U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-219/84-09

Docket No. 50-219

License No. DPR-16 Priority ________ Category C

Licensee: GPU Nuclear Corporation
100 Interpace Parkway
Parsippany, New Jersey 07054

Facility Name: Oyster Creek Nuclear Generating Station

Inspection At: Forked River, New Jersey and Cherry Hill, New Jersey

Inspection Conducted: March 26-30 and April 2-3, 1984

Inspectors: C. Cowgill III 4/27/84
C. Cowgill, Senior Resident Inspector date

W. H. Bateman 4/27/84
W. Bateman, Senior Resident Inspector date
Hope Creek

R. Blough 4/27/84
R. Blough, Senior Resident Inspector date
Peach Bottom

S. Chaudhary 4/27/84
S. Chaudhary, Senior Resident Inspector - date
Construction, Limerick

J. Wechselberger 4/27/84
J. Wechselberger, Resident Inspector date

for J. E. Tripp 4/27/84
D. Limroth, Reactor Inspector, date
Performance Appraisal Branch, IE

for J. E. Tripp 4/27/84
F. Paulitz, Reactor Engineer, Region I date

for J. E. Tripp 4/27/84
R. Urban, Reactor Engineer, Region I date

Approved by: J. E. Tripp 4/30/84
J. E. Tripp, Chief, Reactor Projects date
Section 3A, Team Leader

Inspection Summary: Inspection on March 26-30 and April 2-3, 1984 (Report No. 50-219/84-09)

Special team inspection composed of a Region I Section Chief, resident inspectors from Oyster Creek and other sites, Region I and NRC:IE personnel. The inspection included reviews of the processes used for modifications which were implemented in the current major modification and refueling outage at Oyster Creek. The inspection was conducted by selecting several modifications and evaluating the design, construction/installation, inspection, testing, and acceptance for operation by the plant staff. This inspection involved (344) inspector hours on-site and at the Stone and Webster Cherry Hill office.

Results: The results are discussed in the details section of this report. The major problem identified was the lack of adequate interface between GPUN and original designers of the modifications in communicating design changes. There were violations in four areas (design control, installation, QC inspection and document control) involving failures to properly implement parts of Appendix B, 10 CFR 50. No other significant problems were identified. Subject to the completion of corrective actions taken in response to these findings and the results of a comprehensive audit to assess the magnitude and technical significance of the inadequate interface problem which GPUN committed to preform, the impact of the identified problems on the plant's readiness for operation cannot be assessed.

DETAILS

1. Introduction and Inspection Objectives

A Readiness Assessment Team (RAT) inspection was conducted for the purpose of determining the readiness of the Oyster Creek Nuclear Generating Station to resume operation following a major modification outage. A large number (about 75) of modifications were made during this outage. The objectives of this inspection were to determine if: (1) modification design work conformed with applicable NRC and Licensee requirements/criteria, (2) design requirements were properly implemented during construction/installation, (3) appropriate testing was performed to confirm that the recently installed/modified systems performed their intended functions, (4) turnover/acceptance was conducted in a manner so as to identify and resolve any remaining problems, and (5) procedures had been modified and personnel trained so that the modified system can be used to perform its intended function when operation resumes following the outage. This was accomplished by sampling a representative number of those modifications that were safety related (not all modifications are safety related). Implementation of the licensee's programs was then assessed by inspecting the sampled modifications in each of the above areas.

2. Overall Assessment

The inspection identified four apparent violations of NRC requirements. There was evidence of inadequate control of design documents. The licensee had not always informed the appropriate design contractor after making changes to design documents. Thus, it does not appear that the impact of such changes was properly considered. This area was only covered in detail for one modification (and one contractor) during this inspection. The licensee must evaluate the extent and technical significance of this problem. (See Report Detail 4.1). There were other specific examples of inadequate consideration of design interfaces/changes for modifications (See Sections 8 and 10); these appeared to be isolated cases rather than indicative of a programmatic problem.

It appeared that many of the modifications sampled during this inspection had received inadequate constructibility reviews during the initial design stages. As a result, there was an unusually large number of field changes generated for the original designs. Although no programmatic problems were apparent in the licensee's disposition of such field changes, concern was expressed that the collective impact of such changes to the design could not be determined. The licensee committed to conduct an evaluation for the Scram Discharge Volume work, one of the modifications most heavily impacted by such changes, in order to obtain a better perspective on the potential problem.

There were several examples of errors associated with installation of modifications that involved performance of work not covered (included) in the installation procedures or failures to properly implement such procedures. Similarly, there were several examples of QC inspection activities that were deficient in that they involved failures by QC inspection personnel to identify hardware discrepancies. Although the inspection team did not conclude that a programmatic problem existed in either the installation or QC areas, the inspectors did note that a relatively high number of deficiencies were identified considering the limited NRC inspection time/sample pertaining to such activities. Licensee representatives indicated in a telephone conversation on April 5, 1984, that considerable additional inspection verification activities are planned prior to the end of this outage by different GPUN groups including reinspection of piping supports, valves, etc., to establish that modifications are consistent with design documentation and have been appropriately installed, modified and/or that systems were returned to proper configurations. In many cases, these additional inspections will result in double coverage by different licensee groups.

3. Persons Contacted

GPU Nuclear Corporation

W. Behrle	Manager, Startup and Test, Technical Functions
M. Budai	Manager, Plans and Programs
J. Carroll	Director, Startup and Test, Techical Functions
P. Fiedler	Vice President and Director, Oyster Creek
D. Grace	Manager, Oyster Creek Projects, Technical Functions
N. Kazanas	Director, Quality Assurance
R. Keaton	Director, Engineering Projects, Technical Functions
M. Laggart	Manager, BWR Licensing
Dr. R. Long	Vice President, Nuclear Assurance
J. Maloney	Manager, Plant Material, Oyster Creek
R. McKeon	Manager, Plant Operations, Oyster Creek
W. Popow	Director, Maintenance and Construction, Oyster Creek
T. Quintenz	Manager, Maintenance Engineering, Oyster Creek
M. Radvansky	Manager, Technical Functions, Oyster Creek
A. Rone	Manager, Operation Engineering, Oyster Creek
J. Short	Production Manager, Maintenance and Construction
W. Smith	Director, Plant Engineering, Oyster Creek
J. Sullivan	Director, Plant Operations, Oyster Creek
J. Thorpe	Director, Licensing and Regulatory Affairs, Technical Functions
C. Tracy	Manager, Quality Assurance, Modifications and Operations, Oyster Creek
R. Wilson	Vice President, Technical Functions

Stone and Webster at Cherry Hill on April 2 and 3.

R. Cascone	Quality Assurance
W. Drotleff	Vice President
G. Krishnamurthy	Project Engineer
R. Strych	Project Manager

4. Scram Discharge Volume Modifications

These modifications involved enlarging the scram discharge volume (SDV), providing redundant vent and drain valves, and providing separate scram discharge instrument volumes (SDIV's) for the North and South SDV headers, each SDIV with diverse and redundant level instrumentation. The modifications were done to satisfy long-term criteria of the NRC's Generic Safety Evaluation Report for BWR Scram Discharge Systems, dated December 1, 1980. Accordingly, the modification also removed some interim SDV level and scram air pressure instruments previously installed per IE Bulletin 80-17.

4.1 Design

4.1.1 Design Control

The inspectors interviewed licensee engineers and reviewed the following documents:

- SDV Modification Design Criteria
- SDV Modification Proposal, Revisions 0 through 3, including intergrated safety evaluation
- PORC review and approval records
- Installation specifications (mechanical and electrical)
- Installation drawings (sampling)

Also, the inspectors examined the design change documents to determine the adequacy and effectiveness of the change control program. The changes to design and/or construction documents were effected by several distinct methods such as Field Change Request (FCR), Design Change Notice (DCN), and Field Change Notice (FCN). These change documents are controlled by GPU procedures: EMP-0015, EP-003, and EP-009. More than one hundred FCR's were reviewed to assess the technical adequacy and validity of changes and conformance to procedural requirements. In the review of documentation and discussions with cognizant licensee personnel, the inspectors did not identify any problems with the licensee's change control program for internal handling of design changes. It appeared, however, that there might be a certain lack of knowledge regarding the procedural responsibility for design changes, change review and design verification on the part of the Technical Function organization, particularly when the design services of outside contractors were used. The inspectors noted that several FCR's were initiated, dispositioned and approved by the same individual. In at least one case, FCR C-014140, the same individual initiated, dispositioned, approved and performed the design verification function. Although the A/E's procedures might have allowed him to exercise this delegated authority, it did appear to be in conflict with the established, and generally accepted, practice of checks and balances by independent and/or objective review and approval of design changes. Also, the inspectors observed that licensee audits of the A/E in the area of design control had not covered design change control in the two most recent audits.

The inspectors identified the following additional concerns:

(a) Some design documents had numerous FCR's and FQ's posted against them. For example, the electrical installation specifications had over 60 changes. Licensee procedures do not limit the number of changes that may be posted without a revision to the parent document. The inspectors questioned the advisability from a human factors standpoint (i.e. readability, implementation, and auditability) of allowing so many changes without revision. This was subsequently found to be a violation of contractor document control procedures (see Section 4.1.2).

(b) In some cases, significant changes to modifications were implemented via FCR in lieu of revisions. Examples include: (1) major changes in ASME Code specifications for mechanical installation and NDE, and (2) use of the cable tray system instead of dedicated conduits for safety related instrument and control cable routing.

(c) The number and nature of changes effected in the approved design appeared to indicate that there might be a lack of thorough design review before approval and issuance for implementation. The review and approval steps in a design sequence are established to assure that the system as designed is not only technically sound, but also that the design can be successfully implemented and/or constructed. In scram discharge volume modifications (Modification No. 402017), it appears that the design review and approval was not thorough and/or adequate enough to assure constructability. Consequently, the design was changed frequently to meet the construction requirements which create the potential for error and/or oversight.

(d) The original design documents and specifications did not include viable means of establishing instrument trip set points and correlating them to gallons of water in the instrument volume and attached piping.

(e) Even though individual design changes are subject to an engineering review, a large number of minor changes could collectively result in a major change from the original design. In cases where a large number of such changes are made, an overall review of the as-built system against the original design requirements and assumptions appears appropriate.

(f) The modification, as shown on the approved construction drawings, added several valves to the instrument air system. Two of these valves were designated as V-6-2015 and V-6-2016. The inspectors noted that the pre-existing system, as shown on P&ID BR2013, Instrument Air System, also has valves designated as V-6-2015 and V-6-2016. Since the valve V-6-2016 is on the CRD system valve lineup checkoff list, the inspectors recommended that the licensee ensure that the correct valve gets checked during system line-up.

The licensee also reviewed this item, identified four additional duplications, and initiated a FCN to resolve the duplication error. The licensee stated that the design of this system, having been done under a previous modification control system prior to major company reorganization, was susceptible to this type of error. The licensee has a drawing verification program underway to eliminate valve number duplications and other errors.

The inspectors reviewed the instrument air system composite drawing, SK-M-93, Revision 3, 3/24/84, and determined that mispositioning of any of the duplicated numbered valves could result in only conservative failures (i. e., loss of air for which components will fail to the safe conditions -- either "isolated" for isolation valves or "scrammed" for control rods). Because (1) these particular valve number duplications are of minor safety significance, (2) the licensee had previously identified and initiated a corrective action program (including measures to prevent recurrence) on a generic basis for this type of problem, and (3) the licensee initiated prompt corrective action to correct these specific errors, no violation is issued for the design control error.

The adequacy and depth of design verifications, particularly for design changes, could not be completely assessed on site. Much of the design work and design verification effort was done by a design contractor. Therefore, the offices of one of the design contractors (Stone and Webster, Cherry Hill, N.J.) were visited during the course of this inspection. At Stone and Webster, the inspectors reviewed documentation and held discussions with design engineers to verify that design changes had received commensurate verification/review as was accorded to the original design. Several design changes (FCR's) and their supporting calculations were examined. The inspectors determined that adequate supporting verifications and/or reviews were performed for the approval of requested field changes. The review and verification ranged from detailed calculation addenda (i.e. calc #13432.27-19,-13,-12) to simple analyses and checking the change against the original analyses.

4.1.2 Design Interface and Document Control

The design responsibility for the SDV was assigned to Stone & Webster Engineering Corporation (S&W) by the licensee. The quality assurance plan for the S&W scope of work was described in a Project Instruction, PI-8, Rev. 0. During the review of PI-8, the inspectors noted that although the plan established quality assurance requirements for design control, no specific provisions had been delineated for the control of design changes after the formal approval and issuance of the original design. The inspector further noted that the A/E (S&W) had apparently recognized this oversight and tried to alleviate this discrepancy by developing a design change control program which is contained in procedure PI-19. The procedure contained very similar provisions of change control as the A/E's standard procedure/practice for such changes. However, apparently due to a dual responsibility between the licensee and the A/E in this area, PI-19 had not been fully implemented. Specifically, PI-19 requires that no more than two changes be outstanding against a specification at anytime. As of March 22, 1984, there were more than 60 changes posted against the SDV electrical installation specification and more than 25 changes were posted against the SDV mechanical installation specification. These specifications had not been updated since 11/24/82 (electrical spec.) and 6/23/83 (mechanical spec). The failure to establish appropriate document control measures for handling changes is the first example an apparent violation of Criterion VI of Appendix B, 10 CFR 50. (219/84-09-1A).

There did not appear to be a GPUN requirement or system to assure that design documents such as installation specifications were properly distributed. The mechanical specification, OCIS-402017-001, was a typical example. The document was prepared, reviewed and forwarded by S&W to GPUN for approval and issuance in December 1981. The licensee reviewed the document made several significant changes, and issued the specification for use in July, 1982. However, the changes were neither communicated to the originator (S&W), reviewed by them, and/or resolved through mutual agreement; moreover, the licensee failed to transmit the approved specification to the A/E for information and use by S&W design engineers. The inspector further noted that the same specification (OCIS-402017-001) was revised and reissued in June 1983, but numerous field changes (FCR's) posted against it were not incorporated into the document, and the revised specification was also not transmitted to the A/E for their use. This failure to distribute changes to design documents to the location where the design activity was being performed is another example of an apparent violation of Criterion VI of Appendix B, 10 CFR 50 (219/84-09-1B). More significantly, any changes made by GPUN through changes to design documents such as Design Criteria, Modification Proposals and Installation Specifications were apparently made without appropriately evaluating the impact of changes since it was determined, at least for the SDV, that design changes were not transmitted to the original design organization (which still possessed the original design work/analyses) for evaluation. This is an example of an apparent violation of the design control requirements of Criterion III of Appendix B, 10 CFR 50 (219/84-09-2A). This indication of inadequate document control distribution also manifested itself in other areas such as originators of FCR's referencing the wrong revision of specification (FCRs C-017070 and C-16408) and requesting changes in a specification that already had been changed several months prior, (FCR017046) thereby indicating a lack of awareness of current specification revision and the contents thereof.

The inspectors also observed that the revision 1 of the mechanical specification did not contain all approval signatures as required by the engineering procedures. The licensee's procedure (EP-20) requires that the revisions of installation procedures be reviewed and approved by the same organizations as the original issue. The original issue (Rev 0) indicated review and approval by engineering management and quality assurance, however, the revision was issued without any evidence of such review and/or approval. This is another example of an apparent violation of the document control requirements of Criterion VI of Appendix B, 10 CFR 50 (219/84-09-1C).

4.2 Construction

The inspectors discussed the modification with licensee installation personnel and reviewed selected as-built drawings. The mechanical installation procedure (including changes thereto) was reviewed for adequacy, consistency with design requirements and proper QC hold points. The inspectors reviewed the material tagout (83-944, issued 7/27/83) for adequacy. Also, the inspectors observed the modified system for consistency with as-built drawings and for proper workmanship. The following problems were identified:

a. On several pipe supports, the cotter pins to retain the clevis pins were not properly installed. Cotter pins were completely missing from both clevis pins on one support, presenting the potential for the support to become disconnected. This had been noted by GPU QC inspectors. See Detail 4.4.

b. Mechanical snubber NC*IPS-011-2 was not protected from potential damage in accordance with manufacturer's instructions and good engineering practice. The inspectors questioned the licensee as to their generic program to protect mechanical snubbers during construction activities. The licensee responded that there are only a total of five mechanical snubbers in the entire plant and four of them are in the drywell in areas where no construction activity was required. They stated action would be taken to protect snubber NC*IPS-011-2 and verify its operability. This action will be verified in a subsequent inspection (219/84-09-03).

c. The inspectors observed that conduit supports associated with scram discharge volume level transmitter LT RD 86 were not properly fastened to the concrete floor along which the conduit is routed. In particular, the expansion anchor bolts (EAB's) installed to fasten the strut type supports to the concrete floor had not been torqued or inspected. Upon subsequent investigation, it was determined that these supports were never identified and, therefore, were not known to be in existence. As a result, they were never inspected by QC. The failure of Maintenance and Construction to identify the conduit supports in accordance with installation procedures, thus resulting in unsatisfactory and uninspected installed EAB's, is contrary to the requirements of Criterion V of Appendix B of 10 CFR 50 (219/84-09-4A). This is an example of an apparent violation regarding failure of Maintenance and Construction to generate thorough procedures and to follow construction related procedures/documents. It should be pointed out that the licensee identified the affected conduit supports and torqued and inspected the EAB's under QC cognizance prior to the end of this inspection.

d. The inspectors compared the as-installed condition of hanger NC-I*IPS-002-2 to Stone and Webster design drawing 13432.27-EM-3, Sheet 1 of 4. This comparison identified the following discrepancies:

- Undersized and mislocated fillet welds connecting the strut clevis to the base plate.

- FCR No. C-017084, which modified the installation, contained a dimensional discrepancy for the C-C dimension of the strut, i.e., in the elevation view, the dimension was specified as 9-3/4", but in the plan view it was specified as 10". The actual field measurement was approximately 10-5/8" which is in excess of either drawing specification.

- The centerline of the clamp ears and the centerline of the clevis are shown to be in the same horizontal plane on the drawing. The actual field condition indicates the centerline of the clamp ears is in a plane lower than the centerline plane of the clevis. Additionally, the movement of the supported pipe from cold to hot is in a downward direction. The orientation of the clevis is such that the strut paddle is not free to rotate vertically. The manufacturer limits the angular position of the strut centerline to the clevis centerline to 6° in this situation.

QC had inspected this installation. The failure of QC to identify the above listed welding deficiencies and to question the acceptability of the dimensional discrepancies is contrary to the requirements of Criterion X of Appendix B of 10 CFR 50 (219/84-09-5A). This is an example of an apparent violation regarding failure of QC to perform thorough inspections of in-process and completed construction activities. It should be pointed out that a sample reinspection of the welds inspected by the inspector involved in the undersized welds was performed by the licensee prior to the end of this inspection and no additional discrepancies were identified. Additionally, the failure of design engineering to specify the 6° angular limit on the drawing is contrary to the requirements of Criterion III of Appendix B of 10 CFR 50 (219/84-09-2B). This is an example of an apparent violation regarding failure of the licensee to perform adequate review of design documents. And, the failure of Maintenance and Construction to install the support in accordance with the drawing is contrary to the requirements of Criterion V of Appendix B of 10 CFR 50 (219/84-09-4B). This is an example of an apparent violation regarding failure of Maintenance and Construction to generate thorough procedures and to follow construction related procedures/documents. Other examples in each of these areas are included elsewhere in this report.

e. The inspectors reviewed Stone & Webster Design Drawing 13432.27-EM-3 that described the Scram Discharge Volume modification of small bore and instrument line supports and shielding. General note No. 17 of this drawing stated that the support manufacturer (NPSI) should ensure that the rod end bushings of pipe supports will not become disengaged as described in NRC IE Circular No. 81-05. A visual inspection of several pipe supports indicated that two of them (10NC-2*PSST038-2 and 10NC-2*PSST008-2) had significant gaps in the pipe clamp to permit the complete disengagement of the bushing from the assembly. The consequences of complete disengagement of the bushing would be to invalidate the original analytical assumptions used in the piping analysis, potentially creating an overstress condition in the piping or overloading the supports.

The licensee's Purchase Order No. 202154 for these pipe supports stipulated that NPSI should ensure that the pipe supports conform to various specifications, which in effect, directly relate to IE Circular 81-05. In GPUN Surveillance Report OC/1/00303, Rev. 0, dated 4/5/83, the licensee's QA Surveillance Representative examined the pipe supports prior to shipment and found them acceptable. However, this surveillance report did not address the rod end bushing issue and no documentation was available to prove that the QA Surveillance Representative verified this attribute. The licensee stated that a more thorough review of records was needed to determine if such documentation exists. This item will remain unresolved until the licensee can verify that the rod end bushing issue was adequately addressed by some type of QC inspection (219/84-09-06).

4.3 Testing

The inspector discussed the installation startup tests with licensee personnel. A sampling of completed tests was reviewed for adequacy, proper approvals, and proper completion. The test results have been reviewed by Startup and Test group (SU/T) management, but are still subject to Test Approval Group (TAG) review. The inspector verified the TAG approval of test results is included on the incomplete work test (IWL). In reviewing SDV instrument calibration and functional test records, the inspector noted that several FQ's were necessary in order to obtain clear guidance on level instrument trip setpoint acceptance criteria, once finalized acceptance criteria were properly implemented. One test required by the Generic SER was a functional test via scramming from normal operating temperature and pressure with less than or equal to 50 percent rod density. The inspector verified that the test is on the IWL.

4.4 Turnover

This modification was turned over from Technical Functions SU/T to the plant organization on March 23, 1984. The inspector reviewed the SU/T Incomplete Work List (IWL), the Modification Control Checklist (Procedure 124, Attachment 1), and the Turnover Meeting Minutes. The inspector checked that incomplete items had been integrated by the Plans and Programs Group onto one Incomplete Work List (dated March 26) with target completion dates and responsibilities listed for each item. The inspector verified that the plant contact engineer was compiling an engineering file for the modification.

One inconsistency was noted with respect to the consolidated IWL. SU/T IWL items involving resolution of QC Phase I walkdown items, both electrical and mechanical, had been consolidated with "QC Final Walkdown" into one line item on the IWL, with an assigned completion date of June 1. The Turnover Meeting conclusion was to recommend a "System in Service" status, which involves a determination that outstanding items do not interfere with system operation. The inspector disagreed with the determination, in that some items involved missing cotter pins on pipe support clevis pins. The inspector stated that pipe supports that could potentially become disconnected would interfere with operation. At the time of the inspection, the Director of Plant Operations had refused, because of his concerns over IWL items, to accept turnover to the plant operations group. On March 29, the licensee added detailed listings of QC Phase I walkdown discrepancies to the IWL for SDV mods, and instituted a policy that IWL's will list specific discrepancies rather than summaries, so that management will be able to better evaluate individual items. The effectiveness of IWL as a management tool and an aid to the turnover process will be evaluated in a future inspection (219/84-09-07).

4.5 <u>Operations</u>

The inspector reviewed the licensee's procedure revision tracking system and procedures index. Those procedures needing revision appear to have been properly selected. Two completed procedure revisions as well as seven procedure deletions were reviewed. The revisions appeared appropriate. The deletions involved interim (IE Bulletin 80-17) requirements that are superseded by the long-term modifications. Five other procedure revisions were in the review chain; these were included on the IWL.

Two inconsistencies regarding procedures were noted.

a. The licensee had deleted from his Master Surveillance Schedule the requirement to functionally test SDIV level switches following each scram. This was a requirement of IEB 80-17 that was also specified as a long-term measure due to ongoing NRC concern for level switch reliability (reference: Generic SER, December 1, 1980). The licensee committed to functionally testing the level switches after each scram. (This testing is in addition to Technical Specification required periodic functional tests).

b. The inspector noted that SDV vent and drain valves are not included in the local leak rate test program. The containment integrated leak rate test (ILRT) procedure, as currently written, does not test the SDV, SDIV, or vent and drain valves. In an actual LOCA, the reactor would be scrammed, so leakage from the SDV system would be a containment leak path. Therefore, the licensee's containment leak test program should include measurement (and minimization) of this leakage. The licensee agreed to study this issue. Pending licensee analysis and subsequent NRC evaluation, this matter is unresolved (219/84-09-08).

The inspector reviewed operator training for the SDV modifications. A classroom lecture had been given. Makeup training for those missing the lecture is being tracked on the restart certification list. Walk-throughs are planned and are on the IWL. Also, a summary lecture to briefly discuss each modification is planned. The inspector reviewed the SDV lesson plan and discussed the training with the instructor and a sampling of operators. No inadequacies were identified.

The inspector verified that a revised piping and instrument drawing had been provided to the control room. The remaining drawing revisions are on the IWL. The inspector also reviewed the system valve line-up check-off list which had been partially completed as of this inspection.

The inspector noted that a Technical Specification change request to revise the SDIV level instrument operability requirements had been submitted. The licensee's submittal, dated December 21, 1983, stated that the trip setpoints would be clarified after startup testing. This supplemental submittal is being prepared and its approval is being tracked via the restart certification list.

5.0 Control Room Alarm System

This modification is classified "important to safety". The control room annunciator modification does not effect any other plant system during normal plant operation. The objectives of the modification were to:

-- Provide a means for the sequential and automatic recording of alarms.

-- Provide a means of reducing the number of spurious alarms.

-- Increase alarm capacity of the annunciators.

-- Improve the serviceability of annunciator panels.

-- Improve the control room man-machine interface.

5.1 Design

The System Design Descriptions (SDD) and associated documentation were inspected for conformance with applicable NRC and licensee requirements to determine if:

-- Appropriate safety evaluation was performed (50.59).

-- Proper review and translation to procurement and installation specifications were conducted.

-- Proper design reviews and approvals were received.

-- Proper transfers were made of SDD requirements through procurement and installation specifications, drawings, or other communications to vendors and the maintenance and construction division.

-- PORC reviews and approvals were sought and received.

-- Facility Change Requests and Notices (FCRs, FCNs) were properly processed.

This inspection included the following documents:

-- Modification Proposal 244-77-3, Oyster Creek Control Room Alarms

-- Installation Specification for wire trough and reflash units (OCIS-402058-002)

-- Installation Specification for control room annunciator upgrade (OC-IS-402058-001)

-- All FCR's and FCN's for B/A 402058

The following discrepancies were noted. FCR 013863 was issued and implemented changing the logic on the moisture separator reheater turbine trip annunciator logic without design verification. The FCR did not indicate design verification consideration. However, this is not considered to be a safety related annunciator. FCR 008648 blanked out annunciator "Head Seal Leakage HI". Head seal leakage detection had previously been removed by another modification, therefore, the annunciator was no longer required. The licensee is investigating documentation to support the modification to remove head seal leakage detection. The inspector will review this area in a future inspection (219/84-09-09).

The inspector requested to examine the analysis of battery load discharge rate upon automatic bus transfer prepared as a result of the safety evaluation. The analysis is to be provided for review by the resident inspector at a later date. The Fire Hazards Analysis Report Annunciator Upgrade will also be made available for resident inspector review.

As a result of the large number of FCR's issued against this modification, the licensee was questioned as to the kind and extent of field verification conducted prior to commencing modification work. The licensee replied that little drawing verification was conducted. This is significant considering the number of annunciator changes that occurred since initial plant construction. The failure to update base design documents is cited in Section 4 as an apparent violation. Licensee management has made a commitment to determine an apparent violation. Licensee management has made a commitment to determine if the effect of design changes has been appropriately considered by the original design organization.

5.2 Construction

A review was conducted to confirm if design requirements and criteria as established in SDDs were correctly implemented during construction by determining if:

-- Appropriate quality control was exercised during planning.

-- Installation procedures were adequate.

-- As-built drawings reflect plant arrangement.

The following documents were reviewed and found to have accomplished the above:

-- Bill of Materials Conduit Layout (GU-3BM-611-14-001) (40F83)

-- Bill of Materials Panel Annunicators (GU-3BM-611-15-001) (50F83)

-- Bill of Materials TB-1F-QC Mounting Details (GU 3BM-611-15-003) (80F83)

-- Bill of Materials Relay Mounting Panel Annunciators (GU-3BM-611-15-002) (70F83)

-- Installation of new annunciators in control room panels (A15B-30058)

Electrical elementary and electrical connection diagrams were used to conduct a visual inspection of the modified system and hardware. No unacceptable conditions were identified.

5.3 Testing

A review was conducted to confirm if design requirements were met by determining if:

-- Startup and test requirements adequately test the system or component.

-- Test results were reviewed and any anomalies were resolved.

-- Test results demonstrate that design requirements were met.

No deficiencies were noted. The resident inspector will follow ongoing testing to verify all annunciators are properly activated by the sensor devices prior to startup.

6.0 Neutron Monitoring System Intermediate Range Monitor (IRM) Modification

6.1 Design

This modification was initiated to eliminate operational difficulties encountered in switching from IRM to local power range monitors (LPRM)/average power range monitors (APRM) when adequate LPRMs are not on-scale and a LPRM/APRM downscale rod block results. The modification basically involves enabling a tenth range plus installation of relays to enable APRM and IRM upscale rod blocks and MSIV closure when reactor pressure is below 825 psig with mode switch not in the run position.

Design documents invoked various codes and standards for design, material, fabrication and testing which equalled or exceeded those used for initial construction of the systems. This modification has been incorporated in the Operating License through Amendment number 71.

No discrepancies were noted in the design phase of this modification; however, 47 field questionnaires and change requests were generated which may be indicative of inadequate constructability review. This was discussed with licensee management at the exit interview.

6.2 Testing

Startup and test procedures were reviewed and determined to contain adequate measures to demonstrate satisfaction of modification requirements. The test procedures were well prepared as evidenced by the lack of all but minor changes during the conduct of testing and were reviewed and approved prior to conduct in accordance with licensee administrative controls. Quality assurance personnel witnessed the conduct of the portions of the functional test. The package was scheduled for Test Approval Group (TAG) review during the week of April 2, 1984.

6.3 Turnover

The turnover package was reviewed with the plant contact engineer for this system. The most extensive items in the incomplete work list (IWL) include the plant procedures which must be revised prior to start-up. These procedures have been identified by the licensee and are under preparation.

6.4 Operations

Training has been partially completed including simulator training for operators. Additional training to include minimum recirculation flow requirements which are essential elements of the technical specification amendment has been identified. The training element in which this will be included had not been finalized at the time of the inspection.

No deficiencies were noted in the inspection of this modification.

7. Installation of Type HFA Relays in Reactor Protection System (RPS) Systems

7.1 Design

The following documents were reviewed for compliance with NRC regulations and GPU Plant modification control:

-- Installation Procedure

-- Pre-Installation Testing of HFA relays (wire continuity test)

-- A/E Drawings

-- Vendor Drawings

Other plant system modifications required relay wiring changes. These changes were allowed to proceed before the replacement was started. Continuity tests were based on systems as modified. No deficiencies were identified.

7.2 Construction/Installation

These relays were replaced witn model 12HFA151A9F Century Series type relays because the previous relays had reached their "end of life". This replacement was in response to General Electric Service Advice Letters and Service Information Letters which were issued to end-users in 1980 and 1982. Subsequently, IE Bulletin No. 84-02, "Failure of General Electric Type HFA Relays In Use In Class 1E Safety System" was issued. This bulletin covers the use of HFA relays in systems other than the Reactor Protective System (RPS). A total of 90 relays were purchased on P.O. 2291, dated April 18, 1983. These 120 volt AC relays were used to replace 68 relays in RPS panels 6R and 7R. A total of one hundred and twenty replacement 125 DC relays were also purchased on PO 2292, dated April 19, 1983 to be used as replacements as required by IE Bulletin No. 84-02. The AC relays were bench tested upon receipt. These tests were witnessed by QC. Since some of the wire tags had previously fallen off, new wire markers with Ray Chem shrink fittings were applied during the replacement. The removal and reattachment of each wire and continuity test was witnessed by QC. The completed installation on the RPS panels 6R and 7R was inspected and found satisfactory. This modification is completed.

No deficiencies were noted in the inspection of this modification.

8.0 Appendix J Modifications

8.1 Design

The Appendix J modifications resulted from commitments the licensee made to the NRC in a letter dated 11/22/78. This letter discussed the fact that certain containment isolation valves, which were not capable of being individually leak tested per the requirements of 10 CFR 50 Appendix J, would undergo piping system modifications to facilitate leak rate testing. The inspectors reviewed this letter and the design, installation, and test documents that resulted from it to ensure all commitments were met. The results indicated that all commitments were addressed, but that the Reactor Head Cooling containment isolation valves commitment required clarification. Specifically, Item 10 in Table 1 of the letter stated provisions would be made to permit Type A testing of these valves. The particular modifications made, however, were to permit Type C testing. This inconsistency is unresolved pending clarification of the type of test that will be performed on these valves and review of the plant leak rate test procedure to ensure that the type of test performed is consistent with the commitment letter (219/84-09-10).

The particular system modifications reviewed included:

-- Reactor Head Cooling

-- Reactor Sample

-- Reactor Cleanup

-- Liquid Poison

-- Control Rod Drive Hydraulic

-- Feedwater

-- Reactor Building Closed Cooling Water

The design portion of this review involved reviewing the System Design Descriptions, Modification Proposals and Installation Specifications for each of the above listed system modifications. It was determined that the scope of work involved piping system modifications such as addition of block, vent, and drain valves and hangers to existing piping both inside and outside containment. No electrical work was involved. The modification used various codes for design, material, fabrication, and testing. In all cases, it was determined that the codes used met or exceeded the requirements of those used in initial construction for these systems. It was also determined that Stone and Webster, Burns and Roe, and GPU Nuclear were involved in the design process. No problems were identified with the various design documents reviewed. It was observed, however, that an unusually large number of Field Questionnaires (FQ's), Field Change Notices (FCN's), and Field Change Requests (FCR's) were written to address various questions that arose from attempting to use these documents to construct the modifications. This situation indicates that there was insufficient knowledge of the as-built conditions of the systems to be modified. This statement was corroborated through discussions with various personnel who stated that Project Engineering personnel responsible for the design did not spend sufficient time reviewing the modifications for constructability. This situation was exacerbated by the difficulties encountered getting to the various work areas because of inaccessibility due to radiation. Efforts should be made to address this weakness in future modification work. This observation was discussed with the licensee at the exit meeting. The failure to appropriately incorporate changes into design documents is treated as an apparent violation (See Section 4)

8.2 Construction/Installation

The inspectors reviewed the documentation contained in the turnover packages for the Reactor Head Cooling, Reactor Sample, Reactor Cleanup, and Liquid Poison modifications. These packages included installation, cleaning, and hydrostatic test procedures, weld maps and history records, work permits, drawings, related correspondence by way of memos and associated FQ's, FCR's, and FCN's. The installation procedures are the controlling documents for the work and are reviewed and approved by several organizations including plant staff. These procedures contain the various QC hold points and signoff sheets. The inspectors also reviewed a sample of the completed work activity. These reviews resulted in identification of the following problems:

8.2.1 Installation Specification 259-78-16, Rev. 1 for the Liquid Poison modification specifies that all material will be ASME III Class 2. Installed valve V-19-50, a 3/4" isolation valve, was observed to be a Class 3 valve as indicated by the attached vendor's tag. This installation had been inspected by QC. The failure of QC to identify the use of a Class 3 valve in place of the required Class 2 valve is contrary to the requirements of Criterion X of Appendix B of 10 CFR 50 (219/84-09-5B). This is an example of an apparent violation regarding failure of QC to perform thorough inspections of in-process and completed construction activities.

8.2.2 Arc strikes were identified on 2" line RHC-1 both upstream and downstream of valve V-31-6 in the Reactor Head Cooling System. No evidence was available to show that these arc strikes had been identified and evaluated. This installation had been inspected by QC. Subsequent investigation determined that QC did not have an inspection attribute in their visual inspection procedure (MTNE-001) to inspect for arc strikes. The failure of QC to have such an attribute in their visual inspection procedure and failure of QC to identify and evaluate the arc strikes is contrary to the requirements of Criteria X of Appendix B of 10 CFR 50 and is another example of an apparent violation (219/84-09-5C). Subsequent to this finding, the licensee removed the arc strikes and determined them to be minor. Additionally, the licensee added an inspection attribute to visual inspection procedure MTNE-001 to examine piping and valves for arc strikes.

8.2.3 Stone and Webster Isometric Sketch No. 11, which, in part, illustrates the location of hangers on the Reactor Head Cooling system piping and calls for a single hanger in the vicinity of valve V-31-2. Inspection of this installation indicated the existence of a second hanger between valve V-31-6 and the added vent manifold (approximately 2' from the new hanger). A review of Installation Procedures A15F-30024, Rev. 0, indicated that this hanger was not addressed, i.e., no directions were given to either remove or reinstall it. Subsequent investigation determined that engineering was aware of this hanger and had assumed this hanger would aid in carrying the loads. The failure of Maintenance and Construction to include appropriate instructions in the installation procedure to remove and reinstall the hanger and the subsequent failure to accomplish installation activities in accordance with the installation procedures is contrary to the requirements of Criterion V of Appendix B of 10 CFR 50 (219/84-09-4C). This is an example of an apparent violation regarding failure of Maintenance and Construction to generate thorough procedures and to follow construction related procedures/documents. Additionally, the failure of QC to identify the existence of this hanger, which is within the boundaries of the modification, as a discrepancy from the design drawing and installation procedure, is contrary to the requirements of Criterion X of Appendix B of 10 CFR 50 and is another example of an apparent violation (219/84-09-5D).

8.2.4 A review of the Reactor Cleanup modification documentation disclosed a FQ written against Installation Procedure A15C-30024. This particular FQ (FQ No. C-013986) was written to address the fact that a recirculation variable load pipe support interfered with required access needed to weld valve V-16-133. The resolution of the problem was to temporarily remove the permanent plant support after supporting the recirculation pipe with temporary rigging, match-marking the support for subsequent proper reinstallation, and reinstalling it before refill. This FQ should have resulted in a change to Installation Procedure A15C-30024 to accomplish this task. In this way, removal of the support from the recirculation piping and correct reinstallation of the support would have been appropriately approved and tracked. However, a review of the installation procedure indicated that it had not been modified to incorporate the removal and reinstallation of the recirculation line variable load support. The failure of Maintenance and Construction to initiate a change to the installation procedure is contrary to the requirements of Criterion V of Appendix B of 10 CFR 50 and is another example of an apparent violation (219/84-09-4D).

The inspectors questioned the use of punch marks in the fitup of socket welds because several punch marks appeared to be at least 1/32" deep. In particular, the inspectors asked if an evaluation of the punch mark depth had been performed to determine if minimum wall thickness requirements had been violated. It was determined that a thorough evaluation had not been performed. Measurements and evaluation performed during this inspection indicated minimum wall thickness had not been violated.

The inspectors also determined that attachment welds were made to the inside wall of the drywell. Because the drywell is considered to be an ASME Section VIII pressure vessel, the inspector questioned Project Engineering as to what evaluation had been made regarding pressure retest requirements of the drywell as a result of making these attachment welds. The inspectors were informed that this issue had been addressed during a previous modification that had involved welding to the drywell. In particular, agreement had been reached with the applicable Code agencies that the drywell integrity would be verified by acceptable performance of the containment during the 10 CFR 50 Appendix J Type A integrated leak rate test. The inspectors considered this to be an acceptable response.

The inspectors reviewed the WPS, PQR, and welder qualification record for one dissimilar metal weld specified on FCR C-011593. No discrepancies were identified. Individual weld records for a sample of field welds were reviewed to determine if step-by-step signoffs were properly completed and QC and ANI hold points were established and had been adhered to. No discrepancies were identified.

8.3 Testing

The only testing involved in these modifications is hydrostatic testing of new welds. All welds that could be hydrostatically tested were done and others will wait until the reactor vessel pressure test because they are unisolable. The hydrostatic test procedures for several of the modifications were reviewed and found acceptable. The particular criteria inspected were: application of test pressure required by the installation specification, pressure held for at least 10 minutes prior to conducting inspection, evidence of use of relief valves and calibrated instruments, and proper signoff by QC.

9.0 Masonry Walls, Bulletin 80-11

The masonry wall upgrade program pursuant to the above bulletin was reviewed to determine the extent and acceptability. The program was separated into two areas (design and installation) for this inspection.

9.1 Design

The inspector reviewed documentation and held discussions with cognizant licensee personnel for plant modification No. 402240 to determine the acceptability of the identification, analysis, evaluation, and proposed fixes for unacceptable walls. The following documents were reviewed:

-- IE Bulletin 80-11, "Masonry Wall Design"

-- JCP&L submittal to NRC, dated July 7, 1980

-- JCP&L submittal to NRC, dated September 19, 1980

-- JCP&L letter to B. H. Grier, NRC, dated November 14, 1980

- -- JCP&L submittal to NRC, dated April 30, 1981
- -- NRC Technical Report on "Applicability of Energy Balance Technique to Reinforced Masonry Walls"
- -- NRC Technical Report on "Applicability of Arching Theory to Unreinforced Block Masonry Walls Under Earthquake Conditions"
- -- Summary of Meeting between NRC and Licensee on November 3, 1982
- -- GPUN submittal to NRC:NRR of August 11, 1983
- -- GPUN submittal to NRC of November 2, 1983
- -- JCP&L Modification Proposal No. 509-80-1 "Removal of Masonry Walls"
- -- GPUN Installation Spec. I.S.509-01-2 "Boundary Supports of Masonry Walls
- -- GPUN Technical Spec. No. GPUN SP-9000-33-001 "Furnishing and Installation of Concrete Expansion Anchors: Single Wedge, Double Wedge, and Ductile Failure Anchors"
- -- JCP&L Modification Proposal No. 509.01-1 "Boundary Supports for Masonry Walls"
- -- GPUN Specification SP-1302-23-001, "Repair of Cracks in Concrete Block Walls
- -- GPUN Installation Spec. No. OCIS-402240-003 "Control Room Wall Paneling"
- -- Detailed Evaluation and Design Calculations for Block Wall Nos. 21, 22, and 23.

By review of above documentation and discussion with licensee personnel, the inspector determined the following:

- -- The licensee had identified and evaluated all block walls in the plant in accordance with the Bulletin 80-11.
- -- A comprehensive program of analysis, evaluation, and redesign for all upgrading has been carried out.
- -- The licensee submitted for acceptance detailed information to NRC regarding the analytical methods, safety evaluation, and proposed fixes to the walls.

The licensee's analyses, evaluations and proposed modifications are currently under review by NRC. NRC will issue a safety evaluation report after the review.

9.2 Construction/Installation

The inspector visually examined completed and in-progress modification work to assess the acceptability of workmanship, adherence to procedures, and conformance to design. The inspector observed the following:

-- The licensee has initiated a prioritized program to modify affected walls to meet the safety requirements.

-- Modifications to high priority walls has been completed or are in progress.

-- The completed or in-progress modifications are based on the licensee's analysis and evaluation and conform to the established requirements for upgrade.

-- Workmanship was of acceptable quality.

-- Construction/installations procedures were followed as required.

-- Request for deferral of modification on some walls until the next plant outage due to less safety significance of those wall on plant operation.

Based on the above observations, the inspector determined that the modifications of the walls was performed in conformance to the licensee's design and analyses. This item will remain open pending issuance of the final SER.

10. New Cable Spreading Room and Raceway

10.1 Design

The following documents were reviewed for compliance with NRC regulations and GPUN plant modification control.

-- System Design Description

-- Fire Hazard Analyses

-- Safety Evaluation Report

-- Procurement Specification

-- Installation Specification

-- A/E Drawings

-- Vendor Drawings

No significant discrepancies were noted.

10.2 Construction/Installation

10.2.1 Missile Protection

The new cable spreading room (NCSR) has two ventilation openings through an existing wall. These openings present a potential pathway into the NCSR from a tornado gernated missile. The licensee indicated that the probabilistic risk assessment (PRA) which was done for such a potential missile indicates that these openings need not be protected. However, preliminary review of this PRA indicated that it addressed potential missile damage to cable tunnels rather than these openings.

10.2.2 Security

The NCSR is located directly above the present control room. This area was previously used as a mechanical equipment room. Some ventilation equipment remains in this area. A wall with a security entrance controlled by a card reader has been installed to limit access to the NCSR. Although the licensee stated that this system was tested, it has not been put into use because of the continued construction in the NCSR. Penetration openings were made through the floor into the control room below. They consist of steel sleeves with caps screwed on to those sleeves not in use. Since these caps can be unscrewed to provide direct openings (5½-inch diameter) into the control room below the NCSR, the licensee was informed of the existence of a potential security concern. Although it was determined that openings of this size were within the limits of the criteria as specified in the Oyster Creek approved security plan, the licensee immediately secured these openings with a special wrench to reduce the possibility of them being opened. Also, although the normal access will be by a controlled door, there were two ventilation openings through a wall into the NCSR with only metal louvers and a wire mesh screen covering. These two ventilation openings did not have a barrier equivalent to a concrete wall. There was no indication that design of the NCSR considered this aspect in designing the room as an intended vital area (to become a vital area after the next outage). This is another example of an apparent violation involving inadequate implementation of design control measures (219-84-09-2C).

There are two pathways into the tunnels that carry redundant safety cables. As presently designed these openings are not secured against entry. This is an additional security concern that needs to be addressed (219/84-09-11).

10.2.3 Fire Detection and Protection

An ionization type smoke detection system is provided in the NCSR and two cable tunnels. The detectors are installed, but have not been tested. A fixed water sprinkler system is provided with drains in the NCSR. The sprinkler system is not complete. A hose station outside the NCSR with a 75 foot hose is the back up to the sprinkler system. It was not installed at the time of this inspection. Some trays extend beyond the last support, but will be removed to provide access throughout the room for manual fire fighting.

A fixed water sprinkler system is also to be provided in the cable tunnels. This system was not installed. This system will be backed up by a hose station with a 100 foot hose, which also was not installed. Design to prevent freezing must also be addressed by the licensee.

A potential fire hazard exists that could affect redundant cables associated with each tunnel. Cables between the NCSR and tunnels would be exposed to a roof fire in this vicinity. There is an opening between the roof and the tunnels which could allow a roof fire to propagate to both redundant tunnels. This violation is another example of inadequate implementation of design control measures (219-84-09-2C).

10.2.4 Electrical Separation

This modification provides a new class 1E cable spreading room and cable tunnels. This system will provide a raceway for future modifications requiring I & C cabling between the control room, reactor building and the turbine building. All future cabling is to comply with the separation requirement of Regulatory Guide 1.75 and IEEE Standard 384, 1977. The modification proposal No. 551-81-1, Rev. 1, dated April 10, 1981, paragraph 6.5.3.5, Electrical Separation, contains an exception that compliance is not required where it becomes physically impossible. Such an exception would not appear to be needed in that the standard permits enough means to comply if space distance can not be achieved. This was discussed with licensee representatives. An examination of the new cable spreading room trays indicated that it appears to be designed to meet the separation standard.

10.2.5 Cable Routing

Cable side wall pressure control is not addressed in Installation Specification 7187, Rev. 3 dated August 6, 1982. The licensee indicated that they will address this omission.

11.0 Transverse In-core Probe (TIP) Upgrade

11.1 Design

This modification resulted from Technical Data Report No. 358 of 9/2/82 which recommended the following modification (in conjunction with overhaul of the remainder of the system) in order to improve the overall reliability of the system:

-- Replacement of indexers with improved model;

-- Replacement of limit switches with proximity switches; and

-- Elimination of slotted guide tubes.

The system is classified as not important-to-safety with the exception of the shield chamber proximity switches due to the interface with the primary containment isolation system.

The design portion of this review involved examination of the System Design Description (SDD) Division I and safety evaluation (a memo from the Manager, Mechanical Components to Manager, Oyster Creek Engineering Projects dated March 15, 1984 requested waiver of Division II SDD) and installation procedures to verify satisfaction of installation specifications. This modification is, in essence, the replacement of existing marginally useable equipment with equipment of improved design with no change in the system's function. No problems were identified as a result of the design documents reviewed. It was noted that four submittals between 10/27/82 and 6/3/83 of the System Design description were required prior to acceptance by the Plant Operations Review Committee (PORC). Sixteen field change requests (FCRs) were generated during this modification, some of which were to improve future maintainability. The remainder were mostly minor in nature and were identified in the installation phase.

11.2 Construction/Installation

The installation procedures were compared against the installation specifications; no discrepancies were noted. The installation procedures contained quality control (QC) hold points which had been signed off in the process of installation. A limited inspection of the new installation outside the TIP shield wall identified no discrepancies.

The turnover package for start-up and test was not completed and start-up test procedures were not reviewed by the NRC inspector.

11.3 Operating Procedures and Training

Procedures affected by this modification have been identified and are under revision by the plant contact engineer. Training requirements have been identified and are scheduled for completion prior to May 15, 1984.

No deficiencies were noted during the inspection of this modification.

12. Management Interview

The licensee was advised of the purpose and scope of the inspection at the entrance interview on March 26, 1984. During the course of the inspection preliminary findings were periodically discussed with station management. Results of the on-site inspection were presented at the exit interview on March 30, 1984. On April 4, 1984, a conference call between M. P. Fiedler, Mr. R. Wilson and others, was held to discuss results of the NRC inspection at Stone and Websters offices in Cherry Hill, New Jersey.