent" part specification represented vague procurement information that would require additional evaluation of critical characteristics and more complete acceptance testing to support dedication of the parts.

3. Acceptance testing, the acceptance method employed for all of the packages reviewed (although procedures allow source verification as an alternative), and most often implemented by post-installation testing, in which it was not clear that the critical characteristics would be properly verified:

a. PR 10400 for a plastic cell strip for station batteries is noted above. For a post-installation test, the PR called out procedure SUR 5.5-16, the surveillance procedure for weekly station battery checks. This procedure checks cell voltage, electrolyte specific gravity, and electrolyte level. None of these checks are made with the battery loaded as it would be when performing its safety function, and seismic excitation, which would presumably be necessary to verify critical characteristics for such a component, is not applied in this operational surveillance procedure. Although the safety function(s) and critical characteristics of the cell strips were not adequately defined, they would not be verified by the checks in SUR 5.5-16. Without complete design information on the parts and their application, the adequacy of the test was not established.

b. PR's 10482 and 10486 covering circuit breaker parts are discussed above. A more elaborate post-installation test was specified by plant maintenance procedure PMP 9.5-16, but in the absence of a documented design evaluation, the adequacy of the test was not established.

c. PR R09549 (PO 915816) requisitioned pressure gauges for an unspecified application, and prescribed a post-receipt calibration. Process fluid temperature, mounting

orientation, and other design parameters that could affect the ability to perform a safety function were not addressed. Therefore, the adequacy of the test in this instance also was not established.

C. Corrective Action on Nonconforming Material and Parts

A concern was identified during the review of Bechtel Power Corporation (BPC) purchase order packages regarding the method in which HNP controls its responsibilities under 10 CFR Part 50, Appendix B, Criterion XV, "Nonconforming Material, Parts or Components," and Criterion XVI, "Corrective Action." These criteria require that measures be established to control items that do not conform to requirements in order to prevent their inadvertent use or installation, and that appropriate procedures be established and executed to control identification, documentation, and disposition of deviations. Additionally, they require that measures be established to assure that conditions adverse to quality are identified and corrected.

The concern was whether NUSCO, or its designee, BPC is adequately controlling deviations and nonconformances which are identified during procurement activities. Review of procurement of the new HNP vital battery and associated components revealed an anomaly in the method of dispositioning deviations, in particular, the manner in which they are closed out. BPC is the licensee's designee for performing the vital battery modification and associated procurement activities at the HNP. Identified deviations are typically documented on Bechtel's Supplier Deviation Disposition Requests (SDDRs) which are closed out by a "Bechtel Acceptance/Signature." Review of several closed-out SDDRs revealed that two categories of SDDRs may be closed out on the basis of the BPC Acceptance/Signature alone, even though the deviations have not been completely or adequately dispositioned. The SDDRs are categorized according to whether or not Bechtel engineering accepted the vendor's recommended disposition of the deviation.

Both categories of SDDRs that were reviewed had been "accepted" by a BPC signature even though the deviations have not been fully dispositioned, controlled and corrected in accordance with procedures that meet the intent of 10 CFR Part 50, Appendix B. An example in the first category was SDDR E-518-2, in which the vendor of a safety-related motor control center, in effect, recommended acceptance of a nonconforming condition as is. The vendor stated that, contrary to the PO requirement for a COC certifying that material specifications were met for certain components (including cable), the vendor could not obtain certified material reports for any electrical material other than bus supports, bus barriers, and bus insulators. However, BPC accepted this indeterminate, nonconforming condition without documenting an analysis of the possible adverse effects and/or justification for acceptability of the material without the requested certifications.

The other category of improper acceptance consisted of SDDRs for which the vendor disposition was rejected by BPC engineering, yet the SDDR was still "accepted" by BPC signatures. Examples of these included: SDDRs E-554-13 (unmarked field wires found on a constant voltage transformer), E-554-14 (poor workmanship in SOLA transformer splices, i.e., solid wire leads used solder only for splices), E-554-15 (inverter IEEE-650 documentation requirements not met), and E-554-8 (vendor tests of inverter indicating efficiency less than PO specification). The BPC disposition appears to have been a recommendation rather than a requirement that the vendor comply with the specifications which was an insufficient basis for acceptance and closeout of these SDDRs.

Based on the findings cited above, the NRC inspectors questioned the effectiveness of Bechtel's (and HNP's) handling of procurement deviations. However, the information available to review during this inspection was insufficient to define the scope of the problem, and further review will be required to confirm that deviations in vendor-supplied components are being controlled, corrected and dispositioned consistent with NRC regulations. Accordingly, this issue is designated as Unresolved Item 50-213/89-200-01.

D. Molded Case Circuit Breakers

In light of the NRC's recent inspection findings regarding misrepresented and/or refurbished molded case circuit breakers (MCCBs), (as promulgated in NRC Information Notice 88-46 and its Supplements 1 and 2) and licensee actions mandated by NRC Bulletin 88-10, particular emphasis was placed on this area during this procurement/vendor interface inspection at HNP. The inspection of this area at HNP concentrated on the following aspects of HNP's practices regarding MCCBs:

(1) Evaluation of procurement and dedication procedures and their implementation to determine:

(a) fundamental adequacy for assuring quality of replacement MCCBs for safety-related applications and

(b) effectiveness of the process in identifying misrepresented/refurbished MCCBs and preventing their use in the plant in safety-related applications.

(2) Evaluation of HNP's actions in response to NRC Information Notice 88-46, Supplements 1 and 2, and any other correspondence concerning misrepresented/refurbished MCCBs.

(3) Determination of the status of HNP's actions in compliance with NRC Bulletin 88-10, including establishing traceability of installed MCCBs to their original manufacturers, establishing traceability of MCCBs in warehouse storage, and testing of non-traceable MCCBs.

1. MCCB Dedication

The NRC inspectors reviewed HNP's program and its implementation regarding dedication of MCCBs, including procedures, inspection, test methods and practices, specifications, and test results, and also observed testing of an MCCB procured as a CGI and intended for a safety-related application. The MCCB test sample was drawn from supplies purchased for the new HNP switchgear building project. Consistent with HNP's established practice, these MCCBs, although not receipt-tested, were being tested in accordance with HNP plant maintenance procedure PMP 9.8-88 prior to installation. Further tests were to be performed following installation.

The following plant maintenance procedures (PMPs) were included in the MCCB dedication review:

- PMP 9.5-41, "Testing of Molded Case Circuit Breakers," Revisions 1 (1/7/79) through 6 (8/2/88)(current) which is used by HNP electrical maintenance technicians for routine pre-installation testing.

- PMP 9.8-88, "Testing of Molded Case Circuit Breakers and Motor Circuit Protectors," Revision 1 (12/31/88) (current) which is used by NUSCO construction electricians for pre-installation testing of MCCBs for HNP's new switchgear building.

- PMP 9.5-16, "50DHP-250 Breakers," Revision 10 (9/22/88).

- SPL 10.8-9, "Testing of Molded Case Circuit Breakers in Accordance with NRC Bulletin 88-10," Original (2/9/98) which was approved for use by HNP electrical maintenance technicians for testing of untraceable MCCBs in accordance with NRCB 88-10, Attachment 1.

The routine, pre-installation testing observed was conducted in accordance with the procedures, however, the review of the procedures revealed that some lacked important tests and some acceptance criteria were not included, or were incomplete.

a. PMP 9.5-41, Revisions 1, dated 7/2/79 through 5, dated 7/15/86, included an overcurrent trip test at 300 percent of rated load, which is normally intended to be a functional verification of the thermal, inverse-time, overcurrent trip function of the MCCB. The other test included in these revisions was an overcurrent trip test at 1500 percent of rated load, which could be considered a functional check of the instantaneous magnetic overload trip. The acceptance criterion for the 300-percent test was that the MCCB trip within the maximum and minimum thermal trip times given for various W MCCBs in Table II on Attachment 2 to the procedure which appeared to have been photocopied from a W MCCB technical publication. The

acceptance criterion for the 1500-percent test was that the MCCB trip in less than 1 second.

Although these two tests are important field verification functional checks, not all critical characteristics necessary to be verified in order to consider an MCCB suitable for general purpose or unrestricted application in Class 1E circuits are verified. The trip times listed in Table II applied to certain models of W MCCBs only, and no guidance was given for other MCCBs. The "Test Procedure" steps printed beside the tables in Attachment 2 called for the 300-percent test to be done at 77°F (25°C) ambient temperature, and required the use of test leads of a certain length, sized according to Table I of the attachment, in order for the trip times given to be valid. However, there were no mandatory prerequisites or procedural steps that required verification and/or recording of ambient temperature, or that required test leads to be in accordance with the attachment. Additionally, the 1500-percent overcurrent trip test did not include a requirement to attempt to reclose the MCCB immediately after tripping to verify that the thermal trip did not actuate and cause the trip. This is particularly important since the procedure called for no waiting time between the thermal and magnetic test for a given pole and the thermal trip may remain warm from the 300% test. The NRC inspector did note, however, that this practice was followed by NUSCO electricians during the observed testing.

Other tests prescribed in industry standards [including the National Electrical Manufacturers Association (NEMA) Standard AB 1, the NEMA MCCB field verification guide, (AB 2), and Underwriters Laboratories (UL) Standard UL-489] and categorized as necessary for complete field verification were not required by Revisions 1 through 5 of PMP 9.5-41. Such tests include (1) manual trip function checks, (2) continuity checks for each pole and any auxiliary switches with contacts open and closed, (3) insulation resistance (IR) checks between phases, from phases to ground, and open-breaker line-to-load, (4) contact resistance (or millivolt drop) checks diagnostic of worn, corroded, pitted, loose or misaligned contacts and/or low contact pressure, (5) complete thermal calibration to verify performance within design trip curve specifications, (6) verification of no tripping or "hold-in" at 100 percent of rated load at ambient temperature for the standard minimum operating times, and (7) magnetic calibration (pulse or run-up) test of the instantaneous overcurrent trip to verify proper pickup current values and design trip times. Tests of such accessories as bell alarms, shunt trip attachments, and undervoltage trip attachments may also be required.

b. In Revision 6 of PMP 9.5-41, dated 8/2/88, HNP incorporated a test of phase-to-phase and open-breaker line-to-load IR (Meggering) and also incorporated a phase (equivalent to contact) resistance test. However, the procedure still did not require measuring phase-to-ground IR, either using a simulated bench ground plane or the actual MCCB enclosure. It was not evident from completed WOs whether post-installation tests included this check. Also, no acceptance criterion was given for the phase (contact) resistance test.

c. PMP 9.9-88, Revision 1, dated 12/31/88, the performance of which the inspectors observed, was significantly more complete, as it included a much more comprehensive list of thermal trip times, magnetic calibrations, a short time trip test, a phase-to-ground IR test, and an acceptance criterion for the contact resistance test. However, it still lacked a hold-in test at 100 percent of rated load.

Note that, depending on the safety function of the MCCB in a particular application and the critical characteristics defined accordingly, functional dedication tests, such as the hold-in test at full rated load, would be required to be conducted under all expected variations in service conditions (e.g., at breaker enclosure full-load operating temperature with loss of air conditioning and/or ventilation and at minimum and maximum line voltage) in order to verify satisfactory performance of safety function under all normal design conditions.

Verifying other critical characteristics such as short circuit current-interrupting capability, requires destructive testing of a prototype to confirm capability of the design and determine its susceptibility to common-mode failure (such as may be due to design defects or overrating). Finally, confirming consistency of production quality contol and trending the expected rate of random failure in service often requires destructive testing of a statistical sample of production MCCBs.

Additionally, verifying acceptable performance of the MCCB under design-basis accident (DBA) conditions (including seismic and/or aging and harsh environment) requires destructive or severely degrading qualification testing of a prototype for design verification against susceptibility to environmentally induced common-mode failure.

Normally, not all critical characteristics are verifiable by inspection and nondestructive testing alone; and, since the extent to which destructive testing of samples reliably predicts performance of an installed MCCB depends on the similarity of the installed MCCB to the sample, which, in turn, depends, on the homogeneity of the production lot of the installed MCCB, traceability to the manufacturer is required. Although commercial grade MCCBs may be manufactured without benefit of a 10 CFR Part 50, Appendix B, QA program, traceability to the manufacturer's known production QC program is also required to ensure the

validity of manufacturers' certifications of quality and applicability of testing as well as the validity of evaluations of design, material, and manufacturing process change history.

Therefore, in addition to testing that was inadequate to verify all MCCB critical characteristics, another deficiency was identified in HNP's program for dedicating commercial grade MCCBs: The program does not assure the establishment of traceability of commercial grade MCCBs to their original manufacturers. As discussed above, this is considered an essential element in an adequate dedication program and the issue of MCCB traceability is also addressed in NRC Bulletin 88-10. Bulletin 88-10 permits use of MCCBs in safety-related applications without full traceability if they have been successfully tested in accordance with Attachment 1 to the bulletin. HNP's actions in response to NRC Bulletin 88-10 were in progress at the time of the inspection, and are discussed in paragraph III.E.7 below.

During the course of the NRC review of commercial grade procurements, several safety-related applications of commercial grade MCCBs were identified in which the dedication had been inadequate in terms of receipt and testing activities as well as lack of traceabilitiy. The potential therefore existed for certain MCCBs of unverified quality to affect the operability of the safety systems in which they were used. Accordingly, HNP initiated an operability determination for the affected systems and components already thus identified, agreed to prepare justifications for continued operation as required, and assigned these MCCBs first priority for replacement with MCCBs for which traceability is established or ones successfully tested in accordance with Attachment 1 to NRC Bulletin 88-10.

II. NUSCO VENDOR AUDIT PROGRAM

The inspectors reviewed the licensee's quality assurance (QA) audit program of vendors of nuclear safety grade materials, equipment and services. Vendor audits for HNP are the responsibility of the Procurement Quality Services (PQS) group of Northeast Utilities, headquartered in Berlin, Connecticut. These audits are performed utilizing either PQS audits, or QA consultant firms such as Kaiser Engineers, Southwest Research Institute and Quality Systems, Inc. A review of the 1989 PQS audit schedule indicated a total of 65 audits were scheduled to be performed. The results are used to maintain and update the PQS Approved Supplier List (ASL). The ASL identifies those vendors evaluated by PQS as having an approved QA program that is acceptable to the licensee. Vendors that are conditionally approved or scheduled for evaluation may also be included on the list with appropriate notations. PQS performs annual evaluations of each of its 212 currently approved vendors. Implementation of approved and conditionally approved vendor QA programs are verified initially and every three years thereafter. The approved status of vendors on the ASL is maintained and based on the results of the PQS audits and other factors including qualification as an ASME Nuclear Certificate Holder, ASME Code Case Register results, NRC inspection

reports and generic communications, and the results of the other licensee surveys.

Additionally, other PQS group activities that contribute to the bases of the ASL were reviewed. They included performance of source inspections, supplier evaluations, comprehensiveness of supplier audit reports, accuracy of audit report letters when compared with audit findings, and degree of PQS management involvement with its programs. PQS appeared to have conducted source inspections in accordance with the PQS inspection packages as required. The inspectors reviewed several audit reports and determined that PQS paid appropriate attention to detail in the inspection attributes that were delineated. Overall, the audit reports appeared satisfactory. Discussions with PQS management personnel indicated that they were very involved and knowledgeable with respect to the specific activities and goals of the group. The PQS group is currently implementing certain program changes to shift its emphasis to address NRC and industry concerns regarding fraudulent and substandard components that have infiltrated the nuclear component supply system. Based on their review, the inspectors found that the overall effectivness of the PQS supplier auditing program appeared satisfactory, based on procedural review and the above discussions.

III. LICENSEE/VENDOR INTERFACE

A. Processing of Incoming Vendor Technical Information

The inspectors reviewed the licensee's system for receiving, tracking, and evaluating incoming vendor information. Specifically, the inspectors reviewed the processing of technical information received from Westinghouse (W), General Motors/Electro-Motive Division (GM/EMD), Morrision-Knudsen (M-K), the Institute for Nuclear Power Operations (INPO), the NRC, and other vendors of nuclear safety grade equipment and components for safety-related applications.

The licensee/vendor interface programs at HNP are established by NU corporate and CY plant-specific procedures. A new CY procedure providing additional guidance for the review, evaluation, and recommended disposition of vendor-generated technical information was implemented January 25, 1989, just before the start of the inspection. The controlling procedures are:

- ACP 1.2-6.14, "Vendor Information Routing"
- ADM 1.1-45, "Relational Database Processor (RDP) Commitment Tracking, Controlled Routings, and Red Folders"
- NOP-1.06, "Vice President-Nuclear Operations Commitment Program"
- NEO 2.06, "Operating Experience Assessment and Utilization"
- NOP-R-2.04, "Nuclear Regulatory Commission Correspondence"
- NOP-R-2.02, Operating Experience Assessment and Feedback"
- NEO 2.25, "Identification and Implementation of NRC Reporting Requirements (10 CFR 50.73, and 10 CFR 50.9)"

Procedures ADM 1.1-45, ACP 1.2-6.14 and NOP-R-2.02 describe those items that the plant is primarily responsible for assessing and the methods for controlling the processes. In general, the plant is assigned the responsibility for assessing all nuclear steam supply system vendor (Westinghouse) bulletins and plant-specific vendor issues not screened by the NUSCO Nuclear Safety Engineering Section in Berlin, Connecticut. This encompasses all Westinghouse Technical Bulletins and the majority of other vendor correspondence applicable to the site. The guidance for performing these evaluations and developing recommendations was just recently formulated in the newly implemented procedure ACP 1.2-6.14 (January 25, 1989). Before this procedure was issued, all evaluations and resulting recommendations were performed informally in accordance with procedure ADM 1.1-45 for controlled routings.

NUSCO is responsible for evaluating NRC, INPO, 10 CFR Part 21, and generic industry notifications. As required, the HNP personnel support the corporate staff in their evaluations and resulting recommended actions. The procedures listed above provide guidance for performing these activities. Although the corporate program appeared to be properly formalized, the plant evaluation process lacked formal guidance until the recent implementation of procedure ACP 1.2-6.14, "Vendor Information Routing."

Implementation of procedure ACP 1.2-6.14 was a good first effort to formalize a program at the plant; additional changes may be needed, however, to include in the procedure minimum qualifications for engineers' evaluating the information as well as the requirements against which the information should be reviewed (plant design basis). In spite of the lack of a formal program at the site, plant personnel were able to demonstrate that, in most instances, adequate evaluations were being performed. Some notable exceptions of plant and corporate evaluations are described in the sections that follow.

B. Vendor Technical Information

The inspectors reviewed approximately 50 vendor issues to determine the adequacy of the screening and assessment process. The vendor issues included those identified in Westinghouse Technical Bulletins and letters, NRC information notices, incoming 10 CFR Part 21 notifications, INPO Significant Operating Experience Reports (SOERs) and other vendor issues. Additionally, the Power Pointers (PPs) and Maintenance Instructions (MIs) from GM/EMD and/or M-K were reviewed. During this review the inspectors found that out of approximately 82 PPs and 41 MIs, only six of the issues covered in them had received a formal documented screening and evaluation for their applicability to HNP. The inspectors found that the licensee had established a formal interface program only with Westinghouse (W). The licensee had not established a formal interface program for receiving technical correspondence from the Class 1E electrical switchgear and emergency diesel generator (EDG) suppliers on a regular basis. In addition, the licensee has not established a program for periodic informal contact with vendors of other key safety-related plant equipment and components.

The lack of a formal interface program with the EDG vendor, M-K (and previously GM/EMD), coupled with the lack of a site-level procedure for handling incoming vendor information, most likely led to the licensee's failure to evaluate the PPs and MIs for HNP applicability.

C. Nuclear Steam Supply System (NSSS) Vendor Interface

The NRC inspectors reviewed a sample of the licensee's screening and evaluation of Westinghouse technical bulletins (TBs) and letters. Issued by W Nuclear Services Integration Division (NSID), these communications generally describe problems experienced at W plants and recommend corrective actions that may be applicable to other plants of which W was the NSSS vendor. The inspectors identified the following TBs, in which the HNP evaluations and/or disposition were found to be inadequate and/or incomplete:

1. Westinghouse Technical Bulletin TB-86-07, "Auxiliary Pump Assembly Hold Down Bolting Requirements," described instances in which safety-related auxiliary pumps hold-down bolts were made from different materials than are specified in the design documentation. W recommended that if hold-down bolts were of the wrong material or of indeterminate material, they should be replaced with the minimum acceptable material needed to meet the equipment seismic qualifications.

   In the initial screening, licensee personnel identified 44 pumps at the HNP that needed to be investigated because the bolts were of potentially indeterminate material. A spot check of a few pumps by the licensee showed that the hold-down bolt material was not as specified and the actual bolts were unmarked. Since it was felt that this was not an NRC issue, no further action was taken and the Controlled Routing (CR) Action was closed out in July 1987.

   The reasonableness of this action was discussed with the licensee during the inspection. The NRC inspectors felt that the seismic qualifications of the affected equipment may be questionable and further review by the licensee was needed. Plant personnel subsequently reopened this issue and committed to the following actions until the specific bolting requirements are known:

   a. The PMMS database information for the affected pumps would be modified with the following statement:

      PUMP AND DRIVER HOLD DOWN BOLTS MUST BE INSPECTED AND MEASURED THE NEXT TIME THE UNIT IS OOS [out of service] FOR AN EXTENDED PERIOD OF TIME. CONTACT ENGINEERING FOR FURTHER INFORMATION.

   (CR 89-155 was issued to the HNP mechanical maintenance department to track this effort.)

b. Once the bolt size and length is determined, any standard size bolt would be replaced with a traceable bolt of a material to be determined by the HNP station engineering group. Odd-sized, special-order bolts would be ordered and replaced as parts and equipment become available.

(CR 89-156 was issued to the engineering group to track this effort.)

2. Westinghouse Technical Bulletin TB-86-08, "Post-LOCA Long Term Cooling: Boron Requirements," described a problem in which during certain accident conditions, the emergency core cooling systems (ECCS) may spray/inject unborated water into the containment and reactor vessel. During this phase of emergency injection, the boron concentration may decrease enough for the reactor to again become critical. W recommended that plants perform an analysis to determine the minimum boron requirements necessary to maintain the reactor subcritical with all rods out and no xenon present, for the most reactive time in core life. Once this is calculated, all sources of unborated water that would or could be injected into the reactors during a loss-of-coolant accident (LOCA) should be identified to determine if the potential exists for the reactor to go critical again. If this can occur, plants need to adjust boron concentrations or take other action to mitigate this event as well as revise the plant emergency operating procedures (EOPs).

Initial evaluations by NUSCO personnel indicated that unborated water would be injected into the reactor vessel via the containment spray system during certain accidents while executing the EOPs. Boron concentration would be reduced from 2200 ppm to 2000 ppm within 3.3 minutes. HNP requested NUSCO to assist in resolving this issue, rather than changing the actions developed for the EOPs. In December 1988, the problem still had not been resolved, and NUSCO had not performed any analysis to justify the actions in the EOPs. At this point, HNP decided to close out the issue without any further action based on the plant design basis for the containment.

This evaluation was inadequate because the EOPs are intended for use outside the plant design basis and are written with the understanding that operator actions, in some instances, intentionally take the plant outside the design basis to eventually stabilize conditions. The inspectors discussed these concerns with the licensee, and plant personnel committed to reopen and resolve the issue in a timely manner through initiation of a Controlled Routing Action Plan.

3. Westinghouse Technical Bulletins TB-83-02 and 83-03. W TB-83-02, dated April 24, 1983 recommended a comprehensive maintenance and testing program for DB-50 reactor trip breakers (RTBs) that would give new special attention to the undervoltage trip attachment (UVTA) including: (a) a revised lubrication

procedure and recommended lubricants, (b) a special UVTA manual test, and (c) cycling the UVTA 10 times and the shunt trip attachment (STA) at least once. TB-83-03 called for separate independent functional verification of the UVTA and STA. Revision 1 of TB 83-02, September 13, 1983 corrected and expanded the lubrication procedures and lubricants and established a 200-cycle lubrication interval for the UVTAs. On the basis of recent W testing, Addendum 1 to Revision 1, of TB-83-02, dated November 29, 1983, established a 1250-cycle UVTA lifetime and forwarded lubrication kits to customers.

Revision 5 of plant maintenance procedure PMP 9.5-23, "Preventive Maintenance of Reactor Trip and Isolation Breakers," dated July 17, 1983 only incorporated the UVTA lubrication provisions of TB 83-02. Revision 5 of PMP 9.5-40 "Periodical Functional Test of RTBs, also dated July 15, 1983, incorporated the provision of TB 83-03 requirement to test the UTVA and STA independently, and also incorporated the lubrication provisions (generally) of TB-83-02. However, CY memorandum PMSM-83-198, dated July 12, 1983, recommended closeout of Controlled Routing (CR) 83-418 dealing with TB-83-02 and -03, stating (inappropriately) that the CR dealt with 83-02 (83-03 was not mentioned), and concluding: "We have reviewed this bulletin and made one or two minor changes to our procedures. These revisions have been approved by the Plant Operational Review Committee (PORC) and no further action is planned. This CR should therefore be closed out." This constitutes an inadequate review and disposition of the CR because not all of the provisions of the W technical bulletins had been addressed and/or incorporated in the procedures.

Revision 8 (major) to PMP 9.5-23, dated May 6, 1985, first incorporated the special manual UVTA test prescribed in TB 83-02 and also the expanded and revised detailed lubrication provisions of TB 83-02, Revision 1, and the life-cycle information of Addendum 1.

Revision 6 of PMP 9.5-40, dated February 24, 1984, incorporated the requirement of TB 83-02 to trip the DB-50 ten times by deenergizing the UVTA, referencing TB 83-03 and Revision 1 of TB 83-02. However, the procedure deviated from the technical bulletin in that the 10 cycles of the UVTA were prescribed to be done in conjunction with tripping the RTB with the STA device as well. This practice is still reflected in the current revision (Rev. 8) of PMP 9.5-40. According to the information available to the NRC inspectors during the inspection, the intent of the 10 UVTA trips was not merely to exercise the UVTA but to confirm lack of binding following multiple operations as had been observed in post-ATWS testing of RTBs at Salem. However, according to reactor protection system (RPS) diagrams, confirmed by HNP personnel, and as implied by licensee submittals pursuant to NRC Bulletin 83-01, the RPS logic at HNP differs from the standard W design in that both the STAs and the UVTAs act to

trip the RTBs on an automatic reactor trip signal as well as a manually initiated trip signal. This would suggest that 10-cycle testing of the UVTA independently is not as critical at HNP, but this matter needs to be clarified. HNP agreed to obtain clarification of this point from W NSID.

D. Emergency Diesel Generator Interface

The two emergency diesel generators (EDGs) 2A and 2B for the HNP were manufactured by General Motors/Electro-Motive Division (GM/EMD), and installed in 1975. The engines, Model 20-645E4, are designed for 2-cycle operation, are turbo-charged, have 20 cylinders in a "V" arrangement, and are rated for 2850 KW at 900 rpm. Since installation, each engine has accumulated about 850 hours of operation. Until late 1987, the licensee had dealt directly with GM/EMD for service information and assistance, and for spare and replacement parts. Since that time, the Morrision-Knudsen Company (M-K) has served as the exclusive authorized distributor for sales, service, and replacement parts for GM/EMD stationary EDGs, including those at HNP. Up to the time of the inspection, no formal structured system had been established on site to process information provided by the vendor for service and operational recommendations for the EDGs. This situation is expected to change as a result of the issuance, on January 25, 1989, of HNP's new procedure for evaluating and tracking the disposition of this type of vendor information.

1. Review of EDG Manuals and Procedures

The inspectors reviewed the following manuals applicable to the emergency diesels:

- "EMD 645E4 Engine Manual," GM/EMD Turbocharged Engine Maintenance Manual, 2nd Edition, August 1967; revised February 1972; contains Section 0-14

- "Turbocharged Engine, 645E4B, Maintenance Manual," GM/EMD, 1st Edition, November 1979; contains Section 0-15

- "Operating Manual, 999 System, Generating Plant," Model 999-20, CYAPCo, October 1969, contains Woodward Bulletin 37708C, "EG-B10 Hydraulic Actuator"

The licensee stated that the EDG operating and maintenance manuals at the HNP are uncontrolled, but the appropriate procedures are controlled. Although GM/EMD had issued service information since the manufacture of the diesel engines in the form of Power Pointers (PPs) and Maintenance Instructions (MIs), it was apparent that the licensee had not incorporated any of this information into the manuals by pen-and-ink changes, as is recommended by the vendor. Examples of revised information for which licensee could show no evidence of evaluation and incorporation into the manuals include MIs 926 (Rev. F), 927 (Rev. E), 174B (Rev. D), 1757 (Rev. D), 1760 (Rev. G), and 9660.

All these MIs were issued subsequent to November 1979 and therefore are not included in the most recent maintenance manual. The manuals governing the operating and maintenance activities for the EDGs therefore, are not considered to be up-to-date. In fact, the first-listed manual above is obsolete and was superseded by the second-listed manual. The licensee stated that major maintenance and design modifications regarding the EDGs are performed under the direction of an EMD or M-K technical representative.

The licensee has prepared and issued procedures to govern the maintenance, testing, and operation of EDGs. The licensee states that these procedures are updated in a controlled manner so that they can be relied upon as the authoritative source of the most recent information for plant personnel. The inspectors included the following plant maintenance procedures (PMPs) for the EDGs in their review:

- PMP 9.5-90, "Maintenance of Emergency Diesel Air Start Motors #1, 2, 3, 4"

- PMP 9.5-43, "Emergency Diesel Cooling Water Heat Exchanger"

- PMP 9.5-36, "Inspection and Preventive Maintenance of the Emergency Diesels"

All of these procedures referenced the uncontrolled vendor manuals. The latter procedure also referenced MIs 1742, 3327, and 4523, but the latest revision of each of these MIs was not indicated in the procedure. The inspectors concluded that because these revisions were not indicated, the procedures also were not maintained in an up-to-date condition.

2. Review of GM/EMD PPs and MIs

The licensee could not provide documented evidence that it had received and evaluated all the PPs and MIs applicable to the HNP. Although the licensee did produce some of the PPs and MIs received from GM/EMD, no assurance could be given that all such vendor information had been received. The licensee took the necessary steps to obtain a complete set of all such documents from the M-K and, in fact, the complete set was received on February 6, 1989, while the inspection was still in progress. The license committed to review all this information and document the disposition of each vendor recommendation applicable to the HNP EDGs using new procedure ACP 1.2-6.14, "Vendor Information Routing." This procedure creates a Station Technical Bulletin Coordinator (STABC) who will maintain a log of all such information inputs, ensure that affected department heads review the information for applicability, and ensure implementation as a necessity. The licensee's processing of future EDG PPs and MIs will be governed by this new procedure.

The inspectors reviewed a list of major EDG changes recommended by M-K and referenced in various PPs and MIs. The inspectors also reviewed 17 HNP Plant Design Change Requests (PDCRs) to determine if they had incorporated any of the PPs and MIs. PDCR-416 addressed six major corrective actions and recommendations promulgated in PPs and MIs, but no other records were available to demonstrate that PPs and MIs had been considered for implementation. Nevertheless it was evident from review of the various EDG procedures, that many of the PP and MI recommendations had been incorporated.

3. EDG Modifications

The inspectors reviewed records of a number of other modifications that the licensee had made to the EDGs including the following:

a. PDCR 487: Added local frequency and kilowatt meters.

b. PDCR 598: Replaced air compressors C-14-1A and 1B.

c. PDCR 312: Changed the loss-of-voltage trip initiation logic to two-out-of-three logic and undervoltage protection.

d. PDCR 304: Modified Alarms.

e. PDCR 221: Installed the starting air system cross-connect line.

f. PDCR 118: Modified starting air system piping.

g. PDCR 785: Diesel start system upgrade (filters)

No problems were identified with these completed modifications.

4. Training

The inspectors reviewed the licensee's practice regarding the use of its personnel for performing maintenance and service activities on the emergency diesel generators. The approach utilized is to perform the routine maintenance, service, and preventive maintenance activities with HNP personnel. For major maintenance or overhaul activities, assistance was originally contracted from GM/EMD and currently from M-K. EDG technicians at HNP are trained by NUSCO personnel at NU's EDG training center located at the Millstone nuclear power station. The NUSCO instructors receive their training by attending courses given by the vendors, including GM/EMD, M-K, and the Woodward Governor Company. Used and spare equipment items serve as training aids. The EDG training program is relatively new at HNP, but its objective is to maintain a minimum of five EDG maintenance technicians at the "Q-level (qualified level). At the time of the inspection, three HNP personnel had achieved the

"I"-level (intermediate level) of qualification as EDG technicians; however, none were qualified at the Q-level. The curriculum also included use of event reports and defect reports such as licensee event reports (LERs), NRC information notices and bulletins, 10 CFR Part 21 reports, and INPO Safety Evaluation Reports (SERs) and Significant Operating Experience Reports (SOERs) to keep personnel apprised of current EDG problems and solutions.

5. NRC Information Notices Affecting the EDGs

The inspectors reviewed the licensee's records regarding the receipt, evaluation, and implementation of emergency diesel generator design and operating experiences as described in NRC information notices (INs). The inspectors reviewed the records for 10 of the most recent INs and found that all had been addressed and implemented as necessary. In the case of INs 87-42, 86-07, and 84-69, the licensee had implemented procedural changes to correct for conditions described in these notices. In the remaining seven instances, the conditions either did not apply to HNP, or they had previously been addressed. The inspectors found the licensee's handling of NRC INs involving the EDGs to be acceptable.

6. Procurement of Spare and Replacement Parts for EDGs

The Material, Equipment, and Parts List (MEPL) (described in Appendix B of this report) stated that the EDGs and station batteries are classified as QA Category I, i.e., safety-related, and are relied upon as the only sources of safety-related station power. However, individual parts of the EDGs are not listed separately in the MEPL, but rather they are listed in the bill of material associated with each EDG drawing. The licensee is presently in the process of determining which parts are to be categorized as safety-related and which are not. Any piece/part of the diesel engine driver whose failure could cause a reduction in power output or a complete loss of the engine will be classified as QA Category I. The HNP Maintenance Department established criteria for the initial determination and has done the first screening. The initial selections will then be finally categorized according to the "Spare Parts Evaluation Check List" and the "Piece/Part QA Determination" which are attachments to ACP 1.2-2.1. This appears to be a significant step in upgrading the procurement of spare and replacement parts for the EDGs.

E. Incoming 10 CFR Part 21 Reports and Vendor and NRC Correspondence

The inspectors reviewed several evaluations of 10 CFR Part 21 reports and vendor letters to determine whether the licensee had taken appropriate action. Some of the letters sent to the licensee were not specifically identified as 10 CFR Part 21 notifications, but involved issues that would have an effect on plant safety. These letters

however, did alert the licensee that the issues should be assessed for potential effect on the plant. The inspectors also reviewed selected licensee assessments of NRC correspondence possibly affecting equipment at HNP.

1. Valcor Engineering Corporation sent a letter, dated April 16, 1986, to NU notifying them of instances in which valves with 17-7PH stainless steel springs failed after a year or two of service in pressurized water reactors (PWRs). The valves were exposed to reactor coolant water above 440°F, and apparently the spring failure was caused by hydrogen embrittlement. The licensee determined that valves using this spring material were in service as reactor head vent and pressurizer vent valves at HNP. A substantial safety hazard evaluation was performed and identified the potential for these valves to fail, but minimized the importance of their function. Specifically, the evaluation stated the head vent valves are beyond the design basis of the plant and minimized the importance of these valves in providing an isolation function.

   These valves were installed as part of the Three Mile Island action plan to vent off hydrogen following a small-break loss-of-coolant accident (LOCA). The valves perform an important safety function and must operate in the closed direction as well, so as not to cause a LOCA. Subsequent review by the licensee did identify their importance as evidenced by a September 10, 1986, internal memorandum that stated, in part: "These failures will not produce an SSH, but are unacceptable based on common sense engineering judgement." The licensee has since replaced the most susceptible valves and will replace other valves during the next outage. However, corrective action would have been taken in a more timely manner had the SSH evaluation appropriately addressed the significance of these valves originally.

2. A 10 CFR Part 21 notification was issued by Gamma-Metrics (G-M) on February 22, 1989 concerning defective solder connections in the cable conduit assembly on the excore neutron flux detectors. The licensee had several internal memoranda and other correspondence on file regarding the G-M 10 CFR Part 21 notification, but it had not been entered into the vendor information routing system. According to a record of an April 8, 1988, telephone conversation on this subject between NUSCO personnel, HNP has no G-M cable assemblies on site because its excore neutron detector system is not yet installed. In a letter from G-M to HNP, dated April 7, 1988, that was in the file, G-M stated that the fabrication process that caused the problem had been corrected and also committed to deliver cable assemblies to HNP that are free of any known defects. However, it was not clear from the correspondence on file whether the cable assemblies to be shipped to HNP were of the modified design described in the updated 10 CFR Part 21 letter from G-M, dated May 10, 1988. The inspector expressed the concern to the licensee that, although

the soldering process had been corrected, the modified design had not yet been satisfactorily environmentally qualified. The licensee agreed to obtain clarification from G-M on this point prior to installing the new cable assemblies in the plant and acknowledged the need to ensure that the system be fully qualified before it is required to be placed in service per HNP's NRC-approved, Regulatory Guide 1.97 implementation schedule.

3. Two 10 CFR Part 21 reports issued by M-K potentially affecting the GM/EMD 20-645E4 Type 999 EDGs at HNP were reviewed by the inspectors. The licensee had received these reports (dated February 14, 1985 and October 5, 1988), evaluated them, and appropriately dispositioned them to address the issues.

   The report of October 5, 1988, described the unexpected opening of the 100-ampere General Electric field circuit breaker for the EDG at the Browns Ferry plant, thereby tripping the diesel. It was determined that the circuit breaker rating and associated wiring were marginal due to the high ambient air temperatures. The 10 CFR Part 21 notifications recommended that the circuit breakers and wiring be upgraded to preclude the problem. As of the time of the inspection, the licensee had evaluated the 10 CFR Part 21 report and decided that the corrective action should be performed at HNP. Controlled Routing Action Plan sheets, dated December 9, 1988 and December 30, 1988, had been initiated to perform the upgrade and track the modification until the breakers are replaced.

4. NRC IE Information Notice 84-83, "Various Battery Problems," discusses potential concerns with batteries. Among the most significant are solvent-induced case cracking and the cumulative effect of a number of small loads added to the DC bus over an extended period of time.

   An inspection of the batteries and their associated areas did not identify any cracks in the battery cases or conditions that could introduce hydrocarbon-based grease or solvents to the battery cases (e.g., painted racks, grease on terminals, procedures allowing cleaning without cautioning personnel not to use hydrocarbon-based cleaning compounds). Discussions with HNP maintenance personnel indicated that only HNP electricians are allowed to perform any work activities on or around the batteries.

   The cumulative loading of the HNP batteries appears to be controlled by four NUSCO procedures: NEO-3.03, "Preparation, Review and Disposition of Plant Design Change Records"; NEO-5.05, "Design Input, Design Verification, and Design Interface Reviews"; NEO-5.06, "Preparation, Review and Approval of Design Analyses and Calculations"; and NEO-5.11, "Design Change Notices for Design Documents." An actual verification by means of reviewing all of the loads added to a particular DC bus for a certain period of time was not attempted due to time

constraints. However, HNP is currently installing a new, larger capacity emergency DC power supply system including batteries, DC chargers, inverters, motor control centers, and related buses and hardware. The HNP actions and disposition of the various potential battery problems appear to have been satisfactory.

5. NRC IE Information Notice 85-74, "Station Battery Problems," discusses several deficiencies involving the maintenance and operation of station batteries that were found to be generic to many sites and attributable to a variety of causes.

   Discussion with HNP station personnel and review of applicable documentation indicated that a satisfactory action plan was established to control the potential deficiencies. The disposition included revisions to station surveillance test procedures as noted on CY Memorandum CR 85-1257, dated September 23, 1986.

6. NRC Information Notice 88-04, "Inadequate Qualification and Documentation of Fire Barrier Penetration Seals," discusses a potential problem with the fire barrier penetration seal as-built configurations being less conservative or having no correlation to applicable fire barrier configuration qualification test reports.

   The inspector determined that HNP has noted numerous problems in this area. As an example, CY internal memorandum EN-88-187, dated February 26, 1988, states, in part: "CY is not in a good position to defend the adequacy of our installed penetration fire seals. The major reasons for this include: (1) Lack of a complete, technically sound, penetration fire seal qualification package and (2) for several years our installation inspection procedures did not provide for review of modifications to existing seals to ensure that the modifications did not affect the seal qualification. Recently, our procedures were revised to require engineering review prior to the seal installation or modification, but the technical information on fire seal qualification parameters and limiting conditions still is not available. In summary, we still do not know what we are limited in doing with our fire seals or whether we have stayed in compliance with the qualification tests...." HNP subsequently conducted discussions with the NRC's Chemical Engineering Branch (NRR) regarding this issue, and committed to perform a fire barrier walkdown to identify the scope of its problem.

   CY LER No. 050000213/89-001-00 described a nonconforming barrier that was identified by the licensee during a walkdown, stating that a supplemental LER would be issued at the completion of the fire barrier walkdown. Therefore, it appears that HNP should have issued an LER under 10 CFR 50.73 in February of 1988. However, HNP did discuss the issue with NRC personnel and implemented measures to review the adequacy of the installed fire barriers.

7. NRC Bulletin 88-10, "Nonconforming Molded Case Circuit Breakers," requires licensees to identify all MCCBs procured for use in safety-related applications. Those for which verifiable traceability to their manufacturers cannot be established are to be removed from service or from availability for service until they have been tested successfully in accordance with Attachment 1 to the bulletin. After receiving Bulletin 88-10, HNP identified 113 MCCBs in safety-related applications and in stores, but were not able to establish traceability for them using documentation available on site. HNP's planned course of action was to contact the suppliers and manufacturers of these MCCBs and attempt, to the extent possible, to obtain such documentation. Concurrently with this task, HNP intended to proceed with testing MCCBs in the warehouse, using a new procedure (SPL 10.8-9) approved near the end of this inspection by the HNP Plant Operational Review Committee (PORC) for testing MCCBs in accordance with Attachment 1 to Bulletin 88-10. Those spare MCCBs that passed the tests were to be used to replace the untraceable MCCBs installed in plant safety systems. HNP's commitments regarding inadequately dedicated commercial grade MCCBs installed in safety-related applications that were identified by the NRC during this inspection are discussed in paragraph II.D in the section of this report dealing with MCCB dedication.

8. NRC Information Notice 88-46, "Licensee Report of Defective Refurbished Circuit Breakers," identified types of MCCBs (and some other components) that were potentially fraudulently refurbished and defective as well as identifying several sources and intermediate suppliers. The disposition of IN 88-46 was tracked under the licensee's NOA No. 9684, dated August 12, 1988. According to CY memorandum EN-88-845, dated October 12, 1988, HNP's actions in response to IN 88-46 consisted of a review of purchasing records back to 1985. HNP concluded that no new equipment listed in Attachment 2 to the information notice was purchased from any suppliers listed in Attachment 1 although some items listed in Attachment 2 were purchased from other suppliers. The same memorandum also described HNP's disposition of Supplement 1 to IN 88-46, stating that the HNP purchase orders referenced in the supplement (issued to a supplier not listed in IN 88-46) were reviewed and the suspect material in the warehouse (45 items) was held under nonconformance report RC-88-166 pending resolution of the issue. However, HNP determined that five reversing starters and one overload relay had been previously drawn from the warehouse. An initial search indicated (but did not confirm) that the six items were used in non-safety-related applications. The memorandum also stated that HNP evaluated its maintenance practices and concluded that although the station test and inspection procedures were not intended to detect fraudulent/refurbished MCCBs, the procedures would adequately screen out defective MCCBs. At the time of the inspection, HNP was still evaluating IN 88-46, Supplement 2, in conjunction with the disposition of Bulletin 88-10. The NRC inspectors' evaluation of HNP station MCCB testing is included in paragraph I.D.3 of this report.

APPENDIX A

PERSONS CONTACTED

A. Connecticut Yankee Atomic Power Company

W. Romberg, Vice President Nuclear Operations
*D. Miller, Station Superintendent
*G. Bouchard, Unit Superintendent
*E. Debarba, Station Services Superintendent
*C. Gladding, Engineering Supervisor
*E. Nichols, Senior Engineer
T. Dente, Nuclear Operations Supervisor, NUSCO
B. Moyer, Material Supervisor
*D. Nordquist, Director, Quality Services Department, NUSCO
*D. McCory, Manager, Procurement Quality Services, NUSCO
*P. L'Heureux, Engineer
D. Ray, Operations Supervisor
*S. Oates, Licensing, NUSCO
G. VanNoodenner, Licensing, NUSCO
*B. Danielson, Maintenance Supervisor
*R. Caminati, Assistant Maintenance Supervisor
W. Ventres, Assistant Maintenance Supervisor
R. Rogozinski, System Engineer
T. McDonald, Technical Traning Supervisor
G. Winters, Senior Technical Trainer
J. Delawrence, In Service Inspection (ISI) Engineering
J. Calderone, ISI Engineering
L. Lebaron, Engineer
J. Stanford, Operations
R. Willis, Shift Supervisor
G. Andrews, Materials Engineer
M. Surprenant, Procurement Vendor Services Supervisor, NUSCO
J. Coleman, Procurement Inspection Services Supervisor, NUSCO
T. Mulder, NUSCO Engineering
R. Kasuga, Engineer
J. Paris, QC Technician
M. Etre, Engineer
G. Pitman, Electrical Manager
T. Clark, Engineer
G. Tylinski, Assistant Engineering Superivsor
K. Murphy, QSD Auditor, NUSCO
S. Wainio, Senior Engineer
*D. Maret, NES
*M. Marino, NUSCO Nuclear Operations
*J. Festa, NUSCO, Instrument and Control (I&C) Engineer

*J. Quinn, Millstone Unit 1, Engineering
*G. McNatt, Millstone Unit 2, Engineering
*W. Richter, Millstone Unit 3, Engineering
*T. Galloway, I&C Supervisor
*J. Beauchamp, NUSCO, Quality Services Supervisor
R. Gill, Security Supervisor
P. Jewett, Security
J. Miskimen, Maintenance

B. Nuclear Regulatory Commission

*E. Brach, Chief, Vendor Inspection Branch (VIB), NRR
*L. Bettenhausen, Chief, Project Branch #1, Region I
*U. Potapovs, Chief, Reactive Inspection #2, VIB
*A. Wang, Project Manager, NRR
*J. Shedlosky, Senior Resident Inspector
*A. Asars, Resident Inspector

---

* Attended exit meeting

APPENDIX B

PROCUREMENT PROCESS AND PROCEDURES

The procurement of material, equipment, and services at Connecticut Yankee Atomic Power Company's (CYs) Haddam Neck Plant (HNP) is governed by the procedures listed below. When the need for procurement of material or services is identified, the cognizant HNP engineer will have a purchase requisition (PR) prepared listing all technical and quality assurance (QA) requirements. The requisition is then reviewed and approved by the appropriate department head with QA concurrence. Any engineering evaluations that are required are prepared by the onsite engineering support organization. The purchasing department and the Procurement System Quality Assurance (PSQA) group under the Northeast Utilities Service Company (NUSCO) headquartered at the Northeast Utilities (NU) corporate offices in Berlin, Connecticut review and approve the procurement requirements and the selection of the vendor and the purchasing department generates a formal CY purchase order (PO) for dispatch to the vendor.

It should be noted that materials, equipment, and services (including replacement components and "piece-parts") used or applied to safety-related systems are subject to the requirements of 10 CFR Part 50, Appendix B, for quality assurance (QA), and of 10 CFR Part 21, "Reporting of Defects and Noncompliance." It should also be noted that these requirements apply to facilities licensed under 10 CFR Part 50, regardless of the original basis or quality assurance standard under which the facility was constructed.

A facility licensed by the NRC under 10 CFR Part 50 may choose to procure parts, equipment, or services for safety-related applications from vendors who lack a 10 CFR Part 50, Appendix B, QA program under which to supply parts certified to be nuclear safety-related. However, the facility must then institute its own measures to ensure that the procured materials are of adequate quality and capability to perform their safety-related functions under normal service, seismic, and harsh environmental conditions as required.

The licensee has prepared a master equipment list of safety-related HNP components. It consists of four volumes of documentation and is entitled, "Connecticut Yankee; Quality Assurance; Material, Equipment, and Parts List" (MEPL). Revision 4, dated August 26, 1988. Preparation and updating of the MEPL is controlled by procedure ACP 1.2-2.1 "Material, Equipment, and Parts List for In-Service Nuclear Generation Facilities." The procedure provides identification of safety-related, (HNP Category I), structures, systems, and components that fall under the auspices of the CY Quality Assurance Program in compliance with 10 CFR Part 50, Appendix B. The MEPL contains specific criteria for determining whether an item of plant equipment is categorized as safety-related, and covers mechanical, electric and instrument and control systems.

In the course of inspecting the HNP procurement and dedication program and its implementation, the NRC inspectors reviewed the following CYAPCO/HNP administrative control procedures (ACPs):

- ACP 1.2-2.1, "Material Equipment Parts List," Revisions 9 (5/85), 10 (1/86), 11 (7/86), 12 (7/87), and 13 (1/89)

- ACP 1.2-2.5, "Classifying and Upgrading Spare Parts," Revisions 3 (4/85), 4 (7/86), 5 (8/86), and 6 (11/87)

- ACP 1.2-4.1, "Procurement Document Review," Revisions 14 (2/85), 15 (11/85), 16 (8/86), 17 (2/87), 18 (4/87), 19 (9/87), 20 (3/88), and 21 (1/89)

- ACP 1.2-4.2, "Commercial Grade Procurement/Upgrade and Dedication," Original (6/88) and Revision 1 (1/89)

- ACP 1.2-4.3, "Substitution of Spare Parts," Original (7/88)

- ACP 1.2-7.1, "Receipt, Inspection and Identification of Materials, Parts and Components," Revisions 15 (1/85), 16 (7/85), 17 (9/85), 18 (7/86), and 19 (2/87)

The overall HNP procurement process is governed by procedure ACP 1.2-4.1 "Procurement Document Review." This procedure defines procurement levels (PLs) "A," "B," "C," and "D," depending on the nature of the purchased commodity, and its intended use or availability for use in the plant.

PL-A is prescribed for procurements of "engineered," safety-related (designated by the procedure as "Category I") components (e.g., for use in plant modifications) and for safety-related services. PL-B is for non-engineered replacement parts and components for safety-related applications to be procured as nuclear safety-related items. PL-C is for the procurement of commercial grade items (CGIs) to be upgraded or dedicated for use in safety-related plant applications. PL-D is prescribed for materials, equipment, and services not considered Category I.

PL-A, -B, -C, and -D procurements each have associated controls, prescribed to be commensurate with the degree and nature of importance to plant safety of the purchased system or equipment. To determine the proper level of control and QA required for procurement, as well as for other reasons, the safety-related status and safety functions are defined for all major plant systems and equipment in the Material, Equipment, and Parts List (MEPL) governed by ACP 1.2-2.1. A relatively new program in the process of being implemented, called the "Bill of Materials Program," is designed to identify those components or piece-parts of safety-related equipment that actually have or are associated with some safety function (active or passive) as distinguished from those with no identifiable safety function. Presently, the scope of the program is limited in most cases to those components that normally are or would be replaced during the course of plant preventive and corrective maintenance.

Under HNP's program for equipment environmental qualification (EQ) pursuant to 10 CFR 50.49, certain additional electrical equipment which is not classified as safety-related (Class 1E), primarily postaccident monitoring equipment, but which is required to be environmentally qualified, is treated for procurement purposes, as Class 1E equipment.

The review of the procedures revealed some programmatic deficiencies and the review of individual procurements identified several instances in which these practices resulted in quality and safety concerns. Examples of deficient individual procurements and dedications are discussed in the main body of this report.

The elements that were missing in HNP's earlier programs that would be necessary for adequate dedication would include, but are not limited to: (1) establishment of traceability of the replacement parts and components to their manufacturers, (2) definition of the items' safety functions and the conditions under which they must be performed, (2) identification of critical characteristics or attributes of the items considered vital to the items' ability to perform its safety functions as required under all design conditions including seismic, (3) review and technical evaluation of any changes in design, process, and materials and any impact on the suitability for safety-related applications under all design conditions, (4) methods for receipt inspection and testing sufficient to demonstrate that critical characteristic requirements are met, and (5) detailed requirements for documentation of these actions.

The procedures required that the licensee evaluate the suitability of commercial grade items for safety-related applications. In practice, this consisted of nothing more than a verification that the part number and catalog specifications are the same. In most instances, as described in the procurement section of the report, no further engineering or technical evaluation, and no review of form, fit, and function beyond part number verification and catalog specifications were documented. Therefore, under HNP's earlier programs, the process of dedicating or upgrading the commercial grade material for safety-related service lacked crucial elements required to provide the assurances otherwise associated with manufacturing under a 10 CFR Part 50, Appendix B, QA program, audited and approved by the licensee, and the assurance, under 10 CFR Part 21, that any deviations from technical procurement specifications would, as a minimum, be reported to the licensee for evaluation of the potential for creation of a substantial safety hazard.

Finally, procedure ACP 1.2-2.5, "Classifying and Upgrading Spare Parts," Revisions 3 (4/85), 4 (7/86), 5 (8/86), and 6 (11/87), provided for the upgrade of parts procured under PL-D. The process consisted, however, of nothing more than a standard minimum receipt inspection as was done under PL-C and documenting results on a material receipt inspection report (MRIR), often with no reference or traceability to a PO. The section of the report on individual procurements gives examples of this process.