U.S. NUCLEAR REGULATORY COMMISSION
Region I

Report No. 50-354/84-23

Docket No. 50-354 License No. CPPR-120

Licensee: Public Service Electric and Gas Company

80 Park Place

Newark, New Jersey 07101

Facility: Hope Creek Generating Station

Inspection At: Hancocks Bridge and Newark, New Jersey

Inspection Conducted: October 23-26, 1984

Inspector: Gene Kelly 11/13/84
E. M. Kelly, Project Engineer date

Approved By: Jack Strosnider 11/16/84
J. Strosnider, Chief, Project Section 1C date

Summary: (30 inspection hours) Systems to calibrate instrumentation in support of the Preoperational Test Program were reviewed, including: various instrument indices such as the Setpoint Register, preparation of Instrument Calibration Data (ICD) cards, the "early" release for test (RFT) program, and actual calibrations.

A review of Design Information Requests (DIR) indicated a difficulty in obtaining data such as setpoint, range, accuracy, tolerance, model number, logic etc., for all calibratable devices (estimated as numbering 22,000 total). Over one-half of all devices have been initially calibrated already. PSE&G management involvement, in assuring that calibrations are performed using verifiable design data, was assessed. An October 15, 1984 Bechtel proposal, which is a step towards resolving this concern, is expected to be acted on in the next month. Progress will be followed (IFI 84-23-01, Detail 6.C.5) in future inspections.

Construction deficiencies associated with induced voltage actuations in Bailey logic modules, low voltage cutoff setpoints for Topaz investors, and CPI power supply faults were also reviewed. Finally, a review of T-ASCO scram pilot solenoid valves in the Control Rod Drive system determined that seat-seal material was recently upgraded with Viton-A polymer; however, the use of polyurethane in T-ASCO valves employed as backup scram devices, and in the scram discharge volume vent and drain system has yet to be evaluated and is unresolved (UNR 84-23-02, Detail 2).

DETAILS

1. Principals Contacted

PSE&G

A. Barnabei, Principal QA Engineer
A. Giardino, Manager, QA Engineering and Construction
R. Donges, Principal QA Engineer
F. Milhorn, Startup Instrument Engineer
A. Drennan, Supervisor, Startup I&C
M. Dobson, Startup Scaler/Emergency Aide
L. Kempa, Supervisor Scaler
D. Shaffer, Startup Test Engineer
M. Woloski, Site Engineer
C. Churchman, Manager, Site-Engineering
R. Webster, Assistant Manager, Startup
F. Cello, Document Control
J. Nichols, Manager, Technical Services
S. Funster, Operations I&C Engineer
M. Zapolski, Operations I&C Engineer
A. Smith, Assistant Project Manager

Bechtel

L. Carey, Lead Control Systems Engineer
B. Mukherjei, Manager, Project Engineering

General Electric

E. Skeehan, Startup Manager
* G. Chu, Operations Superintendent

* Phone conversations on November 2 and 9, 1984.

2. T-ASCO Scram Pilot Solenoid Valve Upgrade

The inspector reviewed the licensee's disposition of a problem experienced on October 6, 1984 at Susquehanna Steam Electric Station involving the failure of four control rods to initially insert during scram time testing for Unit 1. The cause of the failures was determined to be sticking of a polyurethane seal material used in the disc subholder assemblies for T-ASCO scram pilot solenoid valves. Following NRC Region I's involvement with this problem during the week of October 15, 1984, the Hope Creek senior resident inspector asked PSE&G management to assess the seal material used in T-ASCO scram pilot solenoid valves installed onsite. Hope Creek was one of the plants identified during a meeting held on October 16, 1984 at NRR offices in Bethesda, MD, as having T-ASCO scram pilot dual-solenoid valves installed in the CRD system, and originally supplied with polyurethane disc seal material.

All CRD hydraulic control units (HCU's) at Hope Creek were returned to GE-Wilmington, NC, approximately one year ago for refurbishment and upgrade, since they had been installed for more than 4 years. Part of that refurbishment included rebuilt kits for the scram pilot solenoid valves to replace certain shelf-life items such as diaphragms. An October 24, 1984 letter (GP-84-182, J. Larrew to P. Landrew) from GE-San Jose to PSE&G stated GE's recommendation for replacement of the urethane disk, prior to startup, using kits with Viton-A disks. The letter also stated that:

> "The timely refurbishment and upgrading of the Hope Creek HCU's earlier this year did include placing Viton-A disks in the T-ASCO scram pilot valves. No further action on this problem is required at Hope Creek".

The inspector observed the current condition of CRD HCU's in the plant. All units were re-installed, and properly protected, although instrument air has not yet been connected.

The use of T-ASCO solenoid valves is limited solely to the CRD system. However, the inspector contacted a GE representative onsite on November 2, 1984, to ask the status of other (if any) T-ASCO dual-solenoid valves in use in the CRD system, such as the backup scram valves or those used on the scram discharge volume (SDV) vent and drain. Apparently, polyurethane seal material is still installed in the ASCO backup scram valves, since these solenoids are normally de-energized (and not as susceptible to increased temperature adhesiveness). The status of the SDV valves was not determined at the time of this inspection. Pending resolution of that status, this concern for the use of polyurethane material in T-ASCO solenoid valves is unresolved (UNR 84-23-02).

3. Induced Voltage Actuations in Bailey Logic Modules

A construction deficiency (CDR 84-00-14) was reported by phone on September 14, 1984 to NRC Region I, and was followed with a final report to the NRC on October 15, 1984.

During preoperational testing of 4.16 and 7.2 kV switchgear, the normal input to Bailey Controls Model 862 digital logic had to be deactivated. Subsequent testing of MOV's on the Condensate System found that valve position indication and starting logic were being incorrectly activated. Improper actuation of the Bailey logic was occurring as a result of induced voltage spikes on the logic input wires. These wires travel in the same multiconductor cable which carries wire from de-energizing coils used for circuit breakers. The unshielded multiconductor cable allowed noise voltage to be induced, in non-energized wires, from energized conductors in the same or adjacent cable. The presently designed Bailey 862 logic circuitry cannot discriminate against that noise. The noise spike was

later characterized by field tests using an oscilloscope to have a peak amplitude of 200-300 volts (of 30 millisecond duration or less), and was consistently generated from all coils tested and on all DC control circuits. The induced noise level which will activate the Bailey 862 logic was found to vary between 30 and 90 volts AC-rms, depending upon, and most sensitive to, the number of conductors energized within a multiconductor cable. This actuation threshold is less sensitive to the influence of adjacent energized cable. There are a total of 2248 Bailey Model 862 logic modules affected (each accommodating up to 8 inputs) used in both 1E and non-1E circuits. Startup Deficiency Reports (SDR's) document and track this design deficiency.

The licensee conducted initial testing to quantify and duplicate this phenomenon, and promptly involved Bailey Controls Co. to verify the problem and propose a solution. Continued testing by PSE&G representatives onsite, coupled with various initial module modifications by Bailey, has progressed to the point where a successful circuit card design has been identified. A contractor, TKC, was enlisted to develop the worst-case plant circuit condition which will define the design envelop under which the modified Bailey 862 logic cards are to be qualified. The current high impedance input circuit on the logic card is being reduced in impedance with a front-end current discriminator. The addition of this circuit to the filtering network should discriminate between valid signals and induced voltages.

PSE&G Startup personnel initially involved in the investigation of this problem were interviewed, and their preliminary report of testing of the influence of induced noise and spikes on the Bailey 862 System was reviewed. Testing on a circuit setup in the Blockhouse, to characterize this phenomenon, was observed. The licensee's present plans and schedule for modification or replacement of all modules was presented. Bailey has indicated that anywhere from 200-250 modules per week could be handled, tentatively beginning in mid-November and lasting until late January 1985. The inspector concluded that the licensee's disposition and progress towards resolution of this technical issue were timely and thorough, and representative of positive management involvement. Its resolution will be followed in future NRC inspection.

4. Part 21 Notification - CPI Power Supplies

An August 15, 1984 Part 21 closeout letter, addressed to NRC Region II from Computer Products, Inc. (CPI), was reviewed for disposition at Hope Creek.

The licensee concluded, as stated in a Bechtel memorandum dated June 20, 1984 to PSE&G engineering, that the subject deficiency with CPI power supplies was not reportable under 10 CFR Part 50.55e. The potential problem involved failure of 5 volt power supplies used in non-class 1E SPDS input circuitry. The faults, which were caused by shorting of a rivet to a heat sink which disabled power supply transistors, was confined to the 120

VAC feed which is isolated by a transformer at the supply. This does not affect safety-related inputs. Eight of the installed supplies were inspected by CPI and the licensee; three were found to have the potential for this problem and were returned to CPI for replacement. A certificate of conformance dated 7/12/84 documented that replacement, and this item is therefore considered as closed.

5. Construction Deficiency - Topaz Inverters

A 10 CFR 50.55e potential deficiency was reported by phone to NRC Region I on October 9, 1984. This involved an incorrect low voltage shutoff setpoint which had been incorrectly set, at 105 versus 100 volts, by the manufacturer. These inverters are used to power 24 VDC instrument buses in RCIC, and various ECCS including HPCI, ADS, RHR and CPCS. This low setting would cause a delay in the initiation of the above safeguards features.

A GE Part 21 report dated October 8, 1984 provides notification and details of this problem. The licensee is still in the evaluation process, and a report for Hope Creek is expected in November 1984. This item will be followed in future inspections as CDR 84-00-15.

6. Preoperational Instrumentation Calibration Program

A. Introduction

The senior resident inspector identified a concern in Inspection Report 84-10 (Detail 8) that calibration of instrumentation, required for the preoperational test program, was being performed using incomplete or incorrect vendor design information. Various instrument indices (Instrument Index, Setpoint Register, Purchase Order Material Requests, P&ID's) were found to be inadequate or cumbersome in obtaining proper instrument model numbers, setpoint, range, accuracy and other pertinent data. These data are required to prepare Instrument Calibration Data (ICD) cards which are, in turn, used to calibrate instruments in preparation for preoperational testing and, ultimately, Technical Specification surveillance. ICD cards are currently being prepared in conjunction with the licensee's "Early Release for Test" (RFT) program which aims for calibration of 80 to 100% of a system's instrumentation prior to turnover from PSE&G Construction to Startup. The preparation of an ICD card was found to be cumbersome, time-consuming, in-exact (with respect to verifiable design data), and a potential negative impact on the preoperational test program. Inspection 84-10 also raised the concern of an apparent management ineffectiveness in addressing and correcting problems already experienced in preparing and verifying an accurate base of ICD cards, to support the calibrations necessary for preoperational testing and later system surveillance and operation.

B. Summary of Findings

This inspection included: (1) interviews of those I&C Startup group "scalers" and test engineers responsible for the preparation of ICD cards; (2) discussions with organizations responsible for vendor information completeness, accuracy and access thereto (e.g. Bechtel Resident Engineering, GE, and PSE&G Document Control); (3) discussions with that group which will inherit the ICD cards and calibration program - PSE&G Operations/I&C; (4) observation of instrumentation installed and calibrated; (5) review of completed ICD cards and related Design Information Requests (DIR) initiated to obtain incomplete information; and finally, (6) interview of responsible PSE&G supervision and management responsible for calibration and operational testing. This inspection found the senior resident inspector's initial concerns to be well-founded, and based on the above scope of inspection, draws the following conclusions:

-- Roughly half of all ICD cards are already prepared, and initial calibrations to support early RFT are either completed or underway which use, in many cases (estimated to be over 40%), incomplete and unverified data (such as setpoint, manufacturer and model number, process range, logic sequence or proper reference document) - the validity of those calibrations is suspect, and should be finally verified

-- The use of indices such as the Setpoint Register and Instrument Index, which refer to references that in turn go to other documents which either aren't available in a direct fashion or not available at all, is an inefficient and inexact means to prepare timely, accurate, verifiable ICD cards. The enhancement and expansion of the Setpoint Register, which is under consideration by licensee management, would support the preoperational test schedule, and will provide a means to verify all calibrations performed with ICD cards (prior to its implementation), before the final acceptance and approval of preoperational tests.

-- Startup Procedure SAP No. 24 (Revision 2, 6/15/84), which governs preoperational test procedure (PTP) format and instructions, addresses prerequisites for calibration at the component level as simply "... meters and relays are required to be calibrated...". The responsibility for attesting to properly calibrated system devices is with the Startup Test Engineer (STE) assigned to that system. The observation here is that a device initially calibrated (green sticker affixed) would alone suffice to meet this sort of PTP prerequisite, and the questioning of the accuracy or verification of design data provided on an ICD card and used in the initial calibration of a device, would lie

with the STE. Thus: (1) the inherent risk in relying on calibrations performed to-date with incomplete/unverified ICD card information; (2) the possibility that a preoperational test would be conducted on a system not within the approved design envelop; and (3) the need for a method (such as an enhanced Instrumentation/Setpoint Register) to verify ICD cards against approved design conditions.

-- The Setpoint Register, as it currently exists, is an uncontrolled document and does not list all calibratible devices. The senior resident estimated a total of over 30,000 instruments in Report 84-10; this number is apparently over 30% too high. This inspection found there to be a grand total of approximately 22,000 calibratable devices. A little less than 30% of this number, or 6,000 devices, are classified as Q-instruments, and these include the fire protection system. The remainder of non-Q instrumentation accounts for an estimated 16,000 devices. The problem in obtaining design data from the Register for every device requiring some sort of calibration using an ICD card, is that this document presently lists only 50-60% of all those devices. It does not include the following: primary elements (temperature, flow) and signal conditioners, including all devices therein (controllers, logic units, mV converters, setpoint generators). The proposed enhancement of the Setpoint Register is planned to include all pertinent instrument information; process setpoint, range and tolerance, device setpoint, range and accuracy, switch reset and logic schemes, and accurate, approved drawing/document references. This new document will be controlled, and should accurately track design changes.

-- The timing and need for an enhanced instrumentation index which covers all calibratable devices and provides the requisite depth of information, is such that: (1) it could have been effectively used 6 months to 1 year ago, when early - RFT calibrations began in earnest; (2) it is needed in the near future (4-6 months away), when non-electrical preoperational testing begins on safety systems such as Service Water (turnover scheduled early in 1985); and, (3) it will be required, as some form of design verification, before preoperational test results are approved for turnover to PSE&G Operations.

-- PSE&G and Bechtel supervision and management attention was raised to a higher level by the senior resident inspector's initial findings and conclusions in Inspection 84-10. The problems of ICD card preparation, calibration accuracy and verification, and the existence of approved and/or easily accessible vendor documentation have all existed prior to Inspection 84-10. This is due, in part, to the licensee's

aggressive preoperational test schedule which is keyed to a January 1986 fuel load date, and which therefore is dependent upon successful early RFT calibrations. The initial calibration effort is thus viewed by the inspector as a vital cornerstone of the preoperational program. Progress by PSE&G management, during the two-month period following issuance of Inspection 84-10, has been noted in that: (1) first-line Startup Group supervisors are aware of and understand the calibration concerns; (2) proposals to estimate the scope and effort required to enhance and expand instrumentation indices have been developed, and are currently under consideration (refer to October 15, 1984 Bechtel estimate, K. Burrows to W. Gailey); (3) PSE&G project management has assigned responsibility for a decision on a proposal, within the next two weeks, to C. Churchman, Manager of Site Engineering. Thus, progress towards correcting this problem has been observed and a decision on an actual solution is expected to occur in November 1984.

-- NRC inspection emphasis, on PSE&G management's resolution of the concerns raised regarding initial preoperational instrument calibration, will continue. Loop calibration checks, the next level of system testing which precedes the full preoperational test, is an area recommended for immediate inspection attention. Also, the completeness of ICD card information for Service Water, one of the first major (non-electrical) Q-systems scheduled for turnover and preoperational testing, is suggested as a measure of the extent of potential calibrational uncertainties which must be verified. The diesel generators are another Q-system which could be assessed now for calibration status, since they'll be turned over in November and preoperationally tested starting late in 1984.

-- Management's involvement of disciplines outside of the Startup organization has not been evident, to-date. The front-end and back-end recipients or inheritors of vendor manuals, equipment data sheets and other design information - namely, PSE&G Document Control and Operations/I&C - were not fully aware of the extent of this calibration issue. Future coordination between these disciplines and the Startup Group should contribute to a solution, since Document Control will have computerized access to all design information, and Operations I&C is the group already doing the calibrations and the ultimate user of ICD cards. As preoperational activity increases early in 1985, the completion of accurate ICD information (without an enhanced Instrument Register) will become a larger problem, since there are only 7 Startup scalers preparing cards, while there are 40-50 I&C technicians (projected increase to 80 by end of this year) currently performing calibrations. Another tier of verification of

ICD card information will be accomplished upon the final turnover of a system - from Startup to Operations - whereupon I&C engineers will review (Procedure AP-2) card information; but, this will not be a trace back to original approved design input. While not a direct correlation of design data accuracy, the first system to be turned over and preoperationally tested - Auxiliary Boiler - had 762 ICD cards, of which approximately 38% were found to have various problems with model number, manufacturer, units, scaling and other information.

-- In conclusion, there exists a concern with the accuracy of input data used to calibrate instrumentation, as a first step in the preoperational test program. Demands imposed by the preoperational schedule, and the implementation of the early-RFT program, have resulted in a situation where "hardware" (instrumentation or calibratable devices) has been turned-over from Construction to Startup, but the "software" (approved design data) has, in many cases, not been released by Bechtel or made available to PSE&G Startup. This lag, between paper and equipment, was more pronounced 6 to 12 months ago. This is also an issue of the ease of accessibility of instrument data, not just the existence of an approved document. The impact of this issue upon the preoperational test program is yet to be decided; test schedule slippage, resolution of DIR's and disposition of SDR's, generation of startup test exceptions and approval of test results will all provide a direct measure of any actual quality/safety problems attributable to invalid instrument calibrations. The verification of calibrations (ICD cards) with an all-encompassing instrument index which includes all calibratable devices and is a controlled, Code 1 - approved document, will provide a final determination of proper design configuration.

C. Bases for Findings

1. Early RTF Program

The projected date of system turnover, from Construction to Startup, is the milestone to which initial calibration activities are keyed. Design (change) is "frozen" at the point ten weeks prior to turnover; early release of instrumentation for calibration ideally begins about 14 weeks prior to turnover. This program has been in effect for approximately one year, and is designed to support the preop schedule by accomplishing 80% of all initial calibrations at the time of system turnover.

2. Control Room

Control room was the first system to be turned over, in December 1983, with a majority of devices supplied by Bailey Controls. The scaling effort to prepare ICD cards, which began about a year ago, was found to be underestimated. The anticipated 50 cards per day (at about an hour per card per scaler) was not realistic; more than twice that time was being experienced, at an average of 2½ or more hours per card, due to the discovery of incomplete documentation which did not match what was installed in the field. Approved documentation (typically Bailey J-200 drawings or data sheets) was either incorrect or inaccessible, and Bechtel-San Francisco was contacted to finally correct these difficulties. Other problems encountered in the control room involved incorrect ranges found for many of the Bailey indicators found on control boards. Temporary plastic "snap-ons" were or are being provided for about 200-300 devices to correct this example of discrepancy between actual-versus-intended design conditions. Permanent replacements incorporating the required ranges for these Bailey indicators in the control room are being provided by Bechtel, along with replacement transmitters which will match the intended process/instrument ranges. This situation was an early indication of the overall concern for early hardware turnover without "software" or approved backup data upon which the intended design is based. This problem also pointed to the inadequacy of using P&ID's and other data sheets to calibrate so-called "black boxes" or, more-formally, signal conditioners. These devices, which are the principal components referred to on a P&ID and other base information, actually consist of from 2 to 5 primary devices such as square root extractors, logic units, controllers, millivolt converters and set-point generators (each of which has to be calibrated in some fashion). Startup personnel have been assigning "P-numbers" to each of these subelements, as a traceable designation. Therefore, the as-built Bechtel control room instrument design, provided and installed by Bailey Controls personnel and calibrated by the combined PSE&G Startup organization, has yet to be verified by the licensee as correct (intended design).

This same concern can be extended to any system in the plant, which has or will be calibrated prior to preoperational testing, using the current method of ICD card generation.

3. Design Information Requests (DIR)

Startup Administrative Procedure (SAP) No. 23 governs the use of DIR's by Startup to clarify design information provided by Bechtel Engineering. One use of DIR's has been to obtain vendor information, from instrumentation data sheets, to prepare ICD cards. The DIR is initiated by the Startup System Test Engineer

(STE), approved by the Startup Manager, and ultimately responded to by Bechtel Engineering. Review and disposition of that response is then the responsibility of PSE&G Startup, with PSE&G Engineering comments also solicited. The cycle formally begins and ends with the STE. This system is not used to implement design changes, and will be superseded at the time of system turnover from Construction, by a Deviation Control System. Its stated purpose is to provide a controlled communication channel between PSE&G Startup and Bechtel Engineering.

The inspector reviewed SAP No. 23 (Revision 0, May 1982), as well as various examples of DIR's which were initiated at the request of I&C scalers. These were found from a computerized sort (DIR Report dated 10/19/84) for various systems currently having ICD cards prepared by Startup to support early-RFT. The Startup scalers stated that only within the past 6 weeks have DIR's begun to be extensively generated by their group, due to: (1) required references from the Setpoint Register not on the Hope Creek jobsite; (2) "NA" or "later" designations on base documents; (3) discrepancies and errors in logic and elementary diagrams; (4) requests for Bechtel-approved technical manuals; and (5) incomplete vendor information which, while used, had to be obtained by calling Bechtel-San Francisco, the manufacturer or some other source of information.

The DIR system has been in use for over a year, but as stated by Startup scalers, has only been recently used in earnest to document the use of unverified data in the preparation of ICD cards. This type of information could be classified as "bootleg" in that a phone call, unofficial vendor manual, engineering judgement, or a space on the ICD card left blank or termed "later" was used to complete the card for now. Prior to the use of the DIR, so-called Problem Reports were written to track this type of information problem - these were uncontrolled and little more than a note written within the group to later followup on a question. Startup personnel stated that an attempt was made to "grandfather" all Problem Reports (estimated to total 300-500) into DIR's; however, this was not a procedurally-controlled effort and was not verified by the inspector. Further, there's no certainty or means to assure that all ICD card discrepancies were ever documented by a Problem Report.

The DIR sort examined by the inspector was being used by Startup scalers to track 18 systems for which ICD cards were being prepared at the time. The sort actually encompassed roughly one half of the 137 engineering systems which will be preoperationally tested. There were 750 DIR's listed, and a sampling review

of those indicated that most (over 60-70%) pertained to instrument data discrepancies. All DIR's written pertaining to the Service Water System were studied; of a total of ten, 9 pertained to instrumentation, 5 were closed, and all were related to design misinformation, changes or installation discrepancies. A large number of DIR's were written against Reactor Auxiliaries Cooling (total of 40) and Safety and Turbine Auxiliaries Cooling systems (total of 33). The same observations found for Service Water applied to DIR's written for these systems - the majority were instrument problems.

DIR No. AC-0001 is typical of the concern for instrument design data accessibility. Issued in May 1984 and covering the Main Turbine System, the stated problem was that 112 of the 150 instruments listed in Bechtel Requisition M-3 had an "NA" designation in their data sheet. ICD cards could not be written without that information. The approved response to this DIR was to send the Startup scalers to another document, a Bechtel (vice PSE&G) index or vendor print, which in turn would reference another document; this answer has not been found to be a satisfactory solution to prepare ICD cards, to-date.

DIR's are judged, by the inspector, to be a valid measure of the extent of this concern for installed/calibrated versus intended/documented instrumentation design. Their relative numbers, disposition, use by startup test engineers, and possible incorporation into Startup Deficiency Reports (SDR) will be followed in future inspections of the preoperational calibration effort.

4. Calibrations

The inspector observed the preparation of ICD cards by Startup scalers, the actual calibration of instruments and devices by I&C technicians, and then compared selected devices in the field with green calibration stickers affixed versus their prepared ICD cards and scaling calculation sheets. The following instrumentation was selected:

-- KL-PDSH-5825B - Bailey Model 7452 differential pressure switch for Containment Instrument Gas System/nitrogen.

-- KL-PDC-5825C - Bailey Controller (actually 4 devices including control and logic units and 2 setpoint generators) for Containment Instrument Gas System/nitrogen.

-- BB-LIS-N697H - Rosemount Model 510D4 level indicator switch for Nuclear Boiler System/reactor vessel level.

-- BB-FI-R611A - Bailey Type 775 flow indicator for Nuclear Boiler System/recirculation flow.

-- GS-TIC-5074A2 - Analogic temperature indicator controller for Containment Atmosphere Control/Hydrogen Recombiners.

-- EA-PST-2229A - Tobar Model No. 75DPG pressure transmitter for Service Water System/strainer differential pressure.

No discrepancies were noted with these calibrations. The inspector noted that the calibration stickers typically call for either a 540-day (18 month) or 1095-day (3 year) re-calibration period. Because of the method used to prepare ICD cards, its unclear how a design change to any one of these devices, or other individual devices in the same instrument loop, would lead to a re-calibration (if necessary) of all devices in that loop. Design changes are brought to the attention of, and would be picked up by, the Startup Test Engineer, but one could not rely on the current system in use (viz. Setpoint Register) in all cases. The design documentation used to prepare ICD cards for these devices was not traced back or verified by the inspector.

5. Proposals to Enhance the Setpoint Register

Bechtel Engineering letters (BLP-16494 and 14043) to PSE&G Project Engineering, the latest dated October 15, 1984, outline various options proposed to expand and improve upon instrumentation indices. The current Setpoint Register does not list all information needed to prepare an ICD card for the estimated 2200 devices which require calibration. This Register is not a fully controlled document, and in addition to being incomplete as far as certain information's concerned, lists only roughly half (or 12,000) of the total calibratable devices. The following is a breakdown of the estimated number of devices, broken down between Q (quality, including fire protection) and non-Q components:

Device	Q	Non-Q	Subtotal
Analog Indicators or Recorders	2000	5000	7000
Switches, Bistables	800	4600	5400
Transmitters	700	1500	2200
Primary Elements	500	1800	2300
Signal Conditioners (including all) Elements	2000	3100	5100
Totals	6000	16000	22000

The proposed enhancement of the Setpoint Register will incorporate all or most of the above devices, and will be a controlled document, capable of tracking approved design information and changes thereto.

A meeting was held onsite on October 26, 1984 to discuss other proposals; a recommendation for action is expected early in November. Progress in this regard will be followed by future NRC inspections (IFI 84-23-01) to verify that:

(1) As-built instrumentation matches intended design

(2) ICD cards are prepared to correct data

(3) Calibrations, past and present, are valid with respect to (1) and (2) above

(4) Instrumentation and process variable design changes are compared against, and factored into (where necessary) the calibration program

(5) Preoperational testing is performed using verifiable calibrations.

6. General Electric Scope of Work

Discussions with the GE Nuclear Startup Manager found there to be two basic documents for instrumentation information under the GE scope of work:

-- Design Specification Data Sheets (Data Sheets)

-- Elementary Diagram Device Lists (EDDL)

The data sheets contain the general design bases for most safety systems, and these complement the EDDL's which contain instrumentation details such as calibration range. There are a total of 21 EDDL's associated with about 16 engineering systems at Hope Creek - 5 to 6 of these are pertinent to the B21 Nuclear Boiler System which includes reactor and recirculation systems. GE's representative stated that all but one of the EDDL's have been turned-over to PSE&G and are currently available for Start-up calibration references. The inspector concluded that, for the above Q-systems and associated instrumentation, appropriate design information is now available to prepare accurate ICD cards and perform valid calibrations. There are estimated to be 1000 calibratable devices affected by the 21 EDDL's, not including radwaste systems.

The inspector reviewed, in detail, one of the largest systems as far as data sheet/EDDL devices are involved - the Residual Heat Removal (RHR) system. GE EDDL E11-3050 (Revision 10, 7/24/84), and the associated Data Sheet for RHR, Dwg. 22A4305AA (Revision 5) were found to contain calibration information on over 60 devices; these included controllers, transmitters, indicators and other units. Not included in this number but listed in the EDDL were another 70 devices requiring only functional checks such as power supplies, square root converters, isolation cards, fuses, diodes and relays. The detail and scope of information provided in these GE documents was found to be complete and sufficient to meet the needs of Startup scalers in performing calibrations.

Scalers interviewed agreed that the GE Nuclear Systems information was no longer a problem, but that this may not be the case for non-nuclear (Balance-of-Plant) systems provided by GE.

7. Exit Interview

The inspector met with the licensee representatives on October 26, 1984 to summarize the scope, findings and conclusions of this inspection. The licensee was informed on November 1, 1984 that this inspection would be documented in a separate report, rather than in the senior resident inspector's monthly report.