UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-390/95-72 and 50-391/95-72

Applicant: Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Docket Nos.: 50-390 and 50-391 Construction Permit Nos. CPPR-91 and CPPR-92

Facility Name: Watts Bar 1 and 2

Inspection Conducted: September 17 through October 21, 1995

Inspectors: _____ 11/17/95
G. A. Walton, Senior Resident Inspector Date Signed
Construction

W. C. Bearden, Resident Inspector, WBN
J. Brady, Reactor Inspector, RII
R. C. Chou, Reactor Inspector, RII
R. Gibbs, Reactor Inspector, RII
E. H. Girard, Reactor Inspector, RII
F. Jape, Reactor Inspector, RII
J. F. Lara, Resident Inspector, WBN
N. Merriweather, Reactor Inspector, RII
M. Miller, Reactor Inspector, RII
W. H. Miller, Reactor Inspector, RII
C. F. Smith, Reactor Inspector, RII

Approved by: _____ 11/17/95
P. E. Fredrickson, Chief Date Signed
TVA Construction Branch
Division of Reactor Projects

SUMMARY

Scope:

This routine, resident inspection was conducted in the areas of construction work activities, Cable Issues Corrective Action Program (CAP), Electrical Issues CAP, review of quality assurance effectiveness, design baseline vertical slice review deficiency reports and open item status review.

Enclosure

Results:

Quality Control involvement in the process of identification of deficiencies in the applicant's area turnover process has been acceptable. The ongoing walkdowns should identify damaged, loose, or missing hardware deficiencies in the areas prior to turnover. However, the inspectors identified two concerns related to the applicant's potential failure to correct previously identified walkdown deficiencies. One of these is being identified as an unresolved item (paragraph 2.3). The other issue is the subject of a separate review under an ongoing NRC inspection which will be documented in IR 50-390/95-69 (paragraph 2.2). The inspector will continue to monitor the applicant's walkdown activities as well as subsequent actions to correct identified deficiencies as a result of these walkdowns.

Cable separation deficiencies were identified by the NRC and Quality Assurance personnel during this inspection period. These findings will be reviewed as part of the NRC inspections of the implementation of the applicant's Electrical Issues Correction Action Program.

Effective oversight was evident in the Quality Assurance reviews of the three completed issues associated with the Cable and Electrical Issues Corrective Action Programs. The applicant adequately completed the corrective actions associated with the Cable Issues Corrective Action Program subissues of cable bend radius and cable splices and the Electrical Issues Corrective Action Program subissues of flexible conduit installation deficiencies.

REPORT DETAILS

1.0 Persons Contacted

1.1 Applicant Employees:

*G. Benton, Quality Assurance/NRC Liaison
*K. Boyd, Site Licensing Program Administrator
*R. Beecken, Maintenance and Modifications Manager
*A. Capozzi, Concerns Resolution Staff Site Representative
*W. Elliott, Engineering and Modifications Manager
*L. Ellis, Concerns Resolution Staff
*D. Kehoe, Site Quality Manager
*D. Herrin, Licensing Engineer
*D. Koehl, Technical Support Manager
*D. Malone, Assessments Manager
*R. Mende, Operations Manager
*J. Norris, Quality Assurance CAP/SP Manager
*P. Pace, Compliance Licensing Supervisor
*R. Purcell, Plant Manager
*J. Scalice, Site Vice President
*B. Schofield, Site Licensing Manager
*C. Singletary, Quality Program Manager
*S. Spencer, Quality Assurance Manager
*R. Stockton, Licensing Engineer
*J. Symonds, Construction Completion
*S. Tanner, Special Projects Manager
J. Vorees, Regulatory Licensing Manager
*O. Zeringue, Senior Vice President, Nuclear Operations

Other applicant employees contacted included engineers, technicians, nuclear power supervisors, and construction supervisors.

1.2 NRC Personnel:

W. Bearden, Resident Inspector
*J. Brady, Reactor Inspector, RII
R. Chou, Reactor Inspector, RII
E. Girard, Reactor Inspector, RII
F. Jape, Reactor Inspector, RII
*J. Lara, Resident Inspector
N. Merriweather, Reactor Inspector, RII
M. Miller, Reactor Inspector, RII
W. Miller, Reactor Inspector, RII
C. Smith, Reactor Inspector, RII
*G. Walton, Senior Resident Inspector, Construction

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2.0 Construction Activities

Various construction activities were reviewed by the inspectors during the inspection period to evaluate the work effort to applicable procedures, codes, and standards. The results of the more significant inspection efforts are summarized as follows:

2.1 Cable and Raceway Separation (2512/20)

IR 50-390/95-64, paragraph 2.2, documents NRC findings regarding inadequate implementation of cable separation criteria involving cable trays. As a result, VIO 50-390/95-64-01, Deficiencies Involving Cables, Conduits, and Cable Trays, was issued.

During this inspection, the inspector identified an additional example of inadequate cable separation. In the cable spreading room, division B conduit MC924B was observed to be perpendicularly crossing a division A cable tray at tray node 3A53 with a separation distance greater than one-inch. However, the installed cables in the division A tray extended above the height of the tray side rails. This resulted in the cables being in physical contact with the division B conduit. Additionally, during this inspection period a QA assessment identified inadequate horizontal separation between redundant division cable trays. Applicant walkdowns also identified cable separation problems involving free-air cables. The applicant incorporated these deficiencies into PER WBPER950533 which documented physical separation deficiencies.

The applicant's corrective actions for the above deficiencies will be reviewed as part of the previously issued VIO 50-390/95-64-01, Deficiencies Involving Cables, Conduits, and Cable Trays.

2.2 Walkdown Verification for Damaged, Loose, or Missing Hardware (2512/18, /23, and /26)

During this inspection period, the applicant continued to perform WDs to identify and correct damaged, loose, and missing hardware. This process is described by Procedure MAI-1.9, WD Verification for Modifications System/Area Completion and Damaged, Loose, or Missing Hardware, Revision 6.

The NRC has identified 143 area/rooms scheduled for turnover which the NRC staff determined include a significant amount of safety-related equipment. The NRC resident staff plans to inspect each of those areas after the applicant completes turnover of area to plant staff. Nine of those 143 area/rooms remain to be turned over prior to Unit 1 fuel loading. The NRC has completed inspection of 131 of those 134 areas that have been accepted by plant staff. An attachment to this report identifies the applicant's and NRC's status relative to completion and final inspections of these areas.

The inspector reviewed NA Assessment NA-WB-95-0150. This report covered NA's monthly assessment of the implementation of the system/area completion and damaged, loose, or missing hardware WDs and the Class 1E conduit and conduit support WDs. This assessment was performed by the applicant's NA group between September 1 and 29, 1995. During this assessment, several minor hardware deficiencies such as loose bolts/screws, loose clamps, and loose locknuts were identified by QC inspectors. However, no significant hardware problems were identified during this assessment. The assessment report identified WO numbers for each of the hardware deficiencies.

Additionally, the inspector reviewed NA Assessment NA-WB-95-0168. This report documented the review by NA of 25 completed area turnover packages. Area turnover packages are QA records generated in accordance with Procedure SSP-7.57, Area Turnover. This assessment was completed by the applicant's NA group on September 29, 1995. During this assessment NA personnel reviewed the area turnover packages for completeness and also reviewed the original packages which had been submitted to DCRM were now retrievable. The assessment team concluded that the area turnover packages contained the required forms, boundary drawings, and attachments. One minor administrative deficiency was identified. That deficiency involved a missing approval signature on the Area Turnover Acceptance Sheet for Area A905, Auxiliary Building Stairwell 9. This turnover package had not yet been transmitted to DCRM, and the deficiency was corrected on the spot. No other problems were identified during the applicant's assessment.

To determine the adequacy of the ongoing WDs, the inspector performed a confirmatory walkdown of the Emergency Gas Treatment System Filter Room, 480V Shutdown Board Room 2A, 480V Board Rooms 1A and 2B, Relay Room, Unit 1 CST, Unit 1 UHI Room, Airlock to Unit 1 UHI Room, Unit 1 Additional Equipment Building Elevations 740 and 752, Unit 1 South Main Steam Valve Room, Unit 1 Shield Building Radiation Monitoring Room, Unit 1 Post Accident Sampling System Room, Airlock to Unit 1 South Main Steam Valve Room, Unit 1 Penetration Room Elevation 692, Unit 1 Penetration Room Elevation 713, and Unit 1 HVAC Room Elevation 713. These areas had recently been turned over to the plant staff.

During the inspector's walkdown of the Unit 1 CST, a large dent was noted in the upper section of the CST. The inspector reviewed II-W-95-008 and determined that this dent resulted during sandblasting operations on July 16, 1995. The tank vent had been wrapped to prevent grit from entering the tank while sandblasting. However, a rapid decrease of 17 degrees in tank temperature occurred during a thunderstorm. This sudden drop in temperature while the tank vent was wrapped resulted in negative pressure in the CST and the resultant tank deformation. The II stated that NE had reviewed the tank deformation and concluded that the CST structural integrity had not been affected, and the tank was safe to use-as-is. The inspector noted that the tank did not appear to exhibit any actual structural damage which would require repair. The inspector concurred with the applicant's evaluation of this event, and no other problems with the CST were noted.

Oversight of the area turnover process by NA has contributed to identification of most damaged, loose, or missing hardware deficiencies in the areas prior to

turnover. However, a concern was identified in the area of correction of previously identified WD deficiencies. An NRC inspector identified the applicant's failure to replace a broken conduit clamp on Conduit 1T331. This broken clamp had previously been identified by the applicant as a WD deficiency. WR C272944 had been initiated in November 1994 to correct the deficiency. This deficiency had been subsequently dispositioned as "no problem found" on the associated WO. This notation on the WO implied that the problem had been corrected when the condition actually still existed. Based on preliminary results of the applicant's review, this problem is not an isolated case. The applicant reinspected nine areas which had been turned over to the plant staff. The lists of WD discrepancies for those areas included 75 discrepancies which had been annotated as "no problem found" or "no longer exists". As a result of the applicant's reinspection of those areas, a total of 12 discrepancies which were either not corrected or reoccurred were identified. The applicant is continuing their review of this issue. This issue is the subject of a separate review under an ongoing NRC inspection which will be documented in IR 50-390/95-69. Additionally, the inspectors identified a separate concern described in paragraph 2.3, which is related to correction of deficiencies during the MAI-1.9 WDs.

2.3 Walkdown of IPS Building

The inspector performed a WD inspection of the IPS building to evaluate the condition of the area since the applicant had identified the building as being owned by the plant and being ready for operations. During the inspection, the inspector identified various colored ribbons indicating outstanding construction work.

Various orange, green, and pink colored streamers were identified on various components. The identified ribbons were presented to the applicant for evaluation. The majority of the ribbons were determined to be installed during Procedure MAI-1.9 area WDs. One ribbon indicated a nonconforming condition that should have been repaired per Procedure MAI-1.9. Other ribbons were not removed following the completion of the work to correct the deficiency. The IPS was previously considered to be a completed turnover area. This issue of potential hardware deficiencies missed by Procedure MAI-1.9 is identified as an unresolved item URI 50-390/95-72-01, Missed MAI-1.9 Deficiency. The nonconforming condition will be addressed in IR 50-390/95-69.

As discussed above, the other ribbons were not removed following the completion of the associated work. The safety significance of placed ribbons was determined minimal. However, the inspector discussed with the applicant the concern that the area was previously identified to be complete, various area WDs had taken place by the applicant, and system engineers and operations personnel did not identify these ribbons during normal plant tours prior to the NRC inspection. These ribbons were placed in visible areas with no obstructions.

Within the areas reviewed, no violations or deviations were identified.

3.0 Cable Issues CAP (2512/16)

The Cable Issues CAP is described in the applicant's Nuclear Performance Plan, Volume 4. The NRC previously reviewed the implementation of the Cable CAP at the 75 percent complete stage as documented in IR 50-390/94-53. During this inspection period, the applicant notified the NRC that the Cable Issues CAP technical subissues of cable bend radius and cable splices had been completed. The purpose of this inspection was to determine whether the applicant's implementation of the Cable Issues CAP was complete for these issues. The NRC requested, by letter dated November 12, 1992, that the applicant provide a Cable Issues CAP closure package at the 100 percent completion stage documenting the basis for concluding that the CAP was sufficiently implemented to support an NRC inspection. This CAP closure documentation was also reviewed during this inspection.

3.1 Cable Bend Radius

This issue pertains to nonconformance reports and employee concerns which stated that the minimum recommended cable bend radius was violated during the installation of cables. The applicant's Cable Issues CAP, Revision 3, described the corrective actions that were developed for implementation to resolve this technical issue. These corrective actions also addressed recurrence controls. NUREG-0847, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, Supplement 9, Appendix Y, June 1992, documented the NRC staff's reviews of corrective actions related to this issue and identified open items yet to be completed.

The NRC has previously reviewed the applicant's implementation of the corrective actions for the cable bend radius issue. The results of this inspection were documented in IR 50-390/94-53, paragraph 3.7. As documented in IR 50-390/94-53, NRC inspections to verify adequate implementation of the approved corrective actions indicated adequate implementation. Final closure of this subissue required completion of several licensing commitments, resolution of the SER open items, completion of the corrective actions identified in the Cable Issues CAP, and closure of CAQ documents and CDRs.

On October 10, 1995, the applicant informed the NRC resident inspector's office that the Cable Issues CAP subissue of cable bend radius had been completed. This inspection focused on the review to verify that there was no outstanding work associated with cable bend radius. This was verified through the review of licensing commitments, CAQ documents, and TROI data base. These inspection attributes were performed during the review of the Cable Issues CAP closure package (paragraph 3.3 below).

3.2 Cable Splices

A cable splice is defined as the connection of two or more field cables to each other or the connection of a field cable to the pigtails of a device. Beginning in 1984, various cable splicing deficiencies were identified at WBN through CAQRs, employee concerns, and NRC inspections. The deficiencies were predominately related to the misapplication of Raychem Type N heat shrinkable tubing and kits and the applicant's inability to confirm that all Class 1E

splices were identified. The licensee indicated in the Cable Issues CAP that field-installed splices and terminations may not have conformed with the qualified configuration and materials tested by the vendor (e.g., use of non-qualified materials under the splice, improper selection of Raychem tubing, inadequate seal length of the tubing, etc.). These deficiencies were determined to be reportable to the NRC pursuant to 10 CFR 50.55(e) as CDR 50-390/85-31, Incorrect Equipment Cable Terminations in Harsh Environments.

As part of the Cable Issues CAP, the approved corrective actions were to rework all 10 CFR 50.49 cable splices and selected splices in mild environment possibly subject to moisture intrusion. In early 1989, the applicant issued work implementing documents to replace the subject splices. This work was associated with the corrective actions for CDR 50-390/85-31, Incorrect Equipment Cable Terminations in Harsh Environments. During the splice replacement program implementation, the applicant became aware of problems with poor workmanship of splices and terminations (e.g., cable damage at splices, spared conductors which were not sealed properly, and improper application of the Raychem material). These deficiencies were determined reportable to the NRC as CDR 50-390/90-04, Cable Damage at Splices.

The NRC reviewed the applicant's corrective action plan to rework all 10 CFR 50.49 cable splices and those splices in mild environment subject to moisture intrusion. This review was performed as part of the Cable Issues CAP and the applicant's program was determined acceptable as documented in Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 7, Appendix P, September 1991.

In 1995, a QA assessment of the implementation of the corrective actions for the splice rework effort identified deficiencies associated with cable splices. These deficiencies included examples of cable ring cuts. These deficiencies were determined to be reportable to the NRC pursuant to 10 CFR 50.55(e) as CDR 50-390/95-02, Cable Damage at Splices and Terminations.

The NRC had previously reviewed the applicant's implementation of the corrective actions for the cable splice issue. The results of the inspection were documented in IR 50-390/94-53, paragraph 3.8. The inspection results indicated that the applicant had made significant progress in resolving and completing the cable splice issues. While the NRC did not identify major programmatic deficiencies in implementation, additional NRC review of these issues was determined warranted due to the complexity and large scope of work. Since the 1994 inspection, the NRC has performed additional inspections of the applicant's implementation of corrective actions associated with cable splices. These inspections were documented in the following inspection reports:

- 50-390/95-17, paragraph 2.1, Cable and Splice Damage Inspections
- 50-390/95-24, paragraph 3.4, Cable and Splice Damage Inspections
- 50-390/95-33, paragraph 3.0, Cable Damage

During this inspection period, the NRC completed additional reviews of the three cable splice CDRs and determined that the corrective actions were

adequately implemented. These CDRs are listed below along with the inspection report paragraph which documents the closure review.

- CDR 50-390/85-31, Incorrect Equipment Cable Terminations in Harsh Environments (paragraph 7.4)

- CDR 50-390/90-04, Cable Damage at Splices (paragraph 7.13)

- CDR 50-390/95-02, Cable Damage at Splices and Terminations (paragraph 7.29)

IR 50-390/94-72 documents two violations with multiple examples pertaining to cable splices. The specific examples included the use of 600 V splice connectors in 6900 V applications, installation of splices in manholes without the use of required oversleeves for waterproofing, and the failure to install enclosures for cable splices installed in cable trays. The NRC has reviewed the applicant's corrective actions for the violation examples. The results of these reviews are documented in paragraphs 7.26 and 7.27 of this report.

As documented in IR 50-390/94-53, the complete list of Class 1E splices to be replaced was identified in Calculation WBPEVAR8904055, Class 1E Splice List - Unit 1, Common, and Unit 2 Required For Unit 1 Safe Shutdown, as Attachment 8.1, Class 1E Splice List. The complete splice list from Calculation WBPEVAR8904055, Attachment 8.1, was re-issued as design output in DCN Q-17111-A, and the other DCNs (Q-21942-A, Q-26311-A, and Q-28031-A) supplemented DCN Q-17111-A by revising individual pages to address subsequent revisions to Calculation WBPEVAR8904055. These four DCNs are the combined list of splices required to be reworked under the splice replacement program. The inspector performed a review of DCN Q-17111-A which provided a listing of those cables which contained splices required to be reworked as part of cable splice replacement program. The inspector verified that 186 cables associated with systems 1, 72, and 74 were identified in the splice data base along with the respective splice number, location, and work implementing document. Cables included in the Q-DCN but not in the database were verified to be the result of the cables being abandoned or deleted.

The inspector also performed a review of calculation WBPEVAR8903046, Unit 2 Class 1E Cables Required For Unit 1 Operation, Revision 29. Attachment 10.8 of the calculation identified cables required for safe operation and safe shutdown. The inspector selected 12 system 30 cables from the list which were also categorized as 10 CFR 50.49 cables. The inspector verified that the cables which contained splices were included in the splice database and the splices were replaced as part of the above corrective actions.

The inspector reviewed closed PER NCRW510PPER which documented junction boxes and splices installed without being shown on drawings or documented. As part of the Cable Issues CAP review, the NRC accepted the applicant's program for cable splice issues in Safety Evaluation Report NUREG 0847, Supplement 7, dated September 1991. In accordance with the accepted plan, the applicant committed to record data on undocumented splices identified during ongoing construction activities. These undocumented splices would be evaluated and reworked as necessary to meet qualification requirements. The SER also

stipulated that if the cable replacement activities identified a significant number (based on 95/95 confidence level) of undocumented splices, the applicant would re-evaluate its program to assure that all cable splices are adequate. The PER was closed in April 1995 and documented that during the course of implementing cable work activities; 12 splices were located which were either undocumented or the material and adequacy of the splice were not verifiable. These splices were either reworked or the associated cable abandoned. The applicant's data base includes approximately 14,500 splice identification numbers associated with Class 1E cables. Based on the low number of undocumented splices which were located during the course of implementing cable work activities, the inspector concluded that the applicant had met the above NRC staff stipulation regarding the tracking of the number of undocumented splices.

On October 16, 1995, the applicant informed the NRC resident inspector's office that the Cable Issues CAP subissue of cable splices had been completed. This inspection focused on the review to verify that there was no outstanding work associated with cable splices. This was verified through the review of licensing commitments, CAQ documents, and TROI data base. These inspection attributes were performed during the review of the Cable Issues CAP closure package (paragraph 3.3 below).

3.3 Cable Issues CAP Closure Package

The inspector reviewed the closure package for the subissues of cable bend radius and cable splices to evaluate the applicant's conclusion that the CAP implementation was complete. Discussed below are the documentation package attributes for the subissues.

- Verify FSAR/Code requirements have been approved and met.

  The Cable Issues CAP closure package identifies the Cable Issues CAP criteria issues which required NRC action for resolution, such as FSAR changes. The closure report does not identify any required FSAR changes for the issues of cable bend radius and cable splices.

- Verify all SER open items have been resolved.

  The following SSER documented the NRC's conclusion that the applicant had adequately resolved the issues of cable bend radius and cable splices.

  Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 7, Appendix P, September 1991.

  Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 9, Appendix Y, June 1992.

  SSER Supplement 9 documented NRC open items pertaining to cable bend radius which required additional NRC review. These items have been

subsequently reviewed and closed as documented in paragraph 7.19 of this report.

- Verify all commitments made by the CAP/SP have been adequately implemented.

  The respective closure reports identify the commitments which were related to the issues of cable bend radius and cable splices. All of the identified commitments have been closed.

- Verify specific items which formed the basis for the CAP, identified in the applicant's matrix dated July 13, 1989, have been resolved and field implemented.

  The respective closure reports identify the CAP source items. The identified source items have been closed.

- Verify items such as CAQs, CATDs, NRC commitments, etc., which were identified by the applicant after July 13, 1989, to be resolved by the CAP corrective actions, have been resolved and field implemented and the documentation adequately closed.

  NRC commitments are discussed above. CATDs are discussed below. The inspector performed a review of the applicant's TROI data base and did not identify any open CAQs related to the issues of cable bend radius and cable splices.

- Verify corrective actions for all other open items (VIOs, URIs, and IFIs) related to the specific CAP/SP have been completed.

  The Cable Issues CAP closure package and the closure report identify that NRC open items such as VIOs, URIs, and IFIs associated with these issues are closed. The inspector verified through a review of the NRC open item listing that all NRC open items pertaining to the issues of cable bend radius and cable splices were closed.

- Verify all Sargent and Lundy VSR findings related to the CAP/SP are closed.

  The Cable Issues CAP closure package and closure report identified those VSR items pertaining to the issues of cable bend radius and cable splices. The inspector reviewed a listing of the VSR items as documented in the Sargent and Lundy Vertical Slice Review Final Report and determined that they were all closed. The inspector's review included a review of the discrepancy, resolution, and completion reports. No deficiencies were identified during the review of these reports. None of the VSR DR items associated with cable bend radius and cable splices were categorized as design significant.

- Verify all CATDs related to the CAP/SP are closed.

With respect to the cable bend radius issue, CATD 10900-NPS-01 has been closed. As documented in paragraph 7.10 of this report, NSRS Report I-85-06-WBN documented concerns regarding cable bend radius. This issue was identified as I-85-06-WBN-01, The Adequacy of the Dispositions for Identified Cable Bend Radius Problems. This NSRS open item was subsequently closed in 1987 based on CATDs 10900-NPS-01 and 10900-WBN-01 tracking the same technical issue for resolution. The NRC previously reviewed CATD 10900-NPS-01 as documented in inspection report 50-390/94-53. These CATDs have been subsequently closed.

With respect to the cable splice issue, CATDs 10900-WBN-06, 24101-WBN-02, and 30403-NPS-01 have been closed. These CATDs were previously reviewed as documented in IR 50-390/94-53. In response to NRC's questions regarding the updating of CATD CAPs, the applicant provided a response to the NRC concern by letter, dated October 31, 1994, regarding ECSP CAP deviations. The NRC completed review of this information as documented in a letter dated May 17, 1995.

- Verify all CDRs related to the CAP/SP are closed.

  The inspector verified through a review of the NRC open item listing that applicable CDRs associated with the issues of cable bend radius and cable splices have been closed.

- Verify all NRC BUs, INs, TIs related to the CAP/SP are closed.

  The Cable Issues CAP closure package and closure report did not identify any additional NRC open issues applicable to the issues of cable bend radius and cable splices.

- Verify all issues identified by previous applicant assessments (Black and Veatch, Nuclear Safety Review Staff, other contractors) have been resolved.

  Assessments conducted at WBN as documented in the WBN Nuclear Performance Plan, Volume 4, include those by United Engineers and Constructors, Duke Power, Nuclear Safety Review Staff, Institute of Nuclear Power Operations, and Black and Veatch. The CAP closure package did not identify any open independent assessment items related to the issues of cable bend radius and cable splices.

- Verify all corrective actions related to the area identified by the applicant in the ECSP, and not a CATD, have either been implemented or other action taken to resolve the identified issue.

  The inspector performed a review of Lookback reviews performed for ECSP Class "C" concerns which were associated with cable installation concerns. No deficiencies were identified regarding the applicant's resolution of the concerns.

- Verify issues identified in NRR audits have been adequately resolved.

All SER open items associated with these issues have been resolved. There are no other outstanding NRR issues for the issues of cable bend radius and cable splices.

- Verify all issues identified in the applicant's letter to the NRC, dated March 30, 1987, have been resolved.

  The inspector reviewed the applicant's review and resolution of the issues documented in the March 1987 letter which were applicable to cable installation practices. The issues reviewed were classified as Complex Electrical Issues. No deficiencies were identified during this review.

- Verify all employee concerns (post-ECSP) related to the area have been closed or evaluated for impact.

  The inspector performed a review of the current open concerns received through October 20 pertaining to cables or electrical systems at the applicant's CRS and the employee concerns office of Raytheon Constructors, Inc. No concerns were identified regarding the issues of cable bend radius and cable splices.

- Verify Independent Verification Program is complete.

  The following IVP assessments for the issues of cable bend radius and cable splices were completed:

NA-WB-95-0140	Electrical and Cable Issues Corrective Action Program - Subissues: Flexible Conduits, Cable Support in Vertical Raceways, and Cable Bend Radius
NA-WB-95-0095	Electrical and Cable Issues Corrective Action Program - Subissues: Cable Damage/Cable Splices

  Review of the above reports indicated a thorough assessment of the implementation of the CAP corrective actions for these issues. The IVP conclusions were that the subissues were adequately implemented and ready for closure.

- Verify all other applicant open items on the issue are closed.

  The applicant documented the basis for the closure of the issues of cable bend radius and cable splices. Open items were not identified.

- Verify any issues known to the NRC or the applicant which are likely to affect closure are resolved.

  The applicant did not identify any issues associated with this item. No outstanding issues were identified by the inspector.

- Verify all applicable PACR items.

The applicant did not identify any PACRs pertaining to these issues. No outstanding PACRs were identified by the inspector.

3.4 Conclusions

The implementation of the Cable Issues CAP for the issues of cable bend radius and cable splices have been effectively completed. The applicant has addressed the issues identified in the NRC letter, dated November 12, 1992, with regard to the Cable Issues CAP closure package. The applicant has completed independent evaluations as part of the QA IVP concluding that these issues have been effectively completed.

Within the areas reviewed, no violations or deviations were identified.

4.0 Electrical Issues CAP (2512/20)

The Electrical Issues CAP is described in the applicant's Nuclear Performance Plan, Volume 4. The NRC previously reviewed the implementation of the Electrical CAP at the 75 percent completion stage as documented in IR 50-390/94-53. During this inspection period, the applicant notified the NRC that the Electrical Issues CAP technical subissue of flexible conduit installation deficiencies had been completed. The purpose of this inspection was to determine whether the applicant's implementation of the Electrical Issues CAP was complete for this issue. The NRC requested, by letter dated November 12, 1992, that the applicant provide an Electrical Issues CAP closure package at the 100 percent completion stage documenting the basis for concluding that the CAP was sufficiently implemented to support an NRC inspection. This CAP closure documentation was also reviewed during this inspection.

4.1 Flexible Conduit Installation Deficiencies

This issue within the Electrical Issues CAP pertains to flexible conduit installation deficiencies involving inadequate length to account for seismic/thermal movement, lack of compliance with minimum bend radius, and loose fittings.

The NRC has previously reviewed the applicant's implementation of the corrective actions for the flexible conduit installation deficiencies issue. The results of this inspection were documented in IR 50-390/94-45. The inspection results indicated that the applicant developed guidelines for flexible conduit installations and performed inspections to identify where the guidelines were not met. QA audits identified that an unacceptable number of deficiencies remained after the conduits had been subjected to one or more inspections. The NRC's audit sample indicated that a seven percent deficiency rate existed after one or more inspections had been performed. These facts indicated that the CAP, as implemented to date, had not been particularly effective in reducing the deficiencies to an acceptable level. The applicant planned to intensify the inspection effort, especially in the final area turnover inspections. Final closure of this subissue required completion of several licensing commitments including final closure of CAQ documents.

On October 16, 1995, the applicant informed the NRC resident inspector's office that the Electrical Issues CAP subissue of flexible conduit installation deficiencies had been completed. This inspection focused on the review to verify that there was no outstanding work associated with this issue. This was verified through the review of licensing commitments, CAQ documents, TROI data base, and verification that associated DCNs were completed. These inspection attributes were performed during the review of the Electrical Issues CAP closure package (paragraph 4.2 below).

4.2 Electrical Issues CAP Closure Package

The inspector reviewed the closure package for the issue of flexible conduit installation deficiencies to evaluate the applicant's conclusion that the CAP implementation was complete. Discussed below are the documentation package attributes for these subissues.

- Verify FSAR/Code requirements have been approved and met.

  The Electrical Issues CAP closure package identifies the Electrical Issues CAP criteria issues which required NRC action for resolution, such as FSAR changes. The closure report documents the status of the applicant's commitment to review the design basis documents for conformance to the FSAR. This commitment applied to the entire CAP and not just the subissues. This commitment was documented in the Electrical Issues CAP, paragraph 4.3. This commitment remains open and will be completed prior to closure of the Electrical Issues CAP.

- Verify all SER open items have been resolved.

  The following SSER documented the NRC's conclusion that the applicant had adequately resolved the issue of flexible conduit installation deficiencies.

  - Safety Evaluation Report on the Watts Bar Nuclear Performance Plan, NUREG-1232, Volume 4, December 28, 1989.

- Verify all commitments made by the CAP/SP have been adequately implemented.

  The respective closure reports identify the commitments which were related to the issue of flexible conduit installation deficiencies. All of the identified commitments have been closed.

- Verify specific items which formed the basis for the CAP identified in the applicant's matrix, dated July 13, 1989, have been resolved and field implemented.

  The specific items identified in the 1989 letter have been closed. This includes CATDs and Sargent and Lundy VSR DRs which have been closed for WBN Unit 1.

- Verify items such as CAQs, CATDs, NRC commitments, etc., which were identified by the applicant after July 13, 1989, to be resolved by the CAP corrective actions, have been resolved and field implemented and the documentation adequately closed.

  NRC commitments are discussed above. CATDs are discussed below. The inspector performed a review of the applicant's TROI data base and did not identify any open CAQs related to the issue of flexible conduit installation deficiencies.

- Verify corrective actions for all other open items (VIOs, URIs, and IFIs) related to the specific CAP/SP have been completed.

  The Electrical Issues CAP closure package and the closure report identified those NRC open items such as VIOs, URIs, and IFIs associated with this issue. The inspector verified through a review of the NRC open items listing that all NRC open items pertaining to the issue of flexible conduit installation deficiencies were closed or were under review for closure at the completion of this inspection period.

- Verify all Sargent and Lundy VSR findings related to the CAP/SP are closed.

  The Electrical Issues CAP closure package and closure report documented that all Sargent and Lundy VSR DRs pertaining to the issue of flexible conduit installation deficiencies were closed. The inspector performed a review of associated DR discrepancy, resolution, and completion reports associated with this issue. Design significant DRs were not identified to be associated with flexible conduits.

- Verify all CATDs related to the CAP/SP are closed.

  The inspector verified that respective CATDs associated with flexible conduits have been closed for Unit 1.

- Verify all CDRs related to the CAP/SP are closed.

  The inspector verified through a review of the NRC open item listing that applicable CDRs associated with the issue of flexible conduit installation deficiencies had been submitted to the NRC for closure. At the end of this inspection period, the NRC was continuing inspection of CDR 50-390/86-27, Flexible Conduit Not Installed to Compensate for Thermal and Seismic Movements. The implementation of corrective actions associated with this CDR were subsequently determined acceptable and closure of this item will be documented in IR 50-390/95-77.

- Verify all NRC BUs, INs, TIs related to the CAP/SP are closed.

  NRC BUs, INs, and TIs were not identified applicable to the issue of flexible conduit installation deficiencies.

- All issues identified by previous applicant assessments (Black and Veatch, Nuclear Safety Review Staff, and other contractors) have been resolved.

  Assessments conducted at WBN as documented in the WBN Nuclear Performance Plan, Volume 4, include those by United Engineers and Constructors, Duke Power, Nuclear Safety Review Staff, Institute of Nuclear Power Operations, and Black and Veatch. The CAP closure package identified those independent assessment items related to the issue of flexible conduit installation deficiencies. Associated items have been closed.

- Verify all corrective actions related to the area identified by the applicant in the ECSP and not a CATD have either been implemented or other action taken to resolve the identified issue.

  The inspector performed a review of Lookback reviews performed for ECSP Class "C" concerns. No deficiencies were identified regarding the applicant's resolution of the concerns.

- Verify issues identified in NRR audits have been adequately resolved.

  There are no outstanding NRR issues for the issue of flexible conduit installation deficiencies.

- Verify all issues identified in the applicant's letter to the NRC, dated March 30, 1987, have been resolved.

  The inspector reviewed the applicant's review and resolution of the issues documented in the March 1987 letter which were applicable to the issue of flexible conduit installation deficiencies. The issues reviewed were classified as Complex Electrical Issues. No deficiencies were identified during this review.

- Verify all employee concerns (post-ECSP) related to the area have been closed or evaluated for impact.

  None of the post-ECSP concerns were applicable to the flexible conduit issue. On October 20 the inspector reviewed a printout of concerns received at the applicant's CRS and the employee concerns office of Raytheon Constructors, Inc. No concerns were identified regarding the issue of flexible conduit installation deficiencies.

- Verify Independent Verification Program is complete.

  The following IVP assessments for the issue of flexible conduit installation deficiencies were completed:

NA-WB-95-0140	Electrical and Cable Issues Corrective Action Program - Subissues: Flexible Conduits, Cable Support in Vertical Raceways, and Cable Bend Radius

Review of the above report indicated a thorough assessment of the implementation of the CAP corrective actions for this issue. The IVP conclusions were that the issue was adequately implemented and ready for closure.

- Verify all other applicant open items on the issue are closed.

  The applicant documented the basis for the closure of the issue of flexible conduit installation deficiencies. Open items were not identified.

- Verify any issues known to the NRC or the applicant which are likely to affect closure are resolved.

  The applicant did not identify any issues associated with this item. No outstanding issues were identified by the inspector.

- Verify all applicable PACR items.

  The applicant did not identify any PACRs pertaining to this issue. The inspector's review of PACR listing did not identify any applicable PACRs.

The inspector concluded that the applicant has adequately documented evaluation and completion of the above 19 items.

4.3 Conclusions

The implementation of the Electrical Issues CAP for the issue of flexible conduit installation deficiencies has been effectively completed. The applicant has addressed the issues identified in the NRC letter, dated November 12, 1992, with regard to the Electrical Issues CAP closure package. The applicant has completed independent evaluations as part of the QA IVP concluding that these issues have been effectively completed.

Within the areas reviewed, no violations or deviations were identified.

5.0 Review Of QA Effectiveness

The applicant's QC involvement in the area turnover process has been acceptable. The ongoing WDs should identify damaged, loose, or missing hardware deficiencies in the areas prior to turnover. One concern associated with correction of previously identified WD deficiencies was identified. This concern is discussed further in paragraph 2.3 of this report.

The applicant's QA organization completed several assessments regarding the completion of several Cable and Electrical Issues CAP subissues. The following assessments were issued:

- NA-WB-95-0140 Electrical and Cable Issues Corrective Action Program - Subissues: Flexible Conduits, Cable Support in Vertical Raceways, and Cable Bend Radius

- NA-WB-95-0095 Electrical and Cable Issues Corrective Action Program - Subissues: Cable Damage/Cable Splices

Review of the above reports indicated a thorough assessment of the implementation of the CAP corrective actions. The assessments included field verifications of installed flexible conduits, installed vertical supports for cables routed to containment electrical penetrations, and review of associated SCARs and TROI items. The report conclusions regarding the adequacy of the implemented corrective actions were well supported by the assessment results. NRC review of these CAP subissues is discussed in paragraphs 3.0 and 4.0 of this report.

Within the areas reviewed, no violations or deviations were identified.

6.0 Design Baseline VSR DRs

As part of followup to the DBVP CAP, the inspector examined three VSR DRs identified by the Sargent and Lundy Vertical Slice Review to determine if they had been adequately resolved. The applicant had designated these DRs for resolution through the DBVP CAP. The DRs and the inspector's findings are as follows:

6.1 DR-189, Separation Requirements

This DR will be reviewed as part of the Electrical Issues CAP which includes the subissue of electrical physical separation.

6.2 DR-254, Inadequate Calculation

This DR identified the following concerns regarding structural steel design with specific reference to a reactor coolant pump fire protection hood.

- There was no procedure to assure that the latest revisions of loads were considered.
- Thermal loading was not addressed.
- Qualifications of hoods were based on inadequate comparisons to a Sequoyah calculation.
- There was inadequate information on the computer program and on the input and output data used in the above Sequoyah calculation.
- A calculation did not match the drawing of an expansion anchor plate with regard to the number of studs.

The applicant's Resolution Report 254, Revision 1, for this DR indicated that none of the discrepant conditions identified were safety-significant, as they had not resulted in an inadequate design. It acknowledged, however, that the associated design considerations had not been adequately documented. The basis for this conclusion, including references to calculations and other supporting documents, was included in the resolution report. Further, the

resolution report specified corrective actions to address the design considerations that were not adequately documented to assure similar conditions were corrected and to prevent recurrence. In a CR, the organization that identified the DR (Sargent and Lundy) documented their concurrence with the resolution report.

To verify the adequacy of the applicant's resolution, the inspector reviewed the DR, resolution report, completion report referred to above, and the applicant's VSR corrective action completion form for DR-254, issued July 20, 1995. The inspector found that the completion form documented resolution of the discrepant conditions described by the DR and that this resolution was in accordance with the corrective actions agreed to in the resolution report and completion report. Attached to the form were complete or partial copies of the principal documents that implemented the corrective actions. The inspector reviewed these copies and found that they supported adequate completion of the specified corrective actions. One of the partial copies of implementing documents supplied was Calculation WCG-1-1316, which was included to support the acceptability of two reactor coolant pump fire protection hoods. As only its cover page had been provided with the completion form, the inspector obtained a complete copy and confirmed that it satisfactorily determined the acceptability of two reactor coolant pump fire protection hoods. The inspector concluded that DR-254 had been adequately resolved.

6.3 DR-597, Inadequate Fire Wrap

This DR identified two concerns regarding 3M-type fire wrap used to protect conduit.

- A 3-foot section of Conduit 1PLC2811B, near junction box 3459, did not have its 3M M20A fire barrier wrap secured with stainless steel wire at required 8-inch maximum intervals.

- Conduit 1PLC2812 was enclosed in 3M M20A fire barrier wrap, but this was not shown on the installation drawings, and its effect on cable ampacity had not been considered.

The applicant's final resolution of DR-597 was documented in a DR-597 VSR Corrective Action Completion Form, approved April 18, 1995. The inspector reviewed this form which included a description of the resolution actions and supporting documentation. The form reported that the fire wrap was now removed from both conduits and that calculations did not require it to be replaced. The inspector verified this through a field inspection of the conduits and review and discussion of Calculation WBPEVAR9501004, Revision 2, with applicant personnel. The calculation identified the cables at the related location which required fire wrap and did not indicate fire wrap was required on the cables carried by Conduits 1PLC2811B and 1PLC2812.

In reviewing the applicant's actions to determine the extent of condition, the inspector found that it was not clear how the applicant had confirmed that no 3M fire wrap remained on conduits where it was not specified. The closure package indicated no conduits other than 1PLC2811B and 1PLC2812 were found with this condition and that WDs were performed; however, it only referenced

WDs for Conduits 1PLC2811B and 1PLC2812. In response to a concern expressed by the inspector, applicant personnel performed a WD on September 13, 1995, and documented that no unacceptable lengths of 3M fire wrap remained on safety-related conduits. Additionally, the inspector performed a WD on the building level where the original fire wrap discrepancies were identified and found no significant lengths of 3M fire wrap on any conduit. The inspector considered the DR condition adequately resolved.

Within the areas reviewed, no violations or deviations were identified.

7.0 NRC Open Item Status Review (92700, 92901, 92902, 92903, 92904)

The inspectors reviewed the following listed open items during this inspection.

7.1 (Closed) IEB 79-02, Pipe Support Base Plate Design Using Concrete Expansion Anchor Bolts

This IEB was issued by the NRC on March 8, 1979, and required the construction permit holders and the applicant to verify the design of pipe support base plates and anchor bolts in seismic Category I systems. Some deficiencies found in some plants during the inservice inspections included improperly tightened anchor bolt, rigid plate assumption used improperly, and other improper installations of anchor bolts. The IEB required the construction permit holder for WBN to verify the design and consider base plate flexibility, minimum safety factor for anchor bolts, cyclic loads for anchor bolts, and assure design requirements were met for anchor bolts used in pipe supports. The IEB was subsequently revised to Revision 1, Supplement 1, and Revision 2. Supplement 1, dated August 20, 1979, and Revision 2, dated November 8, 1979, contained the complete details of the IEB. The Revision 2 actions required by the construction permit holder were:

- Verify that pipe support base plate flexibility was accounted for in the calculations of anchor bolt loads;

- Verify that the concrete expansion anchor bolts have the minimum factor of safety of four for wedge and sleeve type anchor bolts and five for shell type anchor bolts;

- Describe the design requirements for anchor bolts to withstand cyclic loads such as seismic loads;

- Verify that design requirements have been met for each anchor bolt in cyclic loads and the installation of the correct design size and type;

- Determine the extent that expansion anchor bolts were used in concrete block (masonry) wall to attach piping supports in Seismic Category I systems;

- Determine the extent that pipe supports with expansion anchor bolts used structural steel shapes instead of base plates.

A response was to be submitted which included a schedule for required actions.

The applicant had submitted their preliminary response in 1979. On December 20, 1984, the applicant submitted a formal response, Civil Engineering Branch Report, CEB 84-08, Revision 1, to the NRC. Subsequently, on June 29, 1989, the applicant issued the HAAUP CAP and committed to re-evaluate all Category I pipe supports in accordance with IEBs 79-02 and 79-14. The HAAUP CAP and CEB 84-08 were submitted to the NRC, evaluated, and accepted by the NRC. Meanwhile, the applicant discovered that about 10 percent of pipe support calculations were non-retrievable and committed to the following:

- One hundred percent of the pipe support calculations would be reviewed for compliance with the factor of safety requirements of the Bulletin.

- All non-retrievable or missing support calculations would be regenerated.

In January 1992, NRC issued Supplement 8 to the SER and stated the applicant had adequately addressed the issue of pipe support base plate flexibility and its effects on anchor bolt loads. In July 1995, the applicant informed NRC that all pipe support hardware modifications associated with WBN Unit 1 HAAUP had been completed. A closure package for IEB 79-02 was submitted to NRC. On August 21, 1995, the applicant submitted a closure letter for IEBs 79-02 and 79-14 and stated that all requirements for the two IEBs had been met based on completion of the HAAUP CAP.

The NRC has performed 31 inspections related to WBN for expansion anchor bolts, as described in IR 50-390/95-53, paragraphs 5.8 and 5.8.1. The inspectors reviewed the applicant's closure letter, dated August 21, 1995, and closure package and determined that the closure letter for IEB 79-02 was acceptable.

To verify the implementation of requirements for IEB 79-02, the inspectors performed the inspections on verification of all non-retrievable pipe support calculations being regenerated, the qualification of pipe supports based on the latest pipe stress analyses, the application of the minimum factor of safety upon the expansion anchor bolts, and the consideration of the base plate flexibility. The inspectors randomly selected the pipe support calculations for verification and review as shown on Tables 1, 2, 3, and 4. Table 1 listed the support calculations verified for the non-retrievable or missing calculations to be regenerated for 100 percent calculations for pipe supports. The inspectors randomly selected the stress analysis calculations and checked the support calculations if they existed when compared to the supports listed in the stress calculations. All the supports listed in stress calculations have support calculations. Table 2 listed the support calculations that used the latest loads from the stress analyses. The inspectors checked the latest load summary data in the stress calculations against the design loads used in the support calculations. All calculations were found to use the latest loads from the stress analyses and were acceptable. Stress analyses 2000201, 2000210, 2000211, and 2000212 analyzed the pipe supports designed by EDS, Inc. which the applicant discovered as the

primary suspension of missing pipe support calculations. The inspectors found that all the supports included in the stress analyses do have the support calculations. The inspectors found that the applicant has completed the regeneration of calculations for all the missing supports. Table 3 listed the support calculations using hand computations for the qualification of base plates and expansion anchor bolts. Normally, the applicant's design engineers use Control Data Corporation Baseplate II computer program to qualify the base plates and expansion anchor bolts. The program is a finite element analysis and will automatically account for the base plate flexibility. Some of the original calculations had used hand computation to qualify the base plates and expansion anchor bolts and failed to use multiplication factors to account for the base plate flexibility and pry actions. The multiplying factors are required by the design criteria.

Per the applicant's Design Specification DS-C1.7.1, if the hand computations were used to qualify the base plates and expansion anchor bolts, a factor must be used in both base plates and expansion anchor bolts to account for the base plate flexibility and pry actions. Some of the calculations listed on Table 3 did not use factors to account for the base plates flexibility and pry actions; but, those calculations used the exponent 1 instead of 1.7 as allowed in DS-C1.7.1 to compute the ratio of interaction for the applying loads dividing by the allowable loads. The results for the ratio were conservative compared to the results from Baseplate II. Baseplate II uses the exponent of 1.7. The applicant used Baseplate II analyses to demonstrate that the hand computation for those calculations were acceptable. The comparison is listed below as Table 4. The allowance loads for the expansion anchor bolts stated in DS-C1.7.1, based on the factor of safety four or five required by IEB 79-02, were verified through the review of base plates with analyses using Baseplate II or hand computations. Based on the applicant's actions taken and NRC inspections as shown above, IEB 79-02 for WBN Unit 1 is considered closed.

TABLE 1

100 PERCENT SUPPORT CALCULATION VERIFICATION

Stress Analysis	Support Calculation From	To	Total Support Calculations Reviewed	Comments
2000603	101A380	101A398	13	
2000603	PD07-12	PD07-13	2	Pipe whip restraints used as pipe restraints
2000210	1030540	103A548	7	
2000210	47A401-9-2	47A401-9-3	2	
2601A	261FPR056	261FPR077	14	
2601A	261FPR232	261FPR233	2	

Stress Analysis	Support Calculation From	To	Total Support Calculations Reviewed	Comments
6712R	47A45021193	47A45021245	8	Support IDs are different from stress analysis
7801A	47A45402001	47A45403019	10	

NOTE: Support calculations shown above may not be in order due to the subtraction or addition.

TABLE 2

The Latest Support Design Load Verification

Stress Analysis	Support Calculations From	To	Total Support Calculations Reviewed	Comments
2000201	103A200	103A210	10	
2000204	103A320	103A333	12	
2000201	103A520	103A534	15	EDS, Inc. Contracted Pipe Supports
2000210	103A540	103A548	7	EDS, Inc. Contracted Pipe Supports
2000211	103A560	103A569	7	EDS, Inc. Contracted Pipe Supports
2000212	103A580	103A589	10	EDS, Inc. Contracted Pipe Supports
6711A	47A45003050	47A45003061	11	
7009A	701CCR284	701CCR308	23	

NOTE: Support calculations shown aabove may not be in order due to the subtraction or addition.

TABLE 3

Support Calculations Using Hand Computation for Base Plates

Support Calculations	Revision	Support	Comments
101A380	4	1-01A-380	Used hand calculation first, then used Baseplate II Computer Analysis to qualify the base plate and bolts
101A396	2	1-01A-396	
101A397	5	1-01A-397	
103A543	1	1-03A-543	
103A546	2	1-03A-546	Baseplate II Computer Analysis was used to qualify base plate and anchor bolts
47A45021193B	0	47A450-21-193B	Tension factor for anchor bolt qualification was not applied per Design Standard DS-C1.7.1
47A45402001	2	47A454-02-001	Same as calculation 47A45021193B
47A45j402004	1	47A454-02-004	Same as calculation 47A45021193B
47A45403019	2	47A454-03-019	
701CCR289	3	70-1CC-R289	
701CCR293	2	70-1CC-R293	
701CCR307	2	70-1CC-R307	Same as calculation 47A45021193B
701CCR308	2	70-1CC-R308	Same as calculation 47A45021193B

TABLE 4

Comparison of Hand Computation and BASEPLATE II for Anchor Bolt Margin Factors

Support No.	From Hand Computation	From BASEPLATE II
47A450-21-193B	1.3	3.35
47A454-02-001	2.82	5.92
47A454-02-004	1.87	4.76
70-1CC-R307	4.68	13.22
70-1CC-R308	2.7	5.04

7.2 (Closed) CDR 50-390/82-80, Shielded Power Cable Bend Radius Deficiency

This CDR pertained to deficiencies in the installation of Class 1E cables. These deficiencies included violations of minimum cable bend radius criteria and the failure to define sidewall bearing pressure requirements properly. This CDR was originally identified to NRC in July 1982 and closed by NRC in IR 50-390/83-37,391/83-26 in October 1983. However, due to subsequent employee concerns on these subjects, this CDR was reopened in August 1986. This item was previously reviewed as documented in IR 50-390/95-45, paragraph 6.2. The IR documented that the issues concerning SWBP had been adequately resolved. The CDR was left open pending further review of the applicant's corrective actions associated with the minimum cable bend radius criteria.

The applicant's Cable Issues CAP, Revision 3, Section 4.1.6, Cable Bend Radius, described the corrective actions that were developed for implementation to resolve this technical issue. The NRC reviewed the applicant's CAP and determined that the applicant's corrective actions, when implemented, would resolve the technical issue. This determination was documented in NUREG-0847, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, Supplement 9, Appendix Y, June 1992.

An inspection of the implementation of the corrective actions was performed as part of the NRC inspection of the Cable Issues CAP at the 75 percent complete status as documented in IR 50-390/94-53, paragraph 3.7. The inspection effort included review of calculations, design change notices, and engineering specifications. Additionally, field inspections were performed to assess the as-installed conditions of cables. The inspection results indicated that the applicant had made significant progress in resolving the issue. Within the areas examined, no programmatic weaknesses or deficiencies were identified.

The above referenced SER NUREG-0847, Supplement 9, Appendix Y, June 1992, documented three open items pertaining to cable bend radius:

- Open item 2.6.1 pertained to the lack of formal guidance regarding the methodology used to take cable bend radius measurements. This item was addressed by the applicant, and the NRC determined acceptable resolution. This issue is further discussed in paragraph 7.19 (b) of this report. This open item is closed.

- Open item 2.6.5 pertained to the applicant's long-term aging effects on cable bending. On May 8, 1995, the applicant submitted to the NRC a test plan to test and analyze the age-related effects of lower and upper limit bending of cables in mild and harsh environments. This open item is closed.

- Open item 2.6.6 pertained to the applicant contacting cable manufacturers regarding the acceptability of the applicant's test program used to establish lower-bound bend radius. This item was addressed by the applicant, and the NRC determined acceptable resolution. This issue is further discussed in paragraph 7.19 (a) of this report. This open item is closed.

Since the NRC's 1994 inspection of the Cable Issues CAP, the applicant's QA organization identified deficiencies regarding inadequate cable bend radius. These deficiencies resulted in the issuance of SCAR WBSCA950008. Corrective actions for the SCAR included the re-inspection of all 10 CFR 50.49 terminations in primary containment and MSVV in junction boxes and end devices to inspect for cable bend radius. This inspection effort was performed in conjunction with the applicant's inspection for cable damage. The deficient cable bend radius conditions were either reworked or evaluated by NE as acceptable in accordance with the approved Cable Issues CAP resolution method. Based on the number of deficiencies identified during the re-inspection of 10 CFR 50.49 terminations, the applicant determined that additional inspections were not required outside the 10 CFR 50.49 applications. This determination was based, in part, on an engineering evaluation of the number of identified bend radius deficiencies. No deficiencies were identified during the review of the closed SCAR WBSCA950008 closure package.

As discussed above, SCAR WBSCA950002 was issued to document deficiencies associated with cable and splice damage. As part of the corrective actions, the applicant performed re-inspection of 10 CFR 50.49 cables and splices at end devices for damage and cable/conductor bend radius. The NRC performed extensive inspections of the applicant's implementation of corrective actions. Independent inspection of the cables and splices were performed including consideration for as-left cable/conductor bend radius. The NRC inspection conclusions were that the applicant was adequately resolving cable and splice damage deficiencies as well as cable/conductor bend radius. This inspection effort was documented in the following inspection reports:

- 50-390/95-17, paragraph 2.1, Cable and Splice Damage Inspections
- 50-390/95-24, paragraph 3.4, Cable and Splice Damage Inspections
- 50-390/95-33, paragraph 3.0, Cable Damage

During this inspection period, the inspector reviewed the applicant's exceptions to the cable bend radius criteria documented in General Engineering Specification G-38, Installation Modification, and Maintenance of Insulated Cables Rated Up to 15,000 Volts. The following exceptions were reviewed:

Exception	Description
G-38-WBN-31	This exception approved the reduction of the training radius for medium voltage cables from 12 times the cable OD to factors ranging from 7.47 to 10.88. The applicant's technical justification was that these cables were non safety-related and non-10 CFR 50.49 power feeders for the reactor coolant pumps. The bend radius deficiencies were located in a junction box in an essentially mild environment, and the cables were not under tension. The inspector verified that these cables were classified as non-Class 1E and the Cable Issues CAP does not address non-Class 1E cables. No deficiencies were identified during the review of this exception.
G-38-WBN-36	This exception approved the reduction of the training radius for medium voltage cables from 12 times the cable OD to factors ranging from 8.33 to 9.0. The technical justification for this exception relied on load cycle and corona test results which indicated that medium voltage cables bent to a radius of eight times the cable OD do not display different characteristics from those bent to the required radius. The inspector reviewed the technical basis for the exceptions and the commitments stated in the applicant's Cable Issues CAP and determined that the conditions were acceptable since the as-left bend radius factor of 8.33 was greater than the bend radius upper limit of eight for medium voltage cables.
G-38-WBN-44	This exception approved the reduction of the training radius for medium voltage cables from 12 times the cable OD to factors ranging from 8.21 to 11.19. The inspector determined this condition to be acceptable based on the review documented above for Exception G-38-WBN-36.
G-38-WBN-46	This exception approved the reduction of the training radius for one conductor (Phase C) of a low voltage power cable (500 MCM) from five times the cable OD (MTR of 5.45 inches) to 4.4 inches (factor of 4.04). The technical justification for this exception relied on cable testing and analysis performed as part of the Cable Issues CAP. Based on the tests, the installed configuration of the cable was determined to not adversely impact long-term performance. The Cable Issues CAP evaluated the issues of cable bend radius addressing the application of the cable, cable voltage ratings, and environment. The CAP criteria was that low-voltage power cables eight AWG and larger have a lower

bound bend radius limit of two times the cable OD. Low voltage, single conductor cables located in mild environment were accepted for use as-is based on cable bend radius margin analysis and long-term bend radius monitoring programs. The inspector determined that the applicant's evaluation met the commitments and corrective actions specified in the Cable Issues CAP.

Additional NRC inspections of the cable bend radius concerns are documented in paragraph 3.1 of this report. Based on the inspector's review of closed SCAR WBSCA950008, results of cable bend radius inspections performed, acceptable resolution of SER open items, and the results of QA assessments and verifications, this item is closed.

7.3 (Closed) CDR 50-390/85-19, Fire Rated Penetration Assemblies Deficiencies.

This CDR was initiated by the applicant as a result of deficiencies identified in several fire-rated penetration seal assemblies during WD inspections. Several penetration assemblies had construction deficiencies, and some penetrations were breached without adequate documentation to require the penetrations to be properly resealed. The original CDR was submitted to the NRC on June 25, 1985. A revised final report was submitted on August 12, 1995, and a supplement to the revised report was sent to the NRC on October 11, 1991.

The applicant's evaluation identified that this problem was caused due to the use of inadequate construction procedures for the breaching and replacing of fire barrier penetration seals and documentation of the work associated with these work activities.

Initially, the WBN site procedures used to control the breaching of fire barrier penetrations and to assure that the breached penetrations would be properly resealed were very restrictive. The program was initiated by the applicant during the mid-1980s and was more applicable to an operational plant than to a plant under construction. The requirement to document all breached penetrations and to control these open penetrations became too cumbersome and inefficient due to the need to breach a large number of penetrations to support construction activities. At one time over 2000 open breaching permits were outstanding. Many of these open breaching permits were to remain open indefinitely to support the ongoing construction activities. Therefore, the applicant deleted the requirement to provide a permit each time a fire barrier was breached during the construction phase. Procedure FPI-0100, Administrative Controls, was developed and issued which allowed unrestricted breaching of fire barriers during construction activities, but required a permit for any breached penetration in an area where construction activities had essentially been completed, and the area had been turned over to operations.

Procedure FPI-0100 has recently been revised and divided into four separate procedures. One of these procedures, Procedure FPI 0102, Control of Fire

Protection Impairments, includes the present program to control the breaching of fire barrier penetrations.

Prior to an area being turned over to operations, detailed inspections are to be made of all fire barriers to identify any penetration seal discrepancies or breached penetrations. These inspections were in process during this inspection and were being performed and documented by Procedure 0-FOR-304-1, Fire Barrier/Mechanical, Conduit, Cable Trays, and Fire Dampers (External) Penetrations Visual Inspection, Auxiliary Building, Control Building, Diesel Generator Building, and Intake Structure; and Procedure 0-FOR-304-4, Inspection of Fire Rated Assemblies Located in Unit 1 Reactor Building. All identified, deficient penetration assemblies were being repaired or corrected. Breached penetrations were corrected, or if the breached penetration was required to support construction activities, a breaching permit was being issued to identify the breached penetration. The permit should assure that the breached penetration is properly restored or corrected. The initial performance of Procedures 0-FOR-304-1 and 0-FOR-304-4 will inspect all fire barrier penetrations and establish a baseline for future inspections. After the initial inspection, 20 percent of the total number of penetrations will be inspected annually so that all penetrations will be inspected once every five years.

Additional corrective actions on this item included the revision to the compartmentation drawing by ECNs 5761 and 5762. These items were reviewed during a previous NRC inspection and found acceptable. This reviews is documented by NRC IR 50-390/91-26. Periodic NRC status reviews, as documented by NRC IRs 50-390/94-62 and 95-32, have also been made of these items.

This item is closed.

7.4 (Closed) CDR 50-390/85-31, Incorrect Equipment Cable Terminations in Harsh Environments

This item pertained to several Class 1E equipment cable terminations which were identified as not installed correctly. The affected cables were located in areas designated as having a harsh environment and were below the computed maximum flood level as shown on design drawings. The deficient terminations and splices were made up using 3M Scotch 70 and/or Scotch 33 electrical tape rather than through the use of Raychem heat shrink material and some had been terminated using unapproved end caps. The applicant determined that the deficiency resulted from the misinterpretation of electrical standard drawings by construction personnel. This item was previously reviewed and the results documented in IR 50-390/91-26.

The corrective action to prevent recurrence included the following:

- Class 1E terminations and splices that were in harsh and mild environments at WBN Unit 1 were identified and documented in calculation WBPEVAR8904055. The calculation identified terminations and splices for equipment on the 10 CFR 50.49 Electrical Equipment list.

- The electrical standard drawings were revised to reference General Engineering Specification G-38, which specified the environment conditions and equipment categories that require the use of Raychem materials for termination and splicing.

As part of the Cable Issues CAP, the approved corrective actions were to rework all 10 CFR 50.49 cable splices and selected splices in mild environment which were possibly subject to moisture intrusion. In early 1989, the applicant issued work implementing documents to replace the subject splices. However, during the splice replacement program implementation, the applicant became aware of problems with poor workmanship of splices and terminations (e.g., cable damage at splices, spared conductors which were not sealed properly, and improper application of Raychem material). These deficiencies were determined reportable to the NRC as CDR 50-390/90-04, Cable Damage at Splices. NRC review of this CDR is documented in paragraph 7.13 of this report.

In 1995, a QA assessment of the implementation of the corrective actions for the splice rework effort identified deficiencies associated with cable splices. These deficiencies included examples of cable damage. These deficiencies were determined to be reportable to the NRC pursuant to 10 CFR 50.55(e) as CDR 50-390/95-02, Cable Damage at Splices and Terminations. NRC review of this CDR is documented in paragraph 7.29 of this report.

The NRC has performed various inspections of the implementation of the cable splice inspection and replacement activities. These inspections were documented in the following inspection reports:

89-07	89-20	89-200	92-40	93-10
93-20	93-29	93-35	93-48	93-70
93-85	94-11	94-32		

NRC IR 50-390/94-53, paragraph 3.8, documents the NRC review of the cable splice issue as part of the Cable Issues CAP 75 percent complete stage. The inspection results indicated that the applicant had made significant progress in resolving and completing the cable splice issue. No programmatic weaknesses or deficiencies were identified. However, due to the complexity of the issue and the large scope of work (approximately 26,000 splices/terminations required replacement) and the large number of SCARs and CAQRs still open involving splice problems, the cable splices issue required further NRC review.

The NRC performed a review of the applicant's corrective actions for CDR 50-390/95-02. The NRC documented the acceptability of the applicant's corrective actions in Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 16, Section 8.3.3.1.6, September 1995. The NRC performed extensive inspection of the implementation of the applicant's corrective actions. These inspections included review of the programmatic approach to identify the location of 10 CFR 50.49 cables, splices, and terminations. Additionally, in-process inspections were performed during and after the applicant's inspection and rework of deficiencies. The overall results indicated that the applicant was

adequately implementing the approved corrective actions. These inspections were documented in the following inspection reports:

- 50-390/95-17, paragraph 2.1, Cable and Splice Damage Inspections
- 50-390/95-24, paragraph 3.4, Cable and Splice Damage Inspections
- 50-390/95-33, paragraph 3.0, Cable Damage

Additional NRC inspection of the applicant's implementation of corrective actions to resolve the cable splice concerns are documented in paragraph 3.2 of this report. Based on the extensive NRC inspections of the applicant's implementation of corrective actions and overall acceptable result, established recurrence controls, and independent QA involvement to assess acceptable implementation of corrective actions, this CDR is closed.

7.5 (Closed) 50-390/85-39, Inadequate Separation of Trained Cables.

The applicant's 10 CFR 50, Appendix R analysis found that several safety-related cables had been relocated into Room 737-0-A3 on elevation 737 of the auxiliary building. This resulted in these cables being installed within 20 feet of a Train "A" auxiliary power system cable (1PL4975A). Upon further review, the applicant found an unsatisfactory interaction between cable 2PL4975A and Train "B" auxiliary power cables at column A12S on elevation 737 of the auxiliary building. The applicant performed comprehensive evaluations of the safety-related cable interactions at WBN and developed calculations WBPEVAR9501004 to identify the cables which required separation needed to meet 10 CFR 50 Appendix R. The new calculations found that cables 1PL4957A and 2PL2957A were no longer required for plant shutdown in the event of an Appendix R type fire.

The applicant reported this construction deficiency to the NRC on September 18, 1985, and submitted a revised final report on January 31, 1986.

The applicant issued DCN M-11727-D for the installation of one-hour and three hour electrical raceway fire barrier systems (Thermo-Lag) for designated cables in the auxiliary and diesel generator buildings and for the installation of radiant energy heat shields (3M barrier material) in the reactor building. This DCN identified all of the cables required to be protected to meet 10 CFR 50 Appendix R. During previous NRC inspections, these items were reviewed and found acceptable. These inspections were documented by NRC IRs 50-390/95-03, 50-390/95-16, 50-390/95-26, 50-390/95-32, and 50-390/95-68.

This item is closed.

7.6 (Closed) CDR 50-390/86-17, Lack of Adequate Calculations to Document Electrical Systems Design Basis.

CDR 50-390/86-17 was written to address the fact that the applicant had (1) failed to identify the minimum set of calculations on safety-related systems required to shut down the plant, (2) failed to revise existing calculations to incorporate subsequent design changes, and (3) had issued design documents and drawings before completing supporting calculations. In a letter dated

October 9, 1990, the applicant transmitted a Revised Final Report which delineated commitments for resolution of the identified deficiencies. This letter also stated that this report superseded the commitments previously made with regard to this deficiency. The applicant's revised commitments were as follows;

- Baseline existing calculations and prepare a change review checklist for all design changes that involve the electrical discipline to determine if electrical calculations are impacted.

- Calculations that are necessary to ensure that plant safety and support systems can mitigate the results of a design basis event will be performed under the long-term electrical calculation program before fuel loading.

- Any deficiencies identified by the performance of these calculations will be handled separately and evaluated in accordance with the applicant's corrective action program.

- A computer based CCRIS will be used to provide essential information about the applicant's calculations and to provide cross-reference capability to other supporting calculations.

The applicant's non-plant specific CATD 20501-NPS-04, Electrical Calculation Program, established baseline for the essential electrical calculations identified in commitment 2. This program has been reviewed by the NRC on several occasions with the results of the most recent review documented in NRC IR 50-390,391/95-46. The NRC staff concluded that the inspections indicated that, in general, the Essential Calculation Program, included the necessary calculations and had been adequately implemented.

The inspector reviewed Procedure EAI-3.19, Change Review Checklist for Electrical Calculations, and verified that requirements had been established to determine if design changes associated with a DCN affected electrical calculations. The applicant's commitments for developing a computer based CCRIS was determined to have been completed based on review of computer printouts of CCRIS, Abbreviated Calculation Log for EEB Branch, dated June 29, 1995. NE Procedure NEP-3.1-PCN-1, Calculations, Revision 2, was reviewed and verified to have established administrative controls and assigned responsibilities for maintenance and implementation of CCRIS.

Corrective action plans developed and implemented by the applicant for CDR 50-390/86-17 were documented on SCAR SCRWBNEEB8571SCA. The inspector reviewed the closure package for this SCAR and verified that the essential minimum set of calculations had been prepared by the applicant based on the guidance of Procedure Method PM86-02(EEB), Electrical Calculations, Revision 1. The inspector concluded that the essential minimum set of calculations appeared to be adequately specified in PM-82-02, Calculation Matrix.

The applicant satisfied commitment three with the development and implementation of PER WBP900266PER. This PER was developed to implement corrective actions for hardware deficiencies identified by performance of the

electrical calculations. The extent of condition listed 28 calculations as having identified deficiencies with various equipment. The inspector reviewed the closure package for PER WBP900266PER and verified that DCNs had been prepared for deficiencies identified in the calculations. Work Completion Statements were also included in the closure package and had been signed by the craft to indicate completion of all field work. Based on objective evidence reviewed the inspector concluded that the applicant had satisfied commitment 3.

The integrity of the CCRIS data base was examined by the inspector, who choose a random selection of calculations from the PM 86-02 Calculation Matrix, and verified that it had been incorporated in the CCRIS data base. The inspector determined from this examination that the codes applied to these calculations in CCRIS was shown both as Essential, ie., "E"; and Essential Minimum Set, ie., "EM." The inspector discussed this coding classification with the applicant's engineering personnel and stated that code E appeared to be incorrectly applied to the Essential Minimum Set as defined by PM 86-02. This issue had previously been identified by QE in Assessment NA-WB-93-008, dated April 8, 1993. The inspector reviewed NE's response to the QE Assessment and determined that this finding had not been accepted by NE. NE responded that the DBVP CAP commitment was for each discipline to develop a list of calculations required to address safety-related systems or features. The intent of such a listing was to have a measurable milestone on the front end of the project so that a determination could be made when the calculation program was completed. NE has completed this task as demonstrated by the Procedure PM86-02, Calculation Matrix - Watts Bar, Essential Minimum Set Calculations. The inspector's concern is that a sort on CCRIS for calculations coded EM will not identify all the required calculations. This could potentially lead to situations where calculations that need to be revised because of DCNs could be inadvertently omitted. Based on discussion with the applicant's engineering personnel, it is the inspector's understanding that this issue will be re-examined by the applicant's management.

The inspector concluded that the closure package presented by the applicant for disposition of this CDR contained records which demonstrated that adequate evaluation/analysis of all deficiencies had been performed. The review of the closure package by site QA was determined to have been adequate. Based on objective evidence reviewed, this item is closed.

7.7 (Closed) CDR 50-390/86-39, Deficiencies in Embedded Plate Design

This item was reported because sampling programs determined that discrepancies in documentation and deviations from design criteria may affect the qualification of embedded plates. The sampling programs were conducted to address recommendations for employee concern reviews conducted by the NSRS. CATD 10400-WBN-02 was also issued to track the sampling program results and corrective action. Corrective action was described in CA document SCRWBNCEB8623 and involved completing the sampling program and performing engineering evaluation and where appropriate, modifications. The sample was composed of three groups of embedded plates including cable tray support embedded plates, cable tray supports on surface mounted baseplates, and other large supports. Design specification implementation was reviewed involving

wrong plate numbers on FCRs, embedded plates with missing FCRs, and spacing to adjacent embedded plates and concrete edges. In addition, engineering did an evaluation of embedded plate FCRs for load determination and standard inspection sheet justification calculations.

The result of the review was that some modifications were required. The NRC performed a field review of a sample of the modifications associated with DCNs M-19767-A and M-19765-A in IR 50-390/95-69 during review of the Cable Tray and Supports CAP. The review concluded that the supports were adequately modified, and this issue is closed.

7.8 (Closed) CDR 50-390/86-46, Deficiencies Involving Circuits Inside Penetrations.

The applicant provided two interim reports to the NRC on May 2, 1986, and October 31, 1986, concerning deficiencies identified with the electrical containment penetrations. A final report was provided on February 13, 1987, and identified the installation of temporary and undocumented hoods over penetrations as another potentially significant deficiency. Of the 28 deficiencies identified by the applicant, seven were considered detrimental to Class 1E safety-related circuits and were identified in the final report as follows:

- Improperly applied Raychem heat shrink tubing;
- Raychem sleeves taped improperly;
- Cable splices with incorrect heat shrink;
- Bare copper conductors exposed;
- Connectors loose on feedthrough;
- Flexible conduit to penetrations were loose;
- Penetrations enclosures flexible conduits bushing were missing.

The applicant in this report committed to inspect both sides of 54 penetrations for the deficiencies described and to correct those that were identified. The scope of the inspections and corrective actions included both Class 1E and non-class 1E penetrations. Also, the corrective actions were intended to be completed before the fuel load date for Unit 1. Additional corrective actions, committed to in this report, have been completed by the applicant and were reviewed by the NRC as a construction restart package. The results of this review were documented in NRC IR 50-390,391/91-31. The CDR was left open pending completion of the remaining corrective actions involving field inspections, evaluation of field data, and rework of construction deficiencies identified in the field.

On March 17,1993, the applicant provided the NRC a supplemental report containing information regarding a revised scope of the corrective actions for the following CDRs:

- CDR 50-390/86-46, Deficiencies Involving Circuits Inside Penetrations

- CDR 50-390,391/89-08, Kapton Insulation Penetration Pigtail Damage

- CDR 50-390/90-04, Cable Damage At Splices

Changes to the applicant's commitments specifically related to CDR 50-390/86-46, involved a reduction of the commitment to inspect non-class 1E penetrations for the deficiencies described in earlier reports. the applicant planned to perform only a visual inspection of the non-class 1E penetration area and to correct visible deficiencies which may impact circuit operation. The applicant prepared SCAR SCRW353PSSCA, Revision 1, to document the development and implementation of corrective action plans for the deficiencies identified in the final report. The inspector verified from the extent of condition documented in the SCAR that all 54 Unit 1 required penetrations had been included in the proposed corrective actions. The corrective action plans developed for implementation and resolution of the deficiencies were verified to address all 22 deficiencies identified by the applicant. The inspector reviewed the closure package for the SCAR and verified that the corrective actions for the eight deficiencies documented in the final report had been fully implemented.

Because of Kapton insulation damage identified by the applicant, SCAR WBSCA940055 was prepared for performing comprehensive inspections of electrical penetrations using specially trained personnel. The inspections were specifically concerned with Kapton insulation damage; however, other attributes and conditions were required to be identified, and corrective actions implemented for identified deficiencies. Inspection of the penetrations were completed per SSP-9A, Appendix J, Walkdown Requests, as Interim Corrective Action 1. Completion of additional corrective actions identified 1100 individual cases of Kapton insulation damage by October 21, 1994. The inspector reviewed the closure package for SCAR WBSCA940055 and verified that both interim and final corrective actions had been completed. The corrective actions appeared technically adequate and addressed the root causes of the deficiencies. The corrective actions were also broader in scope than those implemented by SCAR SCRW353PSSCA for disposition of CDR 86-46.

The inspector reviewed selected portions of the following WPs and associated WOs to determine the nature and scope of the field work performed for Class 1E penetrations. The inspector verified that required QMDs/QMIs had been specified to be performed. Degradation inspections, both internal and external, were also verified as having been identified as a work requirement for Class 1E, 10CFR50.49 qualified penetrations.

- WP No D-11953-18, Penetration 1-PENT-293-0008-A

- WP No D-11953-01, Penetration 6

- WP No D-12218-53, Penetration 1-PENT-293-0014A

- WP No D-12218-04, Penetration 17

The inspector concluded that the documentation for disposition of this CDR contained records which demonstrated that adequate evaluation/analysis of all deficiencies had been performed. Additionally, the applicant had determined the impact on safe operation of WBN 1 caused by CDR 86-46 and had implemented corrective actions to eliminate the deficiencies. The review of the closure package performed by the site QA was discussed with site QA personnel. The inspector considered the review inadequate because of QA failure to (1) perform field inspections of the completed work, or (2) review a sample of the completed work implementing documents to assure correction of identified deficiencies. Based on review of the above objective evidence this item is closed.

7.9 (Closed) CDR 50-390/89-04, Improper Limit Switches

This CDR identified deficiencies in the design and installation of limit switches procured on Contract 824495 as replacement for non-qualified switches for Valves 1-FCV-61-97, -192, -194, 1-FCV-77-9, -16, and -18. Reasons stated for the deficiencies were the presence of ambiguous information on instrument tabulations and failure to revise the vendor drawings in a timely manner. Unauthorized field modifications to the switches were also implemented by the craft on Valves 1-FCV-77-16, and 1-FCV-77-18 in order to facilitate proper operation of the limit switches. Additional deficiencies were identified between the limit switches specified by design output documents and those installed by Construction on a total of 18 valves. In a letter dated July 12, 1989, the applicant provided a list of commitments for resolving the above deficiencies. The commitments were identified as follows;

- The applicant will revise design output documents including vendor valve drawings and revise them to specifically state which limit switch Models are to be used on each valve for all limit switches procured under Contracts 824495, and 832128.

- The applicant will prepare WD procedures to verify that proper limit switches and associated hardware were installed and that the limit switches have not undergone any unauthorized modifications.

- A WD will then be performed of all the valves associated with contracts 824495 and 832128 in order to verify that their respective limit switches were installed according to design output documents. All discrepancies will be recorded for resolution.

- Each discrepancy will be reviewed and have a corrective action specified on a case by case basis. Design output will be changed as necessary.

- The discrepant limit switches will then be replaced or reworked according to the corrective action determined to be appropriate. All corrective actions will be completed before fuel load.

The NRC staff has reviewed documentation provided by the applicant and the results are documented in IR 50-390/91-31, dated January 13, 1992. This report documented the staff's observations that commitments 1 and 2 had been

partially completed. The report also concluded that procedures revised by the applicant had established adequate recurrence controls for construction restart. This item was left open pending NRC review of new procedures to be developed by the applicant, completion of WDs, and completion of resulting hardware modification or rework.

The inspector reviewed SCAR WBP890112, Revision 3, and verified that the applicant had developed the following new procedures: (1) SEP-9.5.6, Design Verification, Revision 0; (2) SSP-9.03, Plant Modifications and Design Control, Revision 8; (3) SSP-7.53, Modifications Workplans, Revision 13; (4) STD-9.3, Plant Modifications and Design Control, Revision 7; and (5) EAI-3.05, Design Change Notices, Revision 28. The inspector reviewed the above procedures and determined that the requirements delineated were in accordance with ANSI N45.2.11, 1974, Quality Assurance Requirements for the Design of Nuclear Power Plants, and US NRC Regulatory Guide 1.123, Revision 1. The inspector concluded that the above recurrence controls were adequate to prevent future unauthorized design changes by the craft.

Additional reviews of SCAR WBP890112 found that NE had reviewed design output documents, including vendor valve drawings, and had revised the documents to specifically state which limit switch models were to be used on each valve. All limit switches procured under contracts 824495 and 832128 were included in the above action which was completed on May 25, 1990. Nuclear Engineering also developed plant modification DCN P-04662, for use by Modifications during WD of valves performed in order to verify that actual as-installed limit switches agreed with design output documents.

The results of a walkdown of all Class 1E limit switches identified problems which did not involve the original list of FCVs that were within the scope of SCAR WBP890112. The applicant subsequently determined that SCAR WBP890112 Revision 2 and DCN P-04662 had not resolved the problems of hardware, recurrence control, and corrective actions for design output for safety-related limit switches.

SCAR WBSCA940037, Revision 1, was written by the applicant to identify multiple deficiencies involving limit switches. The deficiencies included activities involving design, i.e., incorrect, inconsistent and missing information on design output documents. The deficiencies also included activities by the modification group involving incorrect wiring of contacts, incorrect cables wired to limit switches, switch covers swapped, and unauthorized modifications made to limit switches. Deficiencies were also found between the as-installed information on limit switches and the information that appears in the Equipment Management System, and on vendor drawings. The inspector reviewed SCAR WBSCA940037 and verified that the applicant had developed 10 proposed corrective actions for resolution of the identified deficiencies. Among the corrective actions were the development of a list of all Unit 1 and Unit 2 required limit switches that would be walked down by Modification and NE to collect sufficient data to allow NE to analyze the plant configuration.

The WDs were performed in accordance with WD instructions prepared by NE. NE's analysis of the WD data was performed using approved design output documents

which depicted the plant configuration and was intended to identify hardware-related discrepancies. Based on review of the closure package, the inspector determined that the applicant had completed all the corrective actions. Root cause analysis, extent of condition, and recurrence controls implemented by the applicant for these deficiencies were determined to be technically adequate. CDR 50-390/89-04 and its associated SCAR WBP890112, Revision 3, were closed by the applicant on the basis of the completed corrective actions for SCAR WBSCA940037.

The inspector concluded that the documentation presented by the applicant for disposition of this CDR contained records which demonstrated that adequate evaluation and analysis of all deficiencies had been performed. Additionally, the applicant had determined the impact on safe operation of WBN 1 caused by CDR 50-390/89-04 and had implemented corrective actions to eliminate the deficiencies. The review of the closure package by site QA was also determined to have been adequately performed. Based on review of objective evidence this item is closed.

7.10 (Closed) URI 50-390/89-08-02, Identification of Cable Damage

This item pertained to an NRC concern raised in 1989 regarding whether the applicant was adequately evaluating cable installation practices which could have resulted in cable damage. As documented in IR 50-390/89-08, paragraph 4, the NRC identified that the electrical engineering verification for electrical cables did not include any attributes for the acceptability of the cables concerning cable pullbys, cable jamming, splices, mid-run flexible conduits, and other cable issues. At that time, the inspector was informed by the applicant that these items would be covered by a CAP for cables and submitted to the NRC for review. A review of the applicant's Cable Issues CAP, Revision 1, dated June 27, 1989, did not clearly provide specific details that would have evaluated possible cable damage problems. Therefore, the NRC opened this URI to track this concern.

During the course of NRC inspections since 1989, the NRC has documented inspection efforts, concerns and conclusions regarding the applicant's identification, evaluation, and resolution of cable damage issues resulting from inadequate cable installation practices. These NRC inspections have been documented in the following inspection reports 50-390/:

89-11	89-13	89-18	90-03	90-06	90-17
90-20	90-22	90-24	90-27	91-31	93-35

Possible cable damage due to installation practices was raised as a concern in 1986. These concerns were documented in various applicant and NRC documents. Additional reviews subsequently resulted in the development of the Cable Issues CAP. Through the review of the Cable Issues CAP, the NRC identified additional concerns regarding possible cable damage and reviewed the applicant's methodology to resolve the outstanding concerns. Discussed below is a summary of the applicant's and NRC reviews pertaining to cable damage.

In 1986, NSRS Report I-85-06-WBN, Investigation of an Employee Concern Regarding Cable Routing, Installation, and Inspection at Watts Bar Nuclear

Plant was issued. This NSRS report was issued in July 1985 pertaining to an employee concern regarding the adequacy of the WBN QA program for routing, installing, and inspecting electrical cables. Two of the six areas of inadequacy identified pertained to possible cable damage issues:

Cable Bend Radius Requirements

NSRS had questions concerning the validity of the Office of Engineering/Office of Construction developed cable bend radius values. The values were not supported by sufficient justifications. This issue was identified as I-85-06-WBN-01, The Adequacy of the Dispositions for Identified Cable Bend Radius Problems. This NSRS open item was subsequently closed in 1987 as documented in NSRS Report WBN-NSRS-1. This closure was based on CATDs 10900-NPS-01 and 10900-WBN-01 tracking the same technical issue for resolution. The issue of cable bend radius is also addressed within the Cable Issues CAP. The NRC concluded that the applicant's resolution and corrective actions for the cable bend radius issue was acceptable. This conclusion was documented in the documents listed below.

- Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 7, September 1991.
- Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 9, June 1992.

The applicant completed the CAP corrective actions and the NRC completed the review of the implementation adequacy. The Cable CAP subissue of cable bend radius was determined to be implemented as documented in paragraph 3.1 of this report.

Cable Pull Tension Requirements and Practices

NSRS concluded that the method of calculating maximum allowable tension, method of pulling, and monitoring were inadequate to ensure a cable pull was successfully completed without insulation degradation. This issue was identified as I-85-06-WBN-02, The Adequacy of the Program for Cable Pulling Activities. This NSRS open item was subsequently closed in 1987 as documented in NSRS Report WBN-NSRS-1. This closure was based on corrective actions underway and outstanding CATDs 10900-NPS-01 and 23900-WBN-01 through 10 tracking the same technical issues for resolution. The concerns of cable pull practices was considered during the development and approval of the Cable Issues CAP. The NRC concluded that the applicant had adequately evaluated the cable pull tension concerns. This conclusion was documented in the documents listed above.

In 1987, the NRC issued Franklin Report TER-C5506-649, Technical Evaluation of Watts Bar Units 1 and 2, Cable Pulling and Cable Bend Radii Concerns, dated March 10, 1987. This report documented NRC concerns regarding WBN cable installation practices which could have resulted in inadequate cable installations and possibly cable damage. This TER was later identified as a source issue during the applicant's development of the Cable Issues CAP. In 1991, the corrective action plans associated with the technical issues within the CAP were reviewed by the NRC and determined acceptable.

In December of 1988, the applicant submitted the Cable Issues CAP, Revision 0, to the NRC. The CAP briefly discussed the concern of potential pullby damage and other cable installation attributes.

In June 1989, The applicant submitted to the NRC the Cable Issues CAP, Revision 1.

IR 50-390/89-08 documents that cable damage was observed on several Unit 2 RPS cables removed from a conduit to evaluate an existing employee concern regarding potential for cable damage due to burning and welding in the vicinity of the conduit. No damage due to welding was observed, but the following conditions were observed:

- nicks, cuts, punctures, and damaged insulation;
- saw cut through cable jacket;
- 200' balled-up rope, anchor bolt, and pieces of broken cable.

Since Revision 1 of Cable Issues CAP did not clearly provide specific details that would have identified cable damage problems. This concern was identified as URI 50-390/89-08-02.

IR 50-390/89-11 updated URI 50-390/89-08-02 to document the evaluation of the above cable damage. Results of the review were examples of cable insulation damage exposing conductor, cables with shield damage, outer jacket damage, missing records for two cables, occurrence of 10 pullbys, and no documentation of pull tension during installation. The inspector's evaluation of cable installation specification G-38, Installation, Modification and Maintenance of Insulated Cables Rated Up to 15,000 Volts, revision in effect at the time the cables were originally installed, indicated lack of procedure requirements and controls for installation of cables.

IR 50-390/89-13 updated the above cable damage and documented the evaluation of Unit 1 cables which were counterpart to the Unit 2 cables which had cable damage. The inspector documented that insufficient records existed to confirm that cable installation pull tension limits were not exceeded. QC inspections of cable installations were not well administered due to QC inspector certification and extensive procedure revisions at the time the Unit 1 cables were installed.

IR 50-390/89-18 updated the URI to document continuing NRC inspections of cable removals. Inspectors witnessed a total of 340 cable removals. Two cables were found to have damage exposing the conductor. The URI item was left open pending the applicant's evaluation of the data to determine what future actions were needed to assure the remaining Unit 1 cables were acceptable.

The Cable Issues CAP was amended through a letter dated December 1989. The letter revised the cable pullby section of the CAP and provided the cable damage assessment and resolution plan for this damage mechanism.

The applicant submitted 10 CFR 50.55(e) report 50-390/89-10, dated December 20, 1989, and discussed the cable damage issue. The applicant has

since completed the corrective actions for this CDR. The NRC closed this CDR as documented in IR 50-390/95-64.

In 1990, IRs 50-390/90-03 and 90-06 documented continued NRC inspections of the implementation of the applicant's Cable Issues CAP. The NRC witnessed removal of cables in high-risk damage conduits. Deficiencies identified during the removal included cable damage exposing conductor, cable damage found outside of a conduit in a cabinet, and cable damage due to the removal of flame retardant coatings.

The Cable Issues CAP was amended through a letter dated June 1990 (Revision 2). This letter provided further information regarding cable pullby damage and updated the cable damage assessment and resolution plan for this damage mechanism.

IR 50-390/90-20 updated the URI to document the identified cable damage in a conduit which was categorized as a low-risk conduit. The URI was left open pending further reviews to determine if Cable Issues CAP program changes were needed to address the identified cable damage. As part of the corrective actions specified in Cable Issues CAP, the applicant performed hi-pot testing of cables routed in 40 worst-case low risk conduits. Successful hi-pot testing indicated assurance of an acceptable threshold between high and low risk conduits for cable pullby damage. Additionally, the applicant performed trending of identified cable damage as part of the cable removal activities. This trending provided additional information as to whether different damage mechanisms were present or whether the corrective actions for the cable pullby issue were acceptable. The NRC reviewed the applicant's trend report and determined that the trending of cable damage was acceptable. This NRC review was documented in IR 50-390/95-64.

IR 50-390/90-22 updated the URI item and documented the witnessing of hi-pot testing and replacement of cables. Some cables failed hi-pot testing while some cables exhibited cable damage due to pullbys. Various other types of cable damage was observed: deformed outer jacket, split outer jacket, and cable puncture exposing the conductor. Cable repairs were also found in conduits. This URI was left open pending further NRC reviews.

IR 50-390/90-24 documented the witnessing of applicant inspections to identify cable damage due to ring cuts. The NRC also viewed boroscope inspection of a conduit which was believed to be the cause of observed cable damage. This URI was left open pending further NRC reviews.

IR 50-390/90-27 updated this URI and documented the problem of cables failing hi-pot testing due to ring cuts at cable splices. Ring cut damage was introduced during splice preparations. The applicant sampled 400 recently installed cable splices and identified approximately 10 percent as having ring cuts. This damage mechanism and other cable splice deficiencies were reported to the NRC pursuant to 10 CFR 50.55(e) as CDR 50-390/90-04, Cable Damage at Splices. This CDR has been reviewed and closed by the NRC as documented in paragraph 7.13 of this report.

In December 1990, the applicant reported to the NRC a deficiency pursuant to 10 CFR 50.55(e) as CDR 50-390/90-09, Cable Damage at Terminations. The identified cable deficiencies consisted of insulation damage. The damage was attributed to poor workmanship by craft personnel and failure of QC inspectors to identify the damage. The CDR corrective actions were implemented by the applicant and reviewed by the NRC. This CDR was closed by the NRC as documented in IR 50-390/95-57, paragraph 11.4.

During 1991 and 1992, the NRC completed the Cable Issues CAP reviews and issued SSERs for the CAP. NRC reviews of the Cable Issues CAP were documented in the following documents:

- Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 7, September 1991.

- Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 9, June 1992.

IR 50-390/91-31 updated this URI item and documented adequate recurrence controls for construction restart. The item was left open pending further inspections of the Cable Issues CAP implementation.

In 1993, IRs 50-390/92-01, 92-22, 92-26, and 92-35, documented the NRC review of the applicant's inspection of Class 1E cables being removed as part of the corrective actions to address possible cable damage resulting from cable jamming. During the initial cable and conduit sizing at WBN, cable jam ratio was not adequately considered in the applicant's design criteria. Cable jam ratio is the ratio of the inside diameter of a conduit to the outside diameter of one cable in a three single-conductor cable pull. A jam ratio between 2.8 and 3.1 can result in cable damage due to jamming or wedging at conduit bends. During these cable removal activities, the applicant identified cable damage conditions. The results of the cable inspections were submitted to the NRC by letter, dated December 21, 1993. The cable inspections yielded the following:

- One cable had jacket and slight insulation damage at the conduit/tray interface;
- Four cables had insulation damage in the conduits or junction boxes within the conduit runs;
- One cable was inspected, and no cable damage was found.

The above conditions were documented in PER WBPER920162. The observed insulation damage included kinks with some flattening of the cable jacket with "bird-caging" of the conductor under the kinked areas; taped repairs of deep cuts in the insulation exposing the conductor; and stranding marks, thinning, compression, and scratches to the cable insulation. Based on the identified cable damage and engineering analysis, the applicant concluded that the damage was most likely the result of kinks which occurred during the installation of these large, stiff cables. These configurations result in high pull tensions due to the passage of the kinks through the conduits. Cable jamming was not considered to have caused the cable damage. With respect to the conclusion that the observed cable damage was most likely due to kinks which occurred during the cable installation practices, the applicant has implemented

additional cable inspections to assess the impact on other installed cables. The inspection criteria and methodology were also presented to the NRC for review. The results of these additional inspections were also discussed in the applicant's,December 1993 submittal. The cable jamming issue was included as a subissue in the applicant's Cable Issues CAP. This subissue was determined complete and closed as documented in IR 50-390/95-17.

IR 50-390/93-35 updated this URI item and documented continuing NRC inspection of implementation of Cable Issues CAP. The report documented the applicant's identification of cable damage, possibly due to high heat from a welding process to an adjacent support (cable 1V1810A in conduit 1VC1121A). The URI was left open pending the applicant's evaluation of the cable damage and continuing NRC inspections. This condition was documented in PER WBPER930068. The damaged cable was evaluated by the applicant's Central Laboratory and determined to have a result of welding activities too close to the raceway. The extent of condition review determined this condition to be an isolated occurrence. The inspector determined that the PER evaluation and closure was acceptable.

In 1994, the applicant submitted Cable Issues CAP, Revision 3, in January 1994. This revision incorporated changes from previous applicant submittals regarding the corrective actions associated with the Cable Issues CAP.

NRC inspection of the Cable Issues CAP at the 75 percent complete stage was documented in IR 50-390/94-53, paragraph 3.12. Included as an inspection element was the review of the applicant's trending of identified cable damage. The IR documented that the applicant committed to monitor cable replacement activities to provide a means to track examples of cable damage. In addition, QC was to inspect for damage all cables being removed for any cause. The gathered data would then be trended and evaluated to identify any cable damage mechanisms other than those known to exist at the time. In December 1993, the applicant issued a report entitled Special Trend Report, Spare/Abandoned Cable Problems, Damaged Cable, Mis-routed Cables and Undocumented Splices, Revision 2. This revision included data collected from closed workplans, CAQs, and other field inspections and covers the period through September 1992. The inspector reviewed the applicant's trending results based on the compilation of cable inspection findings. The results were based on a total number of cables of greater than 2838. Below is a tabulation of the cable inspection results associated with cable damage.

Cable Inspection Findings	No. of Cables	% of Total Cables (2838)
Termination/Splice insulation damage	316	11.1
Other insulation damage	128	4.5
Cable repairs in conduits	13	0.5

The trend report analyzed the significance of the above cable inspection findings and identified the confirmed trends in occurrence. NRC IR 50-390/95-64 documented additional review of the applicant's cable special trend report. The above report does not include the cable damage deficiencies identified in 1995 as discussed below.

In early 1995, the applicant's QA organization performed an assessment of the implementation of corrective actions associated with cable splice rework activities. Based on identified deficiencies regarding damage at Class 1E cables and splices, SCAR WBSCA950002 was issued and the conditions were determined to be reportable to the NRC pursuant to 10 CFR 50.55(e) as CDR 50-390/95-02. The applicant submitted to the NRC the corrective actions to be implemented which included re-inspection of all 10 CFR 50.49 cables and splices at end devices. The implementation of the corrective actions for this CDR were also inspected by the NRC and determined acceptable as documented in the following inspection reports:

- 50-390/95-17, paragraph 2.1, Cable and Splice Damage Inspections
- 50-390/95-24, paragraph 3.4, Cable and Splice Damage Inspections
- 50-390/95-33, paragraph 3.0, Cable Damage

IR 50-390/95-64 documented NRC review of the completed corrective actions for CDR 50-390/89-10, Damaged Electrical Cable In Conduit. This CDR pertained to damage to electrical cables as a result of cable pullbys during the initial installation process. Cable pullbys occur when new cables are pulled into conduits which have existing cables. The results of the NRC inspection indicated that the applicant had completed the corrective actions specified in the CDR Final Report. SCAR WBP890492SCA was closed, and licensing commitments were implemented and closed. The IR also documented the closure of the Cable Pullby Issue within the Cable Issues CAP.

The above discussions provide an overview of the cable damage issues which have been identified through evaluation and resolution of employee concerns and implementation of corrective actions for various CAQ conditions. The applicant's Special Trend Report, Spare/Abandoned Cable Problems, Damaged Cable, Mis-routed Cables and Undocumented Splices, Revision 2, provided acceptable cable damage trending to identify any cable damage mechanisms not previously being evaluated. NRC review of the applicant's cable special trend report determined that the applicant's actions to identify, track, trend, and analyze cable inspection findings were adequate and met licensing commitments. Based on the results of applicant actions to trend and evaluate cable damage deficiencies and NRC review of these trend results, this item is closed.

7.11 (Closed) CDR 50-390/89-12, 10 CFR 50.49, Cables Located Below Flood Level Not Qualified

This CDR involved the installation of 10 CFR 50.49 cables below post-accident flood levels that did not have submergence qualification documentation. Additionally, inconsistencies were noted in the design location of the cables and the as-constructed configuration. The licensee concluded that the design change program for tracking field modifications of 10 CFR 50.49 cables was inadequate. The subject deficiency was initially reported to NRC on

December 22, 1990, in accordance with the reporting requirements of 10 CFR 50.55(e) as CAQR WBP890421. An interim report was submitted by the applicant on January 22, 1990, and a final report was submitted on March 5, 1990.

This item was initially examined and discussed in NRC IR 50-390/91-31. This report examined the applicant's proposed corrective actions and actions taken to prevent further recurrence of the problems. These actions were deemed adequate for construction restart. The actions remaining to be completed by the applicant consisted of preparing and implementing DCNs to rework those unqualified cables. Thus, this item was left open pending completion of the required rework. The applicant documented this deficiency on SCAR WBP890421SCA to investigate the cause, determine extent of condition, and guide the corrective actions for this issue. Revision 3 was the current revision of this report that was reviewed during this inspection.

The inspector reviewed the applicant's closure package for this CDR and verified that the applicant had taken adequate corrective action to resolve this concern. The inspector confirmed that the applicant had conducted WDs of containment and areas outside containment to identify 10 CFR 50.49 cables including end devices, conduit, and junction boxes, that were below postulated flood levels (i.e., LOCA, HELB, and etc.). This equipment was subsequently evaluated by the applicant to determine if the cables and junction boxes that could be submerged post-accident were required to be functional. The operability requirements for the end devices were evaluated in Calculation WBN-OSG4-048, Revision 15, and if functionality was required, the disposition of the submerged cables was addressed in Calculation WBPEVAR9012004, Revision 8. The dispositions included either accepting the installations as-is based on analysis, rerouting the cables above the flood level, or sealing conduits from moisture intrusion. The work implementing documents issued to disposition the 10 CFR 50.49 cables are listed in Calculation WBPEVAR9012004, Revision 8.

The inspector reviewed documented evidence demonstrating that each of the design change documents referenced in the calculation had been issued. The inspector also reviewed the work completion statement records for each of the design change documents attesting that all field work had been completed. A previous NRC inspection, IR 50-390/95-54, conducted WDs of containment and areas outside containment to verify that 10 CFR 50.49 equipment that was subject to submergence had been identified, evaluated, and dispositioned by the applicant as part of the corrective action for this CDR and associated NRC commitments. This inspection concluded that 10 CFR 50.49 equipment subject to submergence had been either sealed from moisture intrusion, rerouted above the flood level, accepted as-is based on analysis, or scheduled to be reworked in accordance with an issued work implementing document. Based on this review and the results of previous inspections as noted, this item is considered closed.

7.12 (Closed) CDR 50-390/90-03, Cable Proximity To Hot Pipes.

This CDR pertained to the condition where cables were in close proximity to hot pipes. The concern of cables in close proximity to hot pipes was described in NRC IEN 86-49, Age/Environment Induced Electrical Cable Failures.

It stated hot pipes and electrical raceways should not be routed in close proximity with each other to avoid either slow degradation and accelerated aging of electrical cable insulation or abrupt failure of the insulation dependent on the actual temperature of the pipes involved and the separation distance.

This issue was originally documented as PIR WBNEEB8644, Revision 0, which was closed after being superseded by CAQR WBN900264R0. CAQR WBN900264 was tracked under the new corrective action program as SCAR WBP900264 SCA, Revision 0. The applicant's program to address the cable proximity to hot pipes concern and prevent recurrence was summarized as follows:

- Develop separation criteria that detailed required clearances between cables/raceways and hot pipes/valves.

- Perform walkdown inspections against the separation criteria.

- Resolve all deviations by analysis, change of pipe insulation, or raceway rework.

- Incorporate the separation criteria into General Construction Specification G-40.

- Review maintenance practices and procedures to address the removal and replacement of thermal insulation and ensure proper controls are in place to protect Class 1E cables.

The inspectors reviewed the following documentation to determine if the applicant adequately addressed the cable proximity to hot pipes concern. The documentation included the following corrective action items verified by NA: (1) The calculation, VBN-OSG4-170, to determine hot pipes greater than 135 degrees Fahrenheit was completed; (2) WD inspections were performed to determine separation as documented in WDs WD-038 and WD-011; (3) Verified WDs were completed and the results were included in calculations WBN-OSG4-138, -139, and -221; (4) DCNs M-10422A and M-10815A were issued to complete rework identified in WDs WD-038 and WD-011; (5) General Engineering Specification G-40 was revised to include separation requirements; and (6) DCNs S-19045-A and S-17353-A were issued to revise maintenance procedures. The inspectors concluded the closure documentation was adequately reviewed by NA.

NRC IR 50-390/94-53 addressed the applicant's corrective action for the cable proximity to hot pipes concern. The reports conclusion was the applicant's "overall program to resolve this issue is comprehensive. The field inspections of completed modifications indicated that the hot pipe/raceway interaction were being adequately resolved. However, the applicant has not performed evaluation of the majority of the 919 violations.... Although the probability is relatively low, any of the remaining conduits or pipes could require re-routing..."

NRC IR 50-390/95-57 addressed the cable proximity to hot pipes concern. The report's conclusion was that the corrective actions for this subissue were

being adequately implemented and the remaining corrective actions needed for completion were:

- Completion of work associated with DCN W-32667-C.
- Closure of CAQR WBP900264SCA.
- Closure of CDR 50-390/90-03.

In IR 50-390/95-57 the conclusion was "based on the limited corrective actions remaining open and adequate implementation to date. The inspector concluded that the Cables Issues CAP sub-issue of cable proximity to hot pipe was effectively completed."

During this inspection, the inspectors conducted a WD and verified that the two remaining WOs WO-94-21301-15 and WO-94-21301-16 for DCN W-32667-C were completed. In addition, the inspectors verified that NA had adequately reviewed and closed DCN W-32667-C and CAQR WBP900264SCA. NA had completed their closure of CDR 50-390/90-03 and submitted it to the NRC for closure. The inspectors concluded the applicant conducted document reviews, field inspections, and implemented the corrective actions specified in the CDR Final Report in a satisfactory manner to close this concern.

This CDR is closed.

7.13 (Closed) CDR 50-390/90-04, Cable Damage at Splices

This item pertained to identified cable damage at splices. The damage identified included ring cuts to the cable conductor insulation introduced during the preparations for making cable splices. The deficiency was initially documented in CAQR WBP900450SCA. This condition was discovered when two low voltage cables failed hi-pot testing due to improperly applied splices. This deficiency was originally reported to NRC on November 1, 1990, with interim reports submitted on November 30, 1990, and February 21, 1991.

In early 1989, the applicant issued WPs to replace Class 1E splices in harsh environment as part of the corrective actions for CDR 50-390/85-31 and in accordance with the commitments in the Cable Issues CAP. During the splice replacement program implementation, the applicant became aware of problems with poor workmanship of splices and terminations (e.g., cable damage at splices, spared conductors which were not sealed properly, and improper application of the Raychem material). SCAR WBP900450SCA documented the issue which was subsequently reported to the NRC as CDR 50-390/90-04 in accordance with the provisions of 10 CFR 50.55(e). The deficiencies potentially affected all Class 1E splices performed between May 3, 1989, and October 25, 1990, and all harsh environment terminations. The corrective action was to reinspect all Class 1E and non-Class 1E Raychem splices and EQ terminations that were worked by construction personnel between May 3, 1989, and October 25, 1990, under WPs WP-5688-1 through -4 series. The May 3, 1989, date represented the start of the series of WPs (i.e., WP M-5688 series) to replace the splices identified in DCN Q-17111-A. In a similar manner, WP series M-5835 were issued to reinspect the subject splices and rework any deficiencies identified.

The NRC performed inspections of the applicant's implementation of the above corrective actions. These inspections were documented in the following inspection reports:

- 50-390/91-23, paragraph 9.g
- 50-390/93-10, paragraph 11.b
- 50-390/94-53, paragraph 3.8
- 50-390/95-06, paragraph 6.1

As discussed in paragraph 3.2 of this report, in 1995 the applicant's QA organization identified examples of cable damage at cable splices. Those deficient conditions were determined to be reportable to the NRC pursuant to 10 CFR 50.55(e) as CDR 50-390/95-02, Cable Damage at Splices and Terminations. The CDR deficiencies pertained to examples of cable damage ranging from minor scuffing and abrasions to exposure of bare copper. The corrective actions for CDR 50-390/95-02 included inspection of 10 CFR 50.49 locations inside containment and main steam valve rooms which contain splices and terminations. As part of CDR 95-02 corrective actions, the applicant also performed a review of previously identified cable damage documented in M-5835 series WPs. These WPs were issued pre-1991 to implement corrective actions for CDR 50-390/90-04. Those cables and splices identified in the M-5835 series WPs as containing damage were reinspected to verify that the identified conditions had been corrected. In submittals dated May 23 and September 21, 1995, the applicant provided additional information and technical basis stating that no further inspections of mild environment splices and terminations, including those subject to moisture intrusion, were considered necessary. The NRC reviewed the applicant's corrective actions to address the identified deficiencies associated with SCAR WBSCA950002. The NRC documented the acceptability of the applicant's corrective actions in Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 16, Section 8.3.3.1.6, September 1995.

The NRC performed extensive inspection of the applicant's implementation of the approved corrective actions for the reinspection of 10 CFR 50.49 cables, splices, and terminations. These inspections were documented in the following IRs:

- 50-390/95-17, paragraph 2.1, Cable and Splice Damage Inspections
- 50-390/95-24, paragraph 3.4, Cable and Splice Damage Inspections
- 50-390/95-33, paragraph 3.0, Cable Damage

The above NRC inspection effort included three major areas: (1) review of the applicant's methodology used to identify EQ end devices including associated splices and terminations for inspection; (2) field inspections to observe initial splice and termination inspections and any required repairs; and (3) inspection of field configurations to verify conformance to as-constructed drawings.

During the implementation of the above corrective actions, the applicant's QA organization also performed in-process assessments of the corrective actions. The results of their review were documented in assessment report NA-WB-95-0095, Electrical and Cable Issues Corrective Action Program -

Subissues: Cable Damage/Cable Splices. The assessment was performed as a followup to previously issued assessment report NA-WB-94-0143 which resulted in initiation of SCAR WBSCA950002. The assessment focused on cable splices, field verification of cable and splice inspection and repairs, and in-process oversight of cable and splice inspections and required repairs. Seventeen cable and splice inspection attributes were included during the QA reviews. The overall conclusions were that the corrective actions for the cable splice issue had been adequately implemented and NA concluded that the subissue was ready for closure.

Based on the extensive NRC inspections of the applicant's implementation of corrective actions and overall acceptable result, established recurrence controls, and independent QA involvement to assess acceptable implementation of corrective actions, this CDR is closed.

7.14 (Closed) CDR 50-390,391/90-07, ABGTS Design Deficiency

This item was reported to the NRC because a design deficiency was found in the ABGTS that could have an adverse impact on the ABSCE pressure control. The design deficiency was associated with the failure position of two vacuum relief isolation dampers and two vacuum relief modulating dampers. The dampers were incorrectly powered from nonessential control air and did not receive an engineered safety feature actuation signal, auxiliary building isolation signal, or ABGTS fan start signal. The applicant's corrective action document SCAR WBP900432SCA addressed this reportable condition.

Several design changes were made to correct this condition. DCN 37107-A installed dual relief dampers in the auxiliary building to ensure that the pressure does not go too negative. DCNs M-20307-A and M20457-A provide essential air (auxiliary control air system) to dampers 0-FCO-30-279 and 1-FCO-30-280, and modulating dampers 0-FCO-30-148 and 0-FCO-30-149. DCN M-10354-B installed a new ABGTS local control cabinet (0-L-430) which replaced previously unreliable instrumentation, modified the ABGTS control logic to start the redundant fan if auxiliary building negative pressure is not maintained, and modified the vacuum relief line isolation damper opening signal. DCN 37323-A was issued to modify Design Criteria N3-30AB-4001, Auxiliary Building Heating Ventilation and Air Conditioning System, reflect the change in operation of the system and to update the FSAR. The FSAR change request was submitted July 6, 1995. The inspector verified that the installation of the hardware was accomplished and that the DCNs were closed. Procedure PTI 030D-03 for the ABGTS provided the post modification testing. PTI 030D-03 was reviewed as documented by the NRC in IR 50-390/94-80 and the test observation was documented in IR 50-390/95-25.

This item is closed

7.15 (Closed) VIO 50-390/90-15-03, Corrosion on System 31 Chilled Water Piping.

The applicant's response to VIO 390/90-15-03, dated January 3, 1991, on external corrosion of cooling system piping describing the actions to correct

this problem are essentially complete. Train A is 100 percent coated and Train B is more than 95 percent complete. The remaining work consists of touch-up of pits and reinstallation of insulation. The inspector witnessed work in progress to coat exposed sections of piping and touch-up of flanges and flange bolting. Work observed was of good quality, and good housekeeping was evident. NRC IR 50-390/92-26 discusses other actions to correct the problem.

Procedure PMI-031-H, Revision 2 is in place to determine if further degradation of coatings is occurring on System 31. This instruction will remain in place until the adequacy of the coating is confirmed. It is intended that this PM be done prior to startup and during the first two refueling outages. Basically, the PM requires photographs to be taken of selected sections of the piping protective coating to determine the effectiveness of the coating. Visual inspection is also required and noted. Corrective action will be determined depending on the exam results. VIO 50-390/90-15-03 is closed.

7.16 (Closed) CDR 50-390/91-04, Inadequate Design of Various Air Handling Unit Control Circuits

During post modification testing, the applicant identified two deficiencies with the main control room AHU control circuits. First, the standby air handling unit would not automatically start on a failure of the operating air handling unit due to insufficient energizing time of the initiating relay. Second, the main control room AHU and chilled water pump would not restart immediately after loading onto the emergency diesel generator following a loss of offsite power. The applicant initially reported this deficiency to NRC on February 22, 1991. The final report was submitted on April 5, 1991, and a revised final report was submitted on February 11, 1993. The applicant initiated SCAR WBP900581SCA to investigate the cause, determine extent of condition, and guide the corrective actions for this issue. The root cause of the design deficiencies were attributed to (1) a poor design resulting in "relay races" being introduced into safety-related control circuits, and (2) a design that required power in the operating unit to drive a time-delay relay which must energize to initiate the start of the standby unit after the operating unit has lost power. In addition, the design failed to consider the design requirement for the AHU to automatically start when transferred to the EDG. The applicant determined that the only other systems affected by these control circuit problems were the electrical board room and shutdown board room air conditioning systems.

The corrective actions proposed by the applicant were stated in SCAR WBP900581SCA as follows:

- Revise safety limits calculation EPM-WVC-101089;

- Revise the demonstrated accuracy calculation WBPE0309004011;

- Revise Bulletin 80-20 switch calculation E27885081201;

- Revise preoperational test scoping documents TVA-9 and 10;

- Issue final approved DCN M-15527-A;
- Nuclear construction to implement DCN M-15527-A;
- Revise prestart test instruction;
- Revise operations procedures;
- Revise annunciator procedures;
- Evaluate the need to revise licensing response on Bulletin 80-20 switches.

A previous NRC inspection, IR 50-390/93-72, reviewed the deficiency and the applicant's corrective actions. The IR noted that items six through nine had not been completed by the applicant. In addition, the inspector expressed a concern that the corrective actions in the SCAR did not adequately address the failure of the preoperational testing programs to identify the system design deficiencies and the necessary action required to prevent recurrence of the oversights. This inspection examined, in particular, the applicant's disposition of items six through nine above. The areas inspected and conclusions reached are discussed in the paragraphs that follow.

The inspector reviewed the applicant's closure package for this item which included documented evidence that each of the specified corrective actions had been completed. The inspector reviewed the work completion statement for DCN M-15527-A which indicated that the associated work plan that implemented the DCN had been closed. The applicant provided evidence of this fact by including a MTS status report which showed the closeout date for the associated WPs. The inspector randomly selected WP D-15527-80 from the list of completed WPs shown on the work completion statement to verify the record supported this conclusion. The inspector noted that the record demonstrated that the field work had been completed and the WP was closed.

The applicant indicated that four safety-related systems were impacted by this control circuit design problem. The preoperational testing of the subject systems were addressed by the following instructions:

- PTI-031M-01, Main Control Room Air Handling Units, Revision 1,
- PTI-031N-01, Electrical Board Room Air Handling Units, Revision 0,
- PTI-031C-01, Shutdown Board Room Air Handling Units, Revision 0,
- PTI-262-01, Integrated Safeguards Test, Revision 0.

The inspector verified that these procedures had been revised to reflect the modifications to the AHU control circuits. The appropriate preoperational test summary reports were also reviewed to verify that testing was completed satisfactorily and that all test deficiencies had been properly resolved. The inspector verified that the Procedures SOI-30.07, Revision 10, and SOI-31.01, Revision 11, had been revised to reflect the changes made to the control circuits by DCN M-15527-A. The inspector also reviewed the annunciator response Procedures ARI-102-108, HVAC and CVCS, Revision 1, and ARI-138-144,

HVAC, 480 Boards, Ice Conditioner, Revision 1, and verified that they had been revised to incorporate changes made by DCN M-15527-A.

The inspector's concern that the corrective actions for this deficiency did not adequately address the preoperational testing program's failure to identify the system design deficiencies was not addressed in the closure package. The applicant considered this issue no longer relevant because the preoperational test program was extensively revised, and the subject control circuits passed their preoperational test. The inspector noted that each of the referenced PTIs were reviewed by the NRC prior to implementation. The results of these reviews are discussed in NRC IRs 50-390/94-58, -94-65, and -94-73. In addition, the NRC witnessed substantial portions of the testing conducted by Procedures PTI-31N-01 and PTI-262-01 as discussed in IRs 50-390/94-73 and 50-390/94-80, respectively. The completed test results for Procedure PTI-262-01 were reviewed by NRC in IR 50-390/95-25. The test results for Procedures PTIs 031C-01, 031N-01, and 031M-01 were reviewed during this inspection and found to be acceptable. Based on this review, the inspector agreed with the applicant that this issue is no longer relevant. This item is now considered closed.

A side issue related to Procedure PTI-262-01 was also reviewed during this inspection. The objectives of Procedure PTI-262-01 were to demonstrate proper automatic actuation, alignment and operation, including bus stripping and load sequencing, of all ESF components controlled by ESFAS with and without offsite power.

The test results for Procedure PTI-262-01 were reviewed in IR 50-390/95-25 as stated above. The IR describes TDN 94-2007 that was initiated because Shutdown Board Room Chiller B-B started after a LOOP then tripped on high motor (0-MTR-31-49/2-B) temperature. A review of the sequence of events recorder printout revealed that the chiller started at the proper time, (post LOOP) but then tripped approximately two minutes later. It was determined that the chiller motor tripped due to chiller operation at low-load conditions which resulted in inadequate coolant being provided to the compressor motor. This chiller unit was successfully retested in Retest 1 with artificial chill water system heat load provided. DCN W-35362-A was initiated to improve the performance of the chiller unit under light-load conditions. TDN 94-2007 was closed and a new TDN 95-0157 was initiated against Procedure PTI-031C-01 to track the closure of the DCN. IR 50-390/95-25 contained an action item for the inspector to review the implementation of equipment modifications and confirm the adequacy of retesting and closure of this TDN at a future date.

During the course of this inspection, the inspector verified that the subject DCN had been implemented and that an appropriate PMT had been conducted. The inspector reviewed the work completion statement for DCN 35362-A and found that it was field complete. The DCN was issued to resolve this problem on both shutdown board room chiller units WBN-0-CHR-031-0036/2-A and WBN-0-CHR-031-0049/2-B. The DCN had been implemented by WOs 9507049-00, -01, and -02. The inspector reviewed the completed WO packages to verify that field work was complete and that the PMT was performed. The completed WO 9507049-00 indicated that the PMT was performed to verify the compressor

motors did not trip on high motor temperature with the chillers at low load. This issue is now considered complete.

7.17 (Closed) CDR 50-390/91-39, Failure to Postulate Breaks in S/G Wet Layup Piping

This item was reported because the applicant had failed to take into account under HELB analysis the steam generator wet layup piping in the auxiliary building from the isolation valves to the main feedwater bypass piping in the yard area. Corrective action was to move the location of the isolation valves to the yard area. The valves are normally closed during operation so the relocation of the valves to the yard area removed the unanalyzed section from the auxiliary building. The inspector verified that the valves had been moved to the yard area in the location shown in DCN M-21776-A. This item is closed.

7.18 (Closed) IFI 50-390/92-01-06, Cable Ampacities Deficiencies.

The above issue identified deficiencies in design standards which failed to consider applicable attributes required for sizing cables. The applicant developed the "Ampacity Program " for correcting this issue. The NRC staff has reviewed this program and the results are documented in NRC report 50-390,391/94-81. Additional reviews of this functional area by the NRC staff were performed during the Electrical IDI Inspection, the results of which are documented in NRC report 50-390/91-201. The NRC staff concluded that the Ampacity Program was acceptable. Additionally, Calculation WBPEVAR8909010, Cable Ampacity-Class 1E NV3 Cables, Revision 0, had identified 242 cables that needed to be repulled, either totally or partially, in order to provide adequately sized current carrying conductors.

The inspector reviewed the documentation for PER WBP900266PER, Revision 4, and verified that corrective actions implemented by calculation WBPEVAR8909010, Revision 0, had been completed. The extent of condition described in Revision 28 of this calculation included 572 cables as failing to meet ampacity requirements. The documentation also identified the cable replacement DCNs and their status. A total of 41 DCNs were listed as having been prepared for implementing corrective actions for resolving the cable ampacity deficiencies. All DCN status was identified as closed with the exception of DCN M11142-A, Cable Replacement Group 4 System, Revision 0. The inspector reviewed a copy of this DCN and determined that the scope of the plant modification involved replacement of six group 4 cables because of inadequate cable ampacity. Discussions with the applicant's staff revealed that the field work required by this DCN had been completed and the DCN was in the process of being closed. Work Completion Statement for DCN M-11142-A was also provided to the inspector as proof of the field work having been completed. Based on objective evidence reviewed this item is closed.

7.19.1 (Closed) IFI 50-390/92-01-08, Evaluation of Cable Bend Radius

This item was opened in 1992 to track applicant actions to resolve NRC concerns regarding the acceptability of corrective actions regarding cable bend radius. This item was opened to follow the applicant's discussions with cable manufacturers to determine the limits of acceptable bend radius criteria

for installed cables and confirmation of 59 cable bend radii inspection results. Additional NRC reviews and issues pertaining to this item were also documented in IRs 50-390/93-83 and 93-91.

(a) Applicant's discussions with cable manufacturers to determine the limits of acceptable bend radius criteria for installed cables

As discussed in NUREG-0847, Supplement 9, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, the NRC staff identified open item 2.6.6 regarding the applicant contacting cable manufacturers regarding the acceptability of the applicant's test program used to establish lower-bound bend radius. The applicant had approached the cable manufacturers on the phone about the technical adequacy of the approach to establish the lower bound for cable bend radius and the response had been favorable to the approach used. However, no written response had been received from the manufacturers. The open item was left open for the NRC resident inspector staff to follow.

In 1995, the applicant solicited several cable manufacturers' review of the technical adequacy of the applicant's approach to the establishment of cable bend radius lower bound limits. The applicant provided three cable manufacturers (Brand Rex, Rockbestos, and Okonite) with a written presentation of the applicant's resolution of the cable bend radius issue. This was followed by a visit to the manufacturers office to discuss the applicant's methodology for resolving the cable bend radius issue. A trip report was prepared by the applicant to document that the manufacturers' review of the methodology confirmed the applicant's conclusions regarding the applicant's approach to the problem resolution. The inspector concluded that the applicant had adequately addressed the SER open item.

This IFI example is closed.

7.19.2 Confirmation of 59 cable bend radii inspection results

As discussed in NUREG-0847, Supplement 9, Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, the NRC staff identified open item 2.6.1 regarding the lack of formal guidance regarding the methodology used-to take cable bend radius measurements. This placed into question the integrity of the WDs completed to date at that time. Consequently, the staff requested that the applicant re-inspect a sample of 59 cables previously examined, which were retrained, using the methodology described in formal work procedures. Additionally, since these cables had been accepted during the original bend radius WDs, the NRC was requested to be informed of any configuration which failed to meet the minimum bend radius criteria. Subsequent NRC review of site cable installation procedures confirmed that the applicant's walkdown procedures contained the proper methodologies for field measurement of cable bend radius. The applicant agreed to perform a walkdown of 59 randomly selected conduits to verify that inadequate prior measurement instructions did not result in under-corrected, over-bent cables. The work plan for this effort was reviewed by the staff and was determined to be acceptable. The open item was left open for the NRC resident inspectors to follow the walkdown of the 59 samples.

The applicant provided the results of the 59 cable inspections as part of the closure documentation for this IFI. The results were documented in PER WBPER910179 and identified no examples were identified where the measured bend radius was below the cable/conductor MTR. The inspector reviewed the results and verified that the bend radius measurements for the 59 cables inspected met the acceptance criteria. The inspector also performed a review of closed PER WBPER910179 which pertained to the deficiency that work instructions did not reference the appropriate work implementing procedure for cable bend radius acceptance criteria. No deficiencies were identified during the above reviews. The inspector concluded that the applicant had adequately addressed the SER open item.

This IFI example is closed.

7.19.3 Issues documented in IR 50-390/93-83

The IR documented a concern regarding General Engineering Specification G-38, Installation, Modification and Maintenance of Insulated Cables Rated Up to 15,000 Volts, Revision 14, provision which allowed the temporary exceedance of the MTR during the cable installation process. Additionally, the specification defined the MPR as the smallest radius to which the inside surface of the cable may be bent under tension and stated that this radius shall not be less than the MTR. Therefore, the inspector raised a concern that the specification wording allowed for both the minimum pulling radius and minimum training radius to be temporarily exceeded during actual cable installation. The applicant's position was the allowance was for exceeding MTR, and by definition MTR was a criteria for a cable not under tension.

The applicant performed additional reviews of the G-38 provisions regarding the allowance for the temporary exceedance of the MTR during the cable installation process. The applicant determined that the existing criteria in G-38 was acceptable since the definition of cable MTR was that the cable was not under tension. Therefore, a cable under tension (during pulling conditions) could not be bent to a value less than the MTR. The inspector reviewed the existing G-38 specification and the applicant's evaluation of the inspector's concern and determined that the existing criteria was acceptable.

This IFI example is closed.

7.19.4 Issues documented in IR 50-390/93-91

This IR documented a condition where the inspector questioned the adequacy of as-installed bend radius conditions in the diesel generator 125 Vdc distribution panels. Diesel generator distribution panels 2-DPL-82-B-B and 2-DPL-82-A-A contained size 2/0 Anaconda cable wiring bent to the point where insulation had flattened, and distortion was visible.

The applicant reviewed the conditions of the cables installed in the diesel generator panels. The cables installed in the panels are single conductor control voltage, are located in mild environment and are vendor cables. Vendor cables was not included within the scope of the applicant's Cable Issues CAP. Vendor cable/wiring was addressed in SCAR WBSCA900214SCA which in

part justified the applicant taking credit for vendors' qualification program for cables. The applicant determined that the installed cable conditions were acceptable based on the following:

- The installed control cables do not have metallic shields. Therefore, there was no possibility that the cable insulation would be cut, although the cables were slightly deformed by the bend. At control voltage the electrical stress is low, thus thermal aging due to internal conductor heating and corona type effects were not applicable.

- The cables were installed in the diesel generator building which is a mild environment. Therefore, temperatures are relatively low such that thermal aging due to external heating was not of concern. Additionally, the cables were enclosed in an electrical panel and not exposed to moisture. Phase-to-phase or phase-to-ground faults without moisture was not considered credible due to the lack of energy at this voltage to arc should the insulation crack. The inspector reviewed the applicant's evaluation of the installed condition, SCAR WBSCA900214SCA, and the applicant's Cable Issues CAP, and determined that the applicant had adequately evaluated the installed configuration.

This IFI example is closed.

The applicant adequately evaluated the four IFI cable bend radius issues, including the SER open items. Therefore, this IFI is closed.

7.20 (Closed) URI 390/92-05-05, Cable Tray Walkdowns

This URI was opened because during a sample inspection of cable tray cover lengths, one out of 10 trays inspected varied in length from that documented during previous WDs. The concern was that since cable ampacity derating only occurred for covers that were six-feet long or greater, tray covers that were close to six-feet in length (5-6 feet) might be mismeasured and the cables not properly derated. The applicant was to take measurements on an NRC selected sample of 11 cable trays with covers to ensure that the previous WD measurements being used for the ampacity calculations were adequate.

The applicant performed a sample WD of 71 tray segments including the 11 selected by the NRC. The sample determined that nine tray cover measurements were inaccurate, including two selected by the NRC. Subsequent to this information, the applicant changed their approach to ampacity derating for cable tray covers. Instead of beginning derating at six feet, the applicant changed their calculation to derate at .1 feet, meaning essentially that all trays with tray covers are derated. This approach is a more conservative approach and resolves the NRC concern about trays not being included for derating due to measurement inaccuracies. The installation of tray covers is the subject of CDR 50-390/86-25 and VIO 50-390/95-64-01.

This URI is closed.

7.21 (Closed) URI 50-390/93-24-02, Evaluation of Nonconformances in Preoperational Tests.

The NRC staff in IR 50-390/93-24, dated May 9, 1993, documented a concern where adequate controls and documentation for identifying, evaluating, and resolving nonconforming conditions had not been used. This concern was based on the NRC's review of IIs II-W-92-19, II-W-92-20, and II-W-92-22. This item was identified as URI 50-390/93-24-02. The applicant, in response to the NRC's concern, performed an assessment of the IIs to evaluate the process being implemented at WBN for identifying, tracking, and trending of nonconformances. The assessment, documented in NA-WB-93-0056, included evaluation of the corrective action documents which delineated the corrective action plans and the ACP implemented for correcting the deficiencies. Based on the above assessment, the IIs were determined to have administrative deficiencies such as missing information required to demonstrate performance of field inspections and misleading information contained on WRs. The applicant documented a total of five recommendations for enhancing the II program based on the results of this assessment. The inspector reviewed the applicant's response to the findings documented on IR 50-390/93-24 and concluded that the results of the assessment and the developed corrective action plans were adequate.

NRC IR 50-390,391/93-58 described a situation where numerous installations and/or fabrication errors had been documented on DN's, which were not subject to reviews for extent of condition, root cause analysis, and recurrence controls. IR 50-390,391/93-75, dated December 13, 1993, also identified additional problems related to: test deficiencies, procedural controls for the equipment failure trending program, and work practices used to implement this program. The results documented in these NRC reports were included with the deficiencies identified earlier as URI 50-390/93-24-02.

The applicant, in response to the above inspection findings, developed and implemented various corrective action plans. Among these were a revision to Procedure SMP 14.0, Test Deficiencies, Revision 3, to include criteria for reviewing nonconformances documented on TDNs to ensure possible elevation to a higher-tier corrective action program document. The inspector verified that procedures listed as requiring revision had been revised in accordance with the developed corrective action plan. The applicant also completed a comprehensive review and evaluation of the corrective action program on March 14, 1994. The results of this assessment were documented in NA CAP assessment NA-WB-94-0046, which identified numerous deficiencies with the corrective action program implementation. The nature of all the deficiencies was in the area of program implementation and did not affect the design function, and/or installation of the physical plant. The assessment report provided recommendations for training personnel in root cause analysis with special emphasis on the review of corrective action plans to ensure that the true extent of deficient conditions were identified. The inspector reviewed training records and verified that this training, to the requirements of WBNP BP-383, Corrective Action Program Guidebook, Revision 5, had been completed. The applicant has established a list of personnel who have been qualified to the requirements of BP-83 which delineates the process pertaining to the disposition and closure of PERs and SCARs.

SCAR WBSCA940033 was initiated for developing and implementing corrective actions for the deficiencies documented on assessment report NA-WB-94-0046. The inspector reviewed this document and determined that Revision 4 also included corrective actions which addressed specific findings from NRC report 50-390/94-37 and Nuclear Assurance and Licensing Audit Report SSA94409, Corrective Action/Correction of Deficiencies. The NRC staff has reviewed the corrective action plans developed by the applicant for resolution of the deficiencies documented on SCAR WBSCA940033. The results of this review were documented in NRC IR 50-390/95-71. This report also documented the closure of VIOs 50-390,391/94-37-01, Failure to Follow Procedures, and 50-390,391/94-13-02, Inadequate Corrective Actions. The deficiencies determined to have been adequately corrected by closure of these violations were within the scope of SCAR WBSCA940033.

The applicant performed an assessmemnt as a follow-up to NA CAP Assessment NA-WB-94-0046 and Nuclear Assurance Corrective Action/Correction of Deficiencies Audit SSA94409. The purpose of this assessment was to determine the adequacy and effectiveness of actions taken to correct implementation problems in the WBN CAP as documented in SCAR WBSCA940033. The results of this assessment documented in Assessment NA-WB-95-0074 concluded that a marked improvement in the implementation of the CAP had been achieved. Implementation of the CAP was determined to be adequate in the areas of root cause identification, problem evaluation and causal factor identification, extent of condition analysis, and corrective action implementation. The assessment team concluded that select, completed corrective actions identified in SCAR WBSCA940033 had been completed. The team also concluded that trending of select ACPs within the WBN CAP was adequate and effective.

The inspector concluded that the documentation presented by the applicant for disposition of this URI contained records which demonstrated that adequate evaluation/analysis of all deficiencies had been performed. Based on closure of the above violations, the inspector's verification of procedures having been revised, and personnel having been trained in the requirements of BP-383, this item is closed.

7.22 (Closed) CDR 50-390/94-04, Potential Freezing of a Main Steam Pressure Transmitter Sense Line

This CDR was written to report the potential freezing of the sensing line for Main Steam Pressure Transmitter 1-PT-1-009A, which was identified as a result of a similar occurrence at the Sequoyah Nuclear Power Plant. The safety significance of this freezing was the potential nullification of the ESF signal that would isolate the Main Steam System with a low pressure event in steam line 2. The applicant determined the cause of this potential problem to be the routing of the sensing line over the air intake for the MSVV, which during cold weather could cause localized freezing and subsequent blockage of the small diameter sensing line, resulting in loss of the safety signal.

The applicant's investigation of the extent of condition of this item resulted in the identification of other areas of the plant, where winter conditions could result in the potential for additional freezing of piping systems, resulting in loss of the safety functions of equipment. The corrective

actions resulting from this investigation for all identified deficiencies were as follows (These corrective actions were tracked to completion by SCAR 940017):

- The sensing lines for several transmitters in the MS and the AFW Systems in both the north and south MSVVs were modified to include heat trace and insulation (Reference DCN W-33829-A).

- The design requirements for heat tracing were added to the system descriptions for MS and AFW (Reference System Descriptions N3-1-4002 and N3-3B-4002 and DCN S-36228-A).

- Surveillance requirements concerning freeze protection for the MSVVs were added to Operating Procedure 1-PI-OPS-1-AB.

- Engineering Specification N3E-934, Instrument and Instrument Line Installation and Inspection, was revised to prevent installing lines near the intakes of MSVVs and the DG building.

- Freeze protection surveillance requirements were added to System Description N3-67-4002 and operations procedure 1-PI-OPS-1-OS (Reference DCN S-34930-A) for the ERCW Pumps.

- Holes were drilled in the disk of the ERCW Pump air release line check valves to permit minimum continuous flow through the piping to prevent freezing (Reference DCN W-34594-A). This DCN was implemented by work orders (WOs) 95-03547-00 thru 11.

- The slope of the ERCW pump motor cooling piping was increased from 3/8-inch per foot to 1-inch per foot to aid in draining of the piping to prevent freezing (Reference DCN W-33232-B). This DCN was implemented by WOs 94-23710-00 through -15 and 95-02085-00 through -07.

The inspector reviewed the DCNs referenced above in order to verify that the scope of work agreed with the applicant's corrective action for closure of this item. In addition, the inspector verified that the WOs which implemented the DCNs were closed. A sample of the WOs was reviewed to verify proper work completion and documentation. The changes to system descriptions for ERCW, AFW, and MS were also reviewed for adequacy. The inspector performed WDs of the ERCW modifications at the intake pumping station, and of the AFW and MS modifications in the north and south MSVVs in order to verify all observable attributes of the modifications had been accomplished.

Additionally, the two operations procedures were reviewed in order to verify that the surveillance requirements were appropriate for the installed hardware. Review of the closure SCAR for the CDR (SCAR 94017) identified references to IEB 79-24 and INPO SOER 82-015, as well as, several other SCARs and PERs involving freeze protection. The inspector question the applicant concerning the relationship of these items to the CDR. It was determined that separate evaluations of the necessity for plant freeze protection had been accomplished by the applicant as a result of the bulletin and the SOER, and the PERs and SCARs were associated with the work related to these evaluations.

It was also determined that the related items, which were incomplete at the time of this inspection, were being properly tracked to completion by the applicant. The inspector discussed the possibility of freeze protection problems in other plant areas with the applicant and based on this discussion as well as the evaluations of the SOER, the bulletin, and this CDR concluded that the applicant had conducted an adequate investigation of potential problems in this area.

Based on the above, the inspector concluded that the corrective action for this item was adequate for the closure of the item on Unit 1. Corrective action for Unit 2 was not completed and the item will remain open for Unit 2.

7.23 (Closed) IFI 50-390/94-19-01, Adequacy of Controls for Cranes Used to Move Heavy Loads.

This IFI identified four NRC verifications to be performed to assure that the applicant's controls for handling heavy loads were satisfactory:

- Verification that the applicant's July 28, 1993 Submittal for NUREG-0612 had been approved by the NRC.

- Verification that the Submittal of July 28, 1993, open actions required for fuel load were completed.

- Verification of satisfactory completion of pre-operational testing of the Polar and AB Cranes.

- Verification that the course (MTS037.006) taken by crane operators provided training/qualifications in accordance with the Submittal.

In the current inspection the NRC inspector performed the above verifications as follows:

- The inspector confirmed that the NRC had determined that the applicant's July 28, 1993 Submittal was acceptable. Acceptance was documented in NRC Safety Evaluation Report NUREG-0847, Supplement 13.

- The applicant documented completion of the July 28, 1993 Submittal open actions as items in their TROI database. The inspector verified the documented completion of each of the items on Watts Bar Standard Closure Forms. The item designations and their completion dates were as follows:

Submittal Item	TROI Item	Recorded Completion Status
1	NC0930238001	OPEN - SCHEDULED 8/29/95
2	NC0930238002	Closed March 31, 1995
3	NC0930238003	Closed June 13, 1994
4	NC0930238004	Closed July 2, 1995
5	NC0930238005	Closed December 22, 1993
6	NC0930238006	Closed December 10, 1993
7	NC0930238007	Closed June 29, 1995

8	NCO930238008	Required first Refueling
9	NCO930238009	Closed January 31, 1995
10	NCO930238002	Required by Unit 2 Fuel Load

As a further verification of the applicant's completion of the items, the inspector reviewed documentation to demonstrate conformance with item 7 for LD-5 and future conformance with item 8 for two LD-33. For LD-5, he verified:

- The evaluation performed to demonstrate conformance with the intent of NUREG-0612 and ANSI N14.6, which was documented in Westinghouse WCAP-10313, dated June 1983, with Addendum 1, dated May 1993

- The acoustic emission inspection documented in Physical Acoustics Corporation Acoustic Emission Inspection Report, Watts Bar Reactor Head and Reactor Internals Lift Rigs, dated September 27, 1994

For LD-33, he reviewed purchase request W-8621, R0, dated July 30, 1995, which specified that LD-33 must meet ANSI B30.9.

- The inspector found that the applicant had submitted a letter to the NRC, dated July 13, 1995, indicating alternative tests rather then preoperational testing the Polar and AB Cranes. NRC Regional management stated the applicant's proposal was considered acceptable. The inspector verified the applicant's completion of the alternative tests by reviewing the records of the following sample:

  - Auxiliary Building 125 Ton Crane Annual Test, identified WO 94-16009-00 and dated complete Ocrtober 1, 1994 (included performance of Maintenance Instruction MI-271.001, Auxiliary Building Crane Annual Test)

  - 125 Percent Rated Load Test of the Auxiliary Hook of the 125 Ton Auxiliary Building Crane, identified WO 94-16360-00 and dated complete October 27, 1994

  - Reactor Building Polar Crane Annual Inspection, MI-271.004, dated complete April 23, 1995

  - From a review of Maintenance Good Practice MGP-M-175, the inspector verified that completion of course MTS037.006 provided the applicant's crane operators with the training/qualifications stated in the submittal.

Based on the above, the inspector concluded that the applicant had completed the actions stated in their July 28, 1993 letter. The NRC had accepted (NUREG 0847, Supplement 13) these actions as providing adequate controls for cranes used to move heavy loads.

7.24 (Closed) URI 50-390/94-53-03, Condulets and Cable Trays at the Top of Vertical Conduit Runs

This item was identified during the NRC inspection of the applicant's implementation of the Cable Issues CAP. The URI pertained to questions regarding whether condulets located at the top of vertical conduit runs contained an inner radius of 1/8-inch and questions regarding the applicant's basis for the reliance of horizontal tray runs above vertical conduits for cable support.

The applicant addressed example one of this URI issue as part of the reevaluation of all conduit configurations in response to example 1 of VIO 50-390/94-53-02. Calculation WBPEVAR9007011, Class 1E Cable Support In Vertical Conduit Walkdown, Evaluation and Disposition, Revision 3, re-evaluated conduit configurations which failed the initial G-38, Installation, Modification and Maintenance of Insulated Cables Rated Up to 15,000 volts, Revision 14, and included the evaluation of conduits identified in revisions 15 through 24 of Calculation WBPEVAR8903046, Unit 2 Class 1E Cables Required for Unit 1 Operation. The calculation also incorporated the results from WDs of raceway fittings (condulets). Conduit fittings were inspected if the installed conduit configuration was acceptable using the criteria in calculation WBPEVAR9005001, Analysis of Effect of Vertical Conduit-Screening, Evaluation and Disposition, and an abrupt transition existed at the top of the vertical drop. As a result of this review, the applicant identified 17 conduits (encompassing 23 condulet fittings) for walkdown inspection to measure the fitting radius. Eighteen fittings were determined to have radii less than 1/8-inch or were inaccessible for measurement. These conduits were included in DCN W-33234-A to provide cable support. The DCN identified a total of 55 conduits in need of cable support. The inspector determined that the above calculation analysis adequately addressed the URI concern. Installation of cable support in vertical conduits specified in DCN W-33234-A, are being performed as part of the corrective actions for VIO 50-390/94-53-02, Design Control Deficiencies Regarding Cable Routing and Vertical Support. The violation remains open pending applicant implementation of the DCN requirements and subsequent NRC review.

The second part of this URI was previously reviewed as documented in IR 50-390/94-66, paragraph 7.13. During that review, the inspector determined that four Class 1E conduits were inappropriately evaluated for not needing cable supports. Therefore, it was concluded that the calculation basis for not providing cable supports was in error. The calculation errors identified as part of this URI example were identified as a violation of 10 CFR 50 Appendix B, Criterion III, and the fourth example of VIO 50-390/94-53-02, Design Control Deficiencies Regarding Cable Routing and Vertical Support. The second part of this URI was closed based on corrective actions being tracked via VIO 50-390/94-53-02.

This item is closed.

7.25 (Closed) Violation 390/94-61-01, Failure to Follow Procedures.

This violation identified two examples of failure to follow procedures.

Example 1

An inspector observed that the load limit on top of a section of ductwork had been exceeded. Seven people were working from the platform which was only rated for 400 lbs according to the attached Appendix E form from Procedure SSP-7.56, Scaffolds and Temporary Work Platforms. The load was concentrated between Rod Hanger Supports 2030-DW920-06H-1702 and 2030-DW920-06H-1703.

Example 2

An inspector found that Electrical Panels 1-L-404 and 1-L-406 contained debris, loose material, or spare equipment following completion of maintenance activities. Examples of items found in the panels included light bulb, screws, washers, and metal clips.

The inspector reviewed the applicant's response to the violation dated November 14, 1994, and supplemental response dated January 3, 1995. Corrective actions and recurrence controls implemented by the applicant were reviewed by the inspector as follows:

Example 1

In the applicant's response this example was attributed to the failure of personnel involved to review the scaffolding permit for load limits before proceeding with the work. As the result of this problem, the applicant issued PER WBPER940483. As corrective action, the applicant performed an evaluation of any potential damage that might have resulted from the excess loading conditions. The applicants evaluation determined that no damage would have occurred to the duct or supports based on the seven individuals working on the platform. A visual inspection of the duct supports was conducted to ensure there was no physical damage. The individuals involved were counseled on this violation and to emphasize greater need for attention to detail. Additional training was performed through a site bulletin and a special GET topic.

Example 2

In the applicant's response, this example was attributed to failure by craft personnel to adhere to proper housekeeping practices by failing to clean the panels before leaving the area. Corrective actions associated with this issue were addressed under PER WBPER940495. As corrective actions, the applicable panels were cleaned and inspected. The applicant verified that the remaining radiation monitor panels along with panels in the Solid State Protection System, 480 Volt Boards and 6900 Volt Boards were cleaned and inspected. Additionally, 30 electrical panels located throughout the plant were selected for inspection. A series of stand down meetings was conducted for the purpose of emphasizing the importance of performing proper housekeeping in the plant.

The inspector reviewed the applicant's completed corrective actions and determined that they were adequate to resolve the identified deficiencies. Recurrence controls are in place which emphasis attention to detail and housekeeping following work in electrical panels. The applicant's

verification activities conducted by QA for this open item, which consisted of document reviews and field inspections, were reviewed and considered adequate by the NRC inspector. Additionally, an inspector observed cleanliness conditions in various safety-related panels located in 480V and 6.9KV Board Rooms. During this inspection no debris was noted and housekeeping was acceptable. This violation is closed.

7.26 (Closed) VIO 390, 391/94-72-01, Inadequate Corrective Actions for SCAR, Electrical Modifications, Manhole Flooding and Torquing.

This violation originally identified four examples of established corrective actions to known deficiencies which were inadequate. A fifth example of this violation was subsequently identified by the inspectors as documented in IR 50-390/94-66.

Example 1

SCAR WBP880636SCA was closed with incomplete corrective action to install seismic restraint clamp bars on instrument racks as specified in DCN C-03053-A. DCN C-03053-A had remained open pending incorporation of a change to the clamp bar orientation provided in FDCN F-29143-A. Subsequent engineering review determined that the orientation provided in FDCN F-29143-A was inadequate.

Example 2

Recurrence controls associated with CDR 50-390,391/86-24 were determined not to be effective in that work activities associated with WPs D-11050-55, D-11050-56, D-11050-57, D-11050-58, and KP06978A-5 were not accomplished in accordance with instructions specified in the WP and General Engineering Specification G-38, Installation, Modification, and Maintenance of Insulated Cables Rated to 15,000 Volts. On September 14, 1994, an inspector identified the use of T&B 54500 Series 2-way connectors in 6900 Volt applications. Use of this connector type was contrary to existing requirements of the applicant's General Engineering Specification, G-38, Installation, Modification, and Maintenance of Insulated Cables Rated Up to 15000 Volts and Procedure MAI-3.3, Cable Terminating, Splicing, and Testing for Cables Rated Up to 15000 Volts. As the result of the applicant's subsequent review, it was determined that a total of 75 Class 1E 6900 Volt splice connections were made using connections rated for 600 Volts.

Example 3

Established corrective actions were not implemented for PER WBP930495 in that 9 of 24 Category I manholes did not have operable water removal systems.

Example 4

Corrective actions associated with VIO 50-390/94-55-02 were not effective in that the inspector identified additional examples of improperly torqued mounting bolts for safety-related instruments.

Example 5

Implementation of corrective actions associated with VIO 50-390/93-24-01 had not been adequate. Numerous procedural, administrative, and documentation discrepancies were identified in WOs. Some inspection findings from the applicant inspection team were not properly dispositioned, WO scope changed by Field Engineers, PMT not adequately specified, and QC inspection findings deleted by Field Engineer without documented justification or concurrence from QC.

The inspector reviewed the applicant's response to the violation, dated January 6, 1995. Corrective actions and recurrence controls implemented by the applicant were reviewed by the inspector as follows:

Example 1

The applicant's response attributed this example to a decision to close the applicable corrective action program document with the FDCN still in an open status.

Corrective actions associated with the first example to the violation were reviewed during a subsequent NRC review of the applicant's Equipment Seismic Qualification Program as documented in IR 50-390/95-30. During that review the inspectors concluded that the design problem and inadequate corrective actions associated with SCAR WBP880636SCA had been resolved.

Example 2

In the applicant's response this example was attributed to a failure by field engineering personnel to obtain NE approval for use of alternate connectors and ambiguous requirements for selection of connector installation tools and crimping dies. In their response TVA committed to the following corrective actions:

- G-38 and Specification Procedure MAI-3.3 were revised to clarify instructions for selection of connectors and associated tools. Additionally, the applicant clarified instructions to use only connectors specifically approved by NE.

- The applicant evaluated use of T&B connectors in 6900V applications and determined that they were acceptable if properly installed.

- QC inspection personnel were directed to verify Procedure MAI-3.3, Raychem Splice Application Data Sheets correctly specify design requirements.

- Procedure SSP-2.10, Vendor Manual/Information Control would be revised to clarify requirements for using vendor information, such as vendor catalogs not controlled by the vendor technical manual process.

- SCAR WBSCA940063 was initiated to address concerns about the use of T&B connectors in 6900V applications. The applicant compiled a list of 6900V cables and splice locations to aid in evaluation of the extent of condition for the misapplication of the T&B connectors. Additional examples of improper crimping operations were identified. Corrective actions for this issue to be addressed under SCAR WBSCA940063.

- Additional training was conducted with field engineering personnel to stress requirements for procedural compliance and obtaining NE authorization when required.

The extent of condition was expanded to include additional types of T&B connectors along with Brundy and Penn Union connectors. The applicant's evaluation of the suitability of these connectors for use in 6.9KV applications and other issues related to inadequate splice installation was reviewed by the NRC staff as documented in Section 8.3 of SER, Supplement No. 15, dated June 1995. Other issues considered in this review includes insufficient number of crimps, flash points not removed, inadequate crimp overlap, and use of wrong crimp tools. During that review the staff concluded that the applicant had adequately justified the acceptability of installed splices at Watts Bar and that the issue was resolved.

The inspector reviewed Specification Revision Notice SRN-G-38-160 and Procedure MAI-3.3, Revision 15, and verified that the stated changes had been made to those instructions. Additionally the inspector reviewed Procedure SSP-2.10, Revision 8, and determined that Appendix O provided new guidance on the use of vendor information outside the scope of the Vendor Manual Program. Vendor Catalogues were included as an example of sources of information that was outside the scope of the Vendor Manual Program.

During a previous review of WO 9412326-19 the inspector had observed completed cable splice installation work on safety-related cables in the IPS. This review was documented in paragraph 2.4 of IR 50-390/94-82. The inspector determined that the splice had been installed in accordance with requirements from Procedure MAI-3.3. Additionally the inspector verified proper splice connector selection.

Based on the above reviews the inspector determined that the applicant has adequately justified the acceptability of installed spices. The applicant's recurrence controls appeared adequate to ensure that future connector selections would be in accordance with established criteria. Additionally, selection of alternate connectors require NE concurrence.

Example 3

In the applicant's response, this example was attributed to a failure to adequately address the programmatic and hardware issues identified in PER WBPER930495 which had resulted from a general lack of accountability and ownership by responsible personnel. Three principal problem areas were identified during the applicant's review of this issue. The applicant determined that inadequate measures had existed to insure acceptable

housekeeping in the manholes, to preclude excess water getting into the manholes, and to ensure that equipment needed to remove excess water remained available. Additional corrective actions associated with problems in manholes are described in SCAR WBSA940057. Specific corrective actions mentioned include:

- Manholes containing 1E electrical cables have been inspected, cleaned, and excess water removed. Operable sump pumps were returned to service. Inoperable sump pumps were repaired.

- Meetings were held with responsible site personnel to emphasize importance of housekeeping standards.

- The applicant established access control requirements for the manholes and manholes would remain locked except for approved work activities.

- Clarification of requirements in the electrical manhole PM instruction to provide specific instructions or actions for inoperable equipment and for removal of debris and foreign material, identify components to be inspected during PM and power feeds for sump pumps.

During a recent review of the applicant's area turnover process, the inspector had performed a series of confirmatory WDs of various areas turned over to plant staff. These areas inspected included Manholes 1, 2, 3, 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B, 8A, 8B, 9B, 18, 19, 20, 21, 22, 23, 24, 25, 26, and 27. During those WDs the inspector noted that the quality of the area turnovers continues to be very good. A alarm system was installed in each of the manholes to alert operations of failure of the sump pump to remove excess water. Housekeeping in each of the manholes was acceptable. The inspector noted that the handswitch for each of the sump pumps was placed in the proper position to allow automatic operation as needed for removal of excess water. Additionally, the inspector witnessed the successful testing of the alarm system for Manhole 18. The inspector noted that Section 4.5.10 of G-40, Installation, Modification, and Maintenance of Electrical Conduit, Cable Tray, Boxes, Containment Electrical Penetrations, Electrical Conductor Seal Assemblies, Lighting, and Miscellaneous Systems, requires that manholes be periodic inspected for water. The inspector reviewed WBN PM Requirements, O-SUMP-040-0065MH5, Manhole and Sump Inspection, and O-PMP-040-0065MH1, 1E Manhole and Sump Inspection, and determined that these PM instructions provided adequate guidance for periodic manhole inspections. Additionally, the inspector reviewed CATD 30400-NPS-01, which related to flooding of manholes and determined that corrective actions associated with this CATD were adequate.

Example 4

In the applicant's response, this example was attributed to a failure to back-fit updated vendor manual installation requirements to field installed equipment.

- Corrective actions associated with Example 4 were reviewed during a NRC review of the applicant's Equipment Seismic Qualification Program as documented in IR 50-390/95-30. During that review the inspectors concluded that the applicant had not yet developed and implemented their corrective actions to address the issue of vendor revisions to seismic installation specifications. This example remained open pending further review of the applicant's corrective actions in this area.

- Corrective actions provided in PER WBP940541 were subsequently reviewed by an inspector as documented in IR 50-390/95-55. During that review the inspector determined that additional assurance of adequate instrument mounting was provided by the ESQ CAP walkthroughs which reviewed 100 percent of the instrument mountings and that this example had been adequately resolved.

Example 5

In the applicant's response this example was attributed to failure to provide adequate documentation of work performed.

- This example is addressed as part of a separate review of CDR 50-390/95-05 and is documented in paragraph 7.31 of this report. Based on the review of the issue, the the inspector determined that this example had been adequately resolved.

The inspector reviewed the applicant's completed corrective actions and determined that they were adequate to resolve the identified deficiencies. TVA verification activities conducted by QA for this open item, which consisted of document reviews an field inspections, were reviewed and considered adequate by the NRC inspector. This violation is closed.

7.27 (Closed) VIO 50-390/94-72-02, Failure to Follow Procedures Concerning Control of Cable Splices

This violation was issued to obtain corrective action concerning failure of the applicant to follow approved procedures concerning the control of cable splices. The initial violation included three examples of failure to follow procedures and a fourth example was added by a subsequent inspection (Reference IR 50-390,391/94-82). The examples cited, as well as the applicants corrective action, and the inspectors followup for each item were as follows:

- Contrary to General Engineering Specification G-38 and site Procedure MAI-3.3, Class 1E medium voltage cable splices were installed in

manholes without the use of nuclear grade Raychem heat shrink tubing to provide waterproofing to the splices.

The applicant determined that this problem was caused by personnel error. Corrective action for the deficiency involved re-instruction of personnel in the importance of adherence to procedures, and an engineering evaluation which accepted the installed splices. The inspector reviewed the documentation of the re-instruction of personnel, and the engineering evaluation of the sleeving. The engineering evaluation was based on testing of similar sleeves by the vendor. The inspector reviewed this testing (reference Raychem reports EDR-5216 and EDR-5181), and concluded that an adequate technical basis had been established for acceptance of the installed splices. In addition, the applicant issued a change to General Engineering Specification G-38 (G-38-WBN-21 R1, Revision 14) which provided an exception for the installed HVSY splices. The applicant also issued changes to G-38, Revision 14, and Procedure MAI 3.3, Revision 15, which allows the use of commercial grade Raychem HVS sleeves for Medium voltage non-LOCA HELB environments. The inspector concluded that the corrective action for this issue was satisfactory.

- Contrary to Procedure EAI-3.05, an exception to G-38 (G-38-WBN-21) was not updated within 45 days of the completion of a design change, to reflect relocation of a cable splice from a junction box in the auxiliary building to a manhole, which had been approved by a field change during performance of the work.

The applicant also concluded that this problem was caused by personnel error. As a result, counselling of personnel was provided. In addition, the exception (G-38-WBN-21, R1) was revised to correct the location of the splice. The applicant also conducted a review of the exceptions in G-38 against the completed field work documentation to verify the exceptions were technically adequate. No additional problems were found during this review by the applicant. The inspector reviewed the documentation of this corrective action and no additional problems were noted.

- The requirements of Standard Drawing E12.5.9 concerning fire protection of splices in or near cable trays had not been implemented concerning several splices accomplished in the DG building. Also, from IR 50-390, 391/94-82, the requirements of Standard Drawing E12.5.9 concerning fire protection of splices in/near cable trays had not been implemented concerning a splice (WBN-SPL-5611) accomplished in a conduit box for Cable 2V1828B.

The applicant determined that these problems were also caused by personnel error. Appropriate re-instruction of personnel was performed to prevent recurrence of the problem. Additionally, DCN F-33082-A and Work Plan D-11050-74 were issued to correct the deficiencies in the cable tray splices in the diesel generator building, and WR 333002 was issued to correct the splice for cable 2V1828B. The applicant also added an attribute to the cable tray walkdown program to inspect for

similar conditions on all trays as the WDs are completed. The inspector reviewed the documentation concerning the re-instruction of personnel, the DCN, WP and WO for correction of the problems in the plant, and the attribute added to the walkdown checklist. In addition, the inspector performed a WD of the work concerning the four cable trays in the DG building, and cable 2V1828B to verify compliance with standard drawing E12.5.9. No deficiencies were noted during this part of the inspection.

Based on the above, the inspector concluded that the corrective action for this item was adequate for the closure of the item on Unit 1. Corrective action for Unit 2 was not completed and the item will remain open for Unit 2.

7.28 (Closed) VIO 50-390/94-88-01, Failure to Properly Support Cables and Install Raychem Repair Sleeve.

This violation included the following two examples of failure to follow Procedure MAI-3.3, Cable Terminating, Splicing, And Testing For Cables Rated Up To 15,000 Volts, Revision 13.

- The Class 1E field cable 1PS117A, located between control room panels 1-M-5 and 1-M-6, was not supported in accordance with Procedure MAI-3.3 requirements as evidenced by being vertically supported through the use of a three tie wraps. Additional Class 1E field cables were then secured to 1PS117A with no other support points.

- The Raychem heat shrink tubing for repairing damaged vendor wire 17-9 at Class 1E outboard containment electrical penetration 1-PENT-293-0052-B was not installed in accordance with vendor manual instructions in that there was no visible flow of sealant at the repair sleeve end indicating inadequate sealing.

Example 1

The inspectors verified that WO 95-02647-00 had been implemented to correct the condition of using tie wraps (without mounts) as a method of support for cable 1PS117A and other Class 1E cables. A WD inspection of the control room panels was conducted to examine the cable installations. Approved cable support mounts for tie wraps were installed in all the control room panels where each cable mount was attached to the panel by a machine screw. The cable mounts were in accordance with Step 6.2.15 of Procedure MAI-3.3. Thirty-five other cables were re-worked in the control room panels to address deficiencies with cable mounting. In addition, the applicant initiated and implemented PER WBPER940305 and WBPER950025 for the purpose of conducting cable mounting inspections in panels. Electrical craft personnel were trained in the proper mounting of cables in panels and the use of Procedure MAI-3.3. The inspectors concluded that the applicant had satisfactorily addressed and corrected Class 1E cable mounting deficiencies in panels.

Example 2

The inspectors reviewed the cable splicing and Raychem corrective action documentation to determine if the applicant adequately addressed these concerns. The inspectors reviewed the applicants closure documentation and three other NRC IRs since field verification was not performed due to inaccessibility. The documentation reviewed included: (1) WO 94-20914-07 that was implemented to correct the improper Raychem installation of 1-PENT-293-0052-B; (2) SCAR WBSCA950002 that implemented inspection of cable splicing and Raychem; (3) WBPER 950047 - inspection of splices and penetrations using Raychem; and (4) WBSCAR 950004 - separation of Class 1E cables. The inspectors examined these documents to verify the applicant had addressed all concerns and completed closure. In addition, the inspector reviewed three other NRC IRs that addressed these cable splicing and Raychem concerns.

NRC IR 50-390/95-17 included 24 WOs that discussed cable and splice damage inspections. The IR 50-390/95-17 conclusion stated "The applicants corrective actions to inspect and identify cable damage and other splice installation deficiencies were observed to be thorough and performed with qualified personnel. Personnel performing the inspections have been trained to recognize cable damage and subsequent NRC inspections have not identified any missed conditions." NRC IR 50-390/95-24 included 28 WOs that discussed inspections conducted for cable and splice damage. IR 50-390/95-24 concluded that "the inspection effort of engineering personnel to identify cable and splice damage is thorough and generally conservative." In addition, the conclusion also stated that "the applicant corrective actions were being well implemented." NRC IR 50-390/95-33 discussed 18 WOs for cable damage. IR 50-390/95-33 concluded that "the applicant has identified all EQ devices inside containment and had or was in the process of inspecting the associated splices and terminations."

The inspectors concluded that the applicant has satisfactorily addressed this violation and implemented appropriate corrective action. In addition, the applicant's verification activities conducted by NA for this violation were reviewed and considered adequate by the inspectors. This violation is closed for Unit 1.

7.29 (Closed) CDR 50-390/95-02, Cable Damage at Splices and Terminations

This item pertained to examples of cable damage ranging from minor scuffing and abrasions to exposure of bare copper. These cable damage examples were documented in SCAR WBSCA950002. The applicant submitted the initial report on April 14, 1995. Additional correspondance was submitted on May 23 and September 21, 1995.

The cause of the deficiency was determined to be a combination of inadequate translation of identified damage from old work control program to the current work control program, a misinterpretation of the cable damage criteria, and a procedure inadequacy. The NRC reviewed the applicant's corrective actions to address the identified deficiencies associated with SCAR WBSCA950002. The NRC documented the acceptability of the applicant's corrective actions in Safety

Evaluation Report Related to the Operation of Watts Bar Nuclear Plant Units 1 and 2, NUREG-0847, Supplement 16, Section 8.3.3.1.6, September 1995. These corrective actions included the re-inspection of all 10 CFR 50.49 cable splices and terminations.

The applicant performed additional inspections for other installation attributes during the implementation of cable and splice inspections. This included inspection for the following attributes:

- cable/conductor bend radius;
- Raychem bend radius;
- Raychem adhesive flow;
- Raychem on suitable substrate;
- all splices identified;
- gasket material on enclosure satisfactory;
- moisture seals installed;
- terminal blocks have RTV coatings, where required;
- enclosure weep holes present, where required;
- spare/abandoned cables and conductors properly sealed;
- electrical separation acceptable within multi-division enclosures;
- information tags removed;
- MELB seals removed are addressed;
- acceptable cable/conductor identifications;
- acceptability of lugs.

Recurrence controls included the training of SWEC QC inspectors and electrical craftsmen. The NRC inspector attended one of the training sessions and observed that the session included physical examples of cable damage. The applicant also developed a training module for plant electrical maintenance personnel. The inspector reviewed the lesson plan for training course Procedure MTE-333.005, Degradation Inspections of Electrical Cable and EQ Components, Revision 0, and determined that the course material adequately presented the concerns and precautions regarding the conditions identified in SCAR WBSQA950002. Plant maintenance personnel involved with maintenance and inspection of electrical cables attended the training for Procedure MTE-333.005.

The NRC performed extensive inspections during the implementation of the applicant's corrective actions. These inspections included review of the programmatic approach to identify the location of 10 CFR 50.49 cables, splices, and terminations. Additionally, in-process inspections were performed during and after the applicant's inspection and rework of deficiencies. The overall results indicated that the applicant was adequately implementing the approved corrective actions. The IRs listed below document the NRC inspections associated with this CDR.

- 50-390/95-17, paragraph 2.1, Cable and Splice Damage Inspections
- 50-390/95-24, paragraph 3.4, Cable and Splice Damage Inspections
- 50-390/95-33, paragraph 3.0, Cable Damage

During the implementation of the above corrective actions, the applicant's QA organization also performed in-process assessments of the corrective actions.

The results of their review were documented in assessment report NA-WB-95-0095, Electrical and Cable Issues Corrective Action Program - Subissues: Cable Damage/Cable Splices. The assessment was performed as a followup to previously issued assessment report NA-WB-94-0143 which resulted in initiation of SCAR WBSCA950002. The assessment focused on cable splices, field verification of cable/splice inspection and repairs, and in-process oversight of cable/splice inspections and required repairs. Seventeen cable and splice inspection attributes were included during the QA reviews. The overall conclusions were that the corrective actions for the cable splice issue had been adequately implemented and NA concluded that the subissue was ready for closure.

Based on the extensive NRC inspections of the applicant's implementation of corrective actions and overall acceptable result, established recurrence controls, and independent QA involvement to assess acceptable implementation of corrective actions, this CDR is closed.

7.30 (Closed) CDR 50-390/95-04, Fifty-two of Sixty-five Incore Thermocouples Failed to Meet Post-Hot Functional Insulation Resistance Tests.

An updated status of this item is presented in NRC IR 50-390/95-57. The item was kept open pending the NRC's review of the testing required for the replacement thermocouples.

The applicant has received a letter from Westinghouse, dated August 30, 1995, related to the question on testing of the replaced thermocouples. The Westinghouse letter did not recommend any specific insulation resistance check. The letter provided a technical justification for not performing any tests other than the post-modification tests specified in DCN 36071-A. CDR 50-390/95-04 is closed.

7.31 (Closed) CDR 50-390/95-05, Loose Connections Found in Vendor Wired Safety-Related Panels

(Closed) VIO 50-390/94-72-01, Example 5, Inadequate Corrective Action

This item was reported because loose connections were found in vendor wired safety-related electrical panels. In 1984 the applicant performed an inspection of 40 safety-related electrical panels in the main and auxiliary control rooms and documented the results in NCR W-205-P. These results included labeling problems, wiring/configuration control deficiencies, and physical problems such as nicks and loose connections. In 1993, the NRC was reviewing CATDs 11200-WBN-05 and -06 and questioned why the remaining panels had not been inspected (NRC VIO 50-390/93-24-01). At approximately the same time, the applicant's QA issued FIR 930012307 for improperly classifying NCR W-205-P as not significant. Other CAQ documents issued included WBPER930292 because a QA inspection deficiency report for the MRs issued to correct the NCR W-205-P problems (WB-DR-85-75) indicated that the MRs were not properly performed. Consequently, the applicant began an inspection program of vendor wired safety-related electrical panels. The results of that inspection were that loose connections were found and were associated with safety-related circuits in various safety-related systems including component cooling, safety

injection, ventilation, ERCW, and RHR. The loose connections involved redundant divisions of safety-related circuits and were assumed by the applicant to create a significant safety hazard during a seismic event if left uncorrected. The condition was reported as this CDR.

The inspector reviewed the closure package for this CDR, CATD 11200-WBN-06, and VIO 50-390/94-72-01, Example 5. The inspector selected a sample of the WOs issued for electrical panel inspection to determine if the documentation showed that the problems found were corrected. The inspector reviewed portions of the WOs for the below listed panels and concluded that the panels were inspected and the discrepancies found were corrected.

1-PNL-99-R46-A	93-23552-00
1-PNL-99-R47-A	93-23553-00
2-BD-211-B-B	94-19444-00
2-MCC-213-A2-A	94-19662-00
2-MCC-214-B1-B	94-12553-00
2-MCC-215-A1-A	93-27982-00
2-MCC-215-A2-A	93-27984-00
2-MCC-215-B2-B	93-27986-00
2-PNL-275-9128-A	93-24540-00
2-PNL-275-R131-B	93-24555-00
2-PNL-278-L10	93-26388-00
1-MCC-213-B1-B	94-19508-00
1-MCC-213-B2-B	94-19660-00
1-MCC-214-A1-A	93-24775-00
1-MCC-214-B2-B	93-24808-00
1-PNL-275-R131-B	93-24527-00
1-PNL-82-B-B	93-23733-00
1-PNL-92-M13-G	93-24114-00
1-MCC-215-B1-B	93-27977-00
2-BD-235-0002-E	94-13775-00
1-MCC-213-A1-A	94-13533-00
1-PNL-278-M015	93-24341-00
1-MCC-232-B-B	94-13870-00
1-PNL-278-M3	94-19668-02
1-PNL-278-L10	94-19668-06
1-PNL-278-L11A	94-19668-07
1-PNL-278-L11B	94-19668-08
various	94-07481-00
1-PNL-L18	94-20272-00
0-BD-236-1-D	94-07480-00
1-PNL-099-R10	94-06647-00
1-PNL-099-R12	94-06667-00
1-PNL-099-R51	94-06669-00
1-PNL-099-R1	94-06589-00
1-PNL-099-R9	94-06596-00
1-PNL-099-R11	94-06628-00
CABLE V430B	94-06615-00
1-PNL-099-L116	94-06649-00
1-PNL-099-R12	94-06646-00
1-PNL-099-R5	94-06629-00

1-PNL-099-R52	94-06607-00
1-PNL-099-R4	94-06720-00
125V VITAL BAT BDII	94-06655-00

During in-process review of the applicant's inspections of the panels, NRC found problems with how the work was documented and dispositioned. Consequently, VIO 50-390/94-72-01, Example 5, was issued in IR 50-390/94-66, and VIO 50-390/93-24-01 was closed. The inspector found that the specific WO problems identified in IR 50-390/94-66 had been corrected, and training had been conducted as committed to.

CDR 50-390/95-05 and example 5 of VIO 50-390/94-72-01, are closed. Examples 1 through 4 of VIO 50-390/94-72-01 are closed as documented in paragraph 7.26 of this report.

7.32 (Closed) VIO 50-390/95-24-01, Failure to Provide Acceptance Criteria for Termination of Motors

The applicant's response, dated June 16, 1995, was accepted by the NRC on June 28, 1995. The corrective actions have been completed by the applicant. The inspector verified the corrective actions. The personnel involved in the installation of 1-MTR-030-0077 were counseled on May 22, 1995.

The two qualification maintenance instructions have been revised to specify that the motor terminations shall be in accordance with the applicable EQ Binder QMDs. EQ binders, WBN EQ-MOT-002 and -003 have been revised by Procedures QMI-Q930413 and QMI-Q930113. WBN EQ-MOT-004 has been revised to complete the corrective actions.

The misleading wording in the QMDs was corrected. The revised wording clearly states the acceptable dimensional arrangement for completing motor splices. A sketch is provided to show the correct motor-pigtail arrangement.

The Training Bulletin, issued June 12, 1995, contained a Lessons Learned write-up regarding this violation. The Bulletin provided information on the circumstances surrounding the violation and emphasized that field work must be performed consistent with the work instructions, such as QMDs referenced by QMIs. Training was provided for quality control instrument maintenance, planners, and electrical maintenance personnel. This was verified through training roster records.

The motors which qualified under EQ binders WBN EQ-MOT-002, -003, and -004 have been inspected. Three splices covered by EQ Binders -002, including the example given in the violation, were found unacceptable. These have been reworked. A total of 24 pigtails, 12 in EQ Binders -003, six in -004, were reinspected by the applicant to determine the extent of condition. Those in EQ Binders -003 and -004 were found acceptable. This was verified through a review of WOs issued for these actions.

NRC IR 50-390/95-33 discusses followup on the completed rework of 1-MTR-30-0077-A and others. The rework was found to be acceptable. No additional field inspection was performed. The applicant has satisfactorily

completed corrective actions as presented in the response to this violation. VIO 50-390/95-24-01 is closed.

7.33 (Open) VIO 50-390/95-27-01, Inappropriate Use of Q-DCNs

This violation was issued because a number of Q-DCNs were being used for functions other than allowed by Procedure EAI 3.05, Design Change Notices. Q-DCNs were found being used to specify changes to design input/output information, thus bypassing the design control program, and accepting nonconforming conditions for plant changes, bypassing the corrective action program. The applicant responded to the violation on June 30, 1995 acknowledging the violation, but denying one of the examples. The NRC inspector met with the applicant on July 11, 1995, and NRC's response of July 18, 1995, identified to the applicant that the example was still valid.

The applicant identified several corrective actions in their June 30, 1995, response. One was a memorandum to the engineering employees that was mentioned in IR 50-390/95-27. The second was a revision to Procedure EAI 3.05 to provide clearer, more effective instructions. A third was to train engineering personnel. A fourth was to review the Q-DCNs for each discipline to determine the extent of misapplication. The applicant identified in the response that the above corrective actions to resolve Q-DCN misapplications will resolve any problems associated with the continued use of Q-DCNs in work documents.

The inspector reviewed the closure package for this violation and observed that corrective actions 1 through 3 were accomplished. The closure package showed that corrective action 4 was accomplished by a review of civil, mechanical, and electrical Q-DCNs. For civil, 264 of 611 were selected based on description as being potentially suspect. The review found 12 of the 264 were improperly used Q-DCNs. For mechanical, 252 were reviewed with five being found to be improperly used. For electrical, 11 were reviewed and none were found improperly used. The inspector also noted that six of the seven Q-DCN examples from the violation were addressed. The example that was initially denied (Q-DCN 35541-A) was not addressed in the package even though after having discussed the example with the NRC, NRC had determined the example was valid. In response to the inspector's questions the applicant revised Q-DCN 35541-A to refer to the proper design output document.

The NA closure review did not identify that the corrective action for the missed example (Q-DCN 35541-A) was not included. In addition, the NA closure review did not look at any Q-DCNs issued since the violation or any work documents that referenced Q-DCNs to determine if the programmatic corrective actions were effective.

An additional example of questionable use of Q-DCNs was found and documented in IR 50-390/95-71 in relation to the use of Q-DCN 20280-A in WO 95-21686-01 to convey that the minimum training radius for internal vendor wiring should be in accordance with DCN Q-20280-A. WO 95-21686-01 was issued in September 1995, after completion of the corrective action, while the Q-DCN was issued in 1992. This additional example is important because, as was the case for the original example documented in IR 50-390/94-81 and as expressed as an NRC

concern in IR 50-390/95-27, the Q-DCN has become the source document for later work. The inspector discussed this example and several additional similar examples (WO 94-0669-00, WO 93-27977-00) found during this inspection with the applicant. The inspector found that the applicant regularly uses Q-DCNs in work documents. The applicant told the inspector that the computerized work planning system uses Q-DCNs in the standard templates for work document statements in both the modifications and maintenance areas. The Q-DCNs appear in standard statements in the WOs in such a way that they convey the Q-DCN to the worker as a design output document or as containing procedural requirements.

The inspector concluded that the corrective actions to resolve the inappropriate use of Q-DCNs had not encompassed the entire extent of condition, in that when engineering was correcting the Q-DCN issuance process they failed to realize that modifications and maintenance had inserted a number of Q-DCNs in the standard work control process. This violation remains open pending the applicant's additional corrective action to remove the inappropriate use of Q-DCNs from the work control process.

7.34 (Closed) IFI 50-390/95-38-02, Completion of the Containment Cooling Special Program

NRC conducted an inspection of the Containment Cooling SP and documented the results in IR 50-390,391/95-38. One IFI was opened to track the 100 percent completion of the SP. At that time, the IFI identified the only remaining action to 100 percent complete the SP was the issuance of four SIs and Procedure SOI-30.03, Containment HVAC and Pressure Control. At the time of the inspection, documented in IR 50-390,391/95-38, the SIs and SOI were in draft form and on "hold status" by the applicant. By letter, dated September 28, 1995, the applicant advised NRC that the SIs and SOI were complete and released from "hold" status.

The inspector verified the following documents associated with the Containment Cooling SP were in effect at WBN:

- 1-SI-30-50, 18 Month Channel Calibration of Lower Containment Temperature Loop 1-LPT-30-1032, Revision 0

- 1-SI-30-51, 18 Month Channel Calibration of Lower Containment Temperature Loop 1-LPT-30-1033, Revision 0

- 1-SI-30-52, 18 Month Channel Calibration of Lower Containment Temperature Loop 1-LPT-30-1034, Revision 0

- 1-SI-30-53, 18 Month Channel Calibration of Lower Containment Temperature Loop 1-LPT-30-1035, Revision 0

- SOI-30.03, Containment HVAC and Pressure Control, Revision 12

Based on the inspector's verification that the above described documents have been issued, this completes the actions on the Containment Cooling SP and the IFI is closed.

7.35 (Closed) 50-390/95-38-03, PER Regarding FSAR Internal Panel Separation Requirements

This IFI pertained to the applicant's issuance of DCN W-36577-A to revise internal panel cable separation criteria. The DCN revised drawing 45W1640 to allow the use of a Glastic red board as an acceptable barrier between redundant division internal panel wiring. The inspector reviewed the DCN and noted that the DCN was issued as not having impact on the WBN FSAR. The inspector questioned this determination since FSAR sections 7.1.2.2.2 and 8.3.1.4 stated that a metal barrier was the approved alternative to providing 6 inches of free air space. Following detailed discussions with NE representatives, the applicant initiated PER WBPER950327 to document that the DCN was inappropriately issued with FSAR impact not identified. This IFI was opened to track the applicant's disposition of the PER and determination of any FSAR updates.

In June 1995, the applicant closed PER WBPER950327. The inspector reviewed the corrective actions in the PER and determined that they were acceptable. The corrective actions included review of exceptions pertaining to cable separation to determine if the exceptions were consistent with the statements included in the FSAR. Additionally, FSAR change package 1271 was prepared to specify the types of barriers used to provide acceptable internal panel cable separation. On August 16, 1995, the applicant submitted FSAR Amendment 90 and included a proposed change to the discussed FSAR sections. The proposed change states that when 6 inches of free air space cannot be maintained, engineering approved barriers would be used. This FSAR Amendment is currently under NRR review for acceptability. The inspector determined that the applicant had appropriately evaluated the conditions documented in the PER and submitted a change to the WBN FSAR.

This item is closed.

7.36 (Closed) URI 50-390/95-47-01, FSAR Table Differs From Tables in Design Criteria and System Description Regarding Conformance with RG 1.52

This item identified an FSAR discrepancy discovered by NRC inspectors. The inspectors found that the FSAR was incorrect and differed from the Design Criteria and System Description regarding conformance with two RG 1.52 sections. The applicant identified this discrepancy for resolution in PER WBPER950407.

In the current inspection, the inspector and applicant personnel performed further reviews of FSAR tables and identified additional errors. For example, the inspector found that Table 9.1-1 of the FSAR recorded a rated flow of 100 gpm for the spent fuel pool skimmer filter. Neither the equivalent table in the SD (N3-78-4001, Table 3.2-1) nor the SD text identified a rated flow for the filter. Instead they specified a design flow of 150 gpm. In discussing the apparent discrepancy, a licensing engineer noted that the skimmer pump had a rated flow of 100 gpm and that this appeared to have been used as the rated filter flow.

The inspector reviewed the FSAR table errors, which were being documented by the applicant in PER WBPER950407. The errors varied from obvious typographical errors to incorrect values of parameters. The inspector did not find any that he believed would be relied on by the applicant in making safety-significant decisions. The applicant's calculations and design basis documents would be used for significant decision-making information in lieu of the FSAR. However, the inspector noted that Region II management was concerned regarding the applicant's longstanding failure to fully correct the FSAR and that this was being discussed with the applicant's management. It was the inspector's understanding that all FSAR tables were being reviewed and would be corrected by the applicant, with the more significant parameter errors to be corrected in the next two FSAR amendments. The inspector was satisfied that appropriate resolution would be accomplished through PER WBPER950407 and that adequate management attention was being directed to this matter. The inspector considered the original item closed.

7.37 (Closed) IFI 50-390/95-47-02, Review of Applicant's Assessments

Two assessments were to be completed by the applicant that reflected on the effectiveness of the DBVP CAP. These were the applicant's IDI and their final QA assessment of the DBVP CAP. The inspectors determined that the findings of the two assessments should be reviewed by the NRC as further evidence of the adequacy of the CAP.

In the current inspection, the inspector found that both the IDI and the final QA assessment of the DBVP CAP had been completed. The inspection reviewed a copy of the IDI report (Audit Report WBA95506) and findings (PERs WBPER940666, 950335, 950400, 950402, and 950408). Additionally, the inspector discussed the performance of the IDI with two of the participants. The inspector found it a thorough and well-performed assessment. The inspector also reviewed the report of the applicant's final QA Assessment of the DBVP CAP (Nuclear Assessment Report NA-WB-95-0069). The inspector found it limited, but adequate in view of the recent performance of the IDI. Based on the review, the inspector determined that the IDI and QA assessments supported the conclusion reached previously that the DBVP CAP had been adequately completed.

7.38 (Closed) IFI 50-390/95-47-03, Review of DBVP CAP Completion of Remaining Source or Associated Issues

According to the DBVP CAP Closure Report, dated July 12, 1995, several of the issues that were the source of the CAP or were associated with the CAP were not fully resolved. The closure report indicated that these issues were scheduled to be resolved by August 7, 1995. The inspectors identified resolution of these issues as an IFI.

In the current inspection, the inspector was informed that the principal actions remaining to resolve the "Source or Associated" issues had been completed. The inspector selected and specifically verified resolution of the remaining issues which he considered of principal importance, PER WBPER871337PER and SCAR WBP910055SCA. The inspector concluded that the important DBVP CAP source or associated issues were resolved.

This IFI is closed.

Within the areas reviewed, no violations or deviations were identified.

8.0 Exit Interview

The inspection scope and findings were summarized on October 20, 1995, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results. Dissenting comments were not received from the applicant. Proprietary information is not contained in this report.

Item Number	Status	Description and Reference
390,391/79-02	Closed	BU - Pipe Support Base Plate Design Using Concrete Expansion Anchor Bolts (paragraph 7.1)
390/82-80	Closed	CDR - Shielded Power Cable Bend Radius Deficiency (paragraph 7.2)
390/85-19	Closed	CDR - Fire Rated Penetration Assemblies Deficiencies (paragraph 7.3)
390/85-31	Closed	CDR - Incorrect Equipment Cable Terminations in Harsh Environments (paragraph 7.4)
390/85-39	Closed	CDR - Inadequate Separation of Trained Cables (paragraph 7.5)
390/86-17	Closed	CDR - Lack of Adequate Calculations to Document Electrical Systems Design Basis (paragraph 7.6)
390/86-39	Closed	CDR - Deficiencies in Embedded Plate Design (paragraph 7.7)
390/86-46	Closed	CDR - Deficiencies Involving Circuits Inside Penetrations (paragraph 7.8)
390/89-04	Closed	CDR - Improper Limit Switches (paragraph 7.9)
390/89-08-02	Closed	URI - Identification of Cable Damage (paragraph 7.10)

390/89-12	Closed	CDR - Cables Located Below Flood Level Not Qualified (paragraph 7.11)
390/90-03	Closed	CDR - Cables Proximity to Hot Pipes (paragraph 7.12)
390/90-04	Closed	CDR - Cable Damage at Splices (paragraph 7.13)
390/90-07	Closed	CDR - ABGTS Design Deficiency (paragraph 7.14)
390/90-15-03	Closed	VIO - Corrosion on System 31 Chilled Water Piping (paragraph 7.15)
390/91-04	Closed	CDR - Inadequate Design of Various Air Handling Unit Control Circuits (paragraph 7.16)
390/91-39	CLosed	CDR - Failure to Postulate Breaks in S/G Wet Layup Piping (paragraph 7.17)
390/92-01-06	Closed	IFI - Cable Ampacities Deficiencies (paragraph 7.18)
390/92-01-08	Closed	IFI - Evaluation of Cable Bend Radius (paragraph 7.19)
390/92-05-05	Closed	URI - Cable Tray Walkdowns (paragraph 7.20)
390/93-24-02	Closed	URI - Evaluation of Nonconformances in Preoperational Test (paragraph 7.21)
390,391/94-04	Closed	CDR - Potential Freezing of a Main Steam Pressure Transmitter Sense Line (paragraph 7.22)
390/94-19-01	Closed	IFI - Adequacy of Controls for Cranes Used to Move Heavy Loads (paragraph 7.23)
390/94-53-03	Closed	URI - Condulets and Cable Trays at the Top of Verical Conduit Runs (paragraph 7.24)

390/94-61-01	Closed	VIO - Failure to Follow Procedures (paragraph 7.25)
390,391/94-72-01	Closed	VIO - Inadequate Corrective Actions for SCAR, Electrical Modifications, Manhole FLooding and Torquing (paragraph 7.26)
390/94-72-02	Closed	VIO - Failure to Follow Procedures Concerning Control of Cable Splices (paragraph 7.27)
390/94-88-01	Closed	VIO - Failure to Properly Support Cables and Install Raychem Repair Sleeve (paragraph 7.28)
390/95-02	Closed	CDR - Cable Damage at Splices and Terminations (paragraph 7.29)
390/95-04	Closed	CDR - Fifty-two of Sixty-five Incore Thermocouples Failed to Meet Post-Hot Functional Insulation Resistance Tests (paragraph 7.30)
390/95-05	Closed	CDR - Loose Connections Found in Vendor Wired Safety-Related Panels (paragraph 7.31)
390/95-24-01	Closed	VIO - Failure to Provide Acceptance Criteria for Termination of Motors (paragraph 7.32)
390/95-27-01	Open	VIO - Inappropriate Use of Q-DCNs (paragraph 7.33)
390/95-38-02	Closed	IFI - Completion of the Containment Cooling Special Program (paragraph 7.34)
390/95-38-03	Closed	PER Regarding FSAR Internal Panel Separation Requirements (paragraph 7.35)
390/95-47-01	Closed	URI - FSAR Table Differs from Tables in Design Criteria and System Description Regarding

		Conformance with RG 1.52 (paragraph 7.36)
390/95-47-02	Closed	IFI - Review of Applicant's Assessments (paragraph 7.37)
390/95-47-03	Closed	IFI - Review of DBVP CAP Completion of Remaining Source or Associated Issues (paragraph 7.38)
390/95-72-01	Open	URI - Missed MAI-1.9 Deficiency (paragraph 2.3)

9.0 List Of Acronyms And Initialisms

AB	Auxiliary Building
ABSCE	Auxiliary Building Secondary Containment Enclosure
ACP	Administrative Control Programs
AFW	Auxiliary Feedwater
AGBTS	Auxiliary Building Gas Treatment System
AHU	Air Handling Unit
ANSI	American National Standards Institute
ARI	Annunciator Response Instruction
AWG	American Wire Gauge
BU	Bulletin
BP	Business Practice
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAQR	Condition Adverse to Quality Report
CATD	Corrective Action Tracking Document
CCRIS	Calculation Cross Reference Index System
CDR	Construction Deficiency Report
CEB	Civil Engineering Branch
CHR	Chiller
ARI	Alternate Rod Injection
CRS	Concerns Resolution Staff
CST	Condensate Storage Tank
CVCS	Chemical and Volume Control System
DBVP	Design Baseline and Verification Program
DCN	Design Change Notice
DCRM	Document Control Records Management
DG	Diesel Generator
DN	Deficiency Notice
DR	Deficiency Report
DS	Design Standard
EAI	Engineering Administrative Instruction
ECN	Engineering Change Notice
ECSP	Employee Concerns Special Program
EDG	Emergency Diesel Generator
EDS	Engineering Data System
EEB	Electrical Engineering Branch EM

EQ	Environmental Qualification
ERCW	Essential Raw Cooling Water
ESF	Engineered Safety Features
ESFAS	Engineered Safety Features Actuation System
ESQ	Equipment Seismic Qualification
FCR	Field Change Request
FCV	Flow Control Valve
FDCN	Field Design Change Notice
FIR	Finding Identification Report
FPI	Fire Protection Instruction
FSAR	Final Safety Analysis Report
GET	General Employee Training
gpm	Gallons per Minute
HAAUP	Hanger Analysis and Update Program
HELB	High Energy Line Break
HVAC	Heating, Ventilation and Air Conditioning
IDI	Integrated Design Inspection
IE	Inspection and Enforcement
IDI	Integrated Design Inspection
IEB	Inspection and Enforcement Bulletin
IEN	Inspection and Enforcement Notice
IFI	Inspector Followup Item
II	Incident Investigation
IN	Information Notice
INPO	Institute of Nuclear Power Operations
IPS	Intake Pumping Station
IR	Inspection Report
IVP	Independent Verification Program
LD	Lifting Device
LOCA	Loss of Coolant Accident
LOOP	Loss of Offsite Power
MAI	Modification/Addition Instruction
MCR	Main Control Room
MPR	Minimum Pulling Radius
MS	Main Steam
MSVV	Main Steam Valve Vault
MTR	Minimum Training Radius
MTS	Master Tracking System
NA	Nuclear Assurance
NCO	Nuclear Commitment
NE	Nuclear Engineering
NEP	Nuclear Engineering Procedure
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
NSRS	Nuclear Safety Review Staff
NUREG	NRC technical report designation
OD	Outside Diameter
PACR	Potential Area of Concern/Recommendation
PER	Problem Evaluation Report
PIR	Problem Identification Report
PM	Preventive Maintenance
PMI	Preventive Maintenance Instruction

PMT	Post Modification Test
PTI	Preoperational Test Instruction
QA	Quality Assurance
QC	Quality Control
QDCN	Quality Design Change Notice
QMD	Qualification Maintenance Data
QMI	Quality Maintenance Instruction
RG	Regulatory Guide
RHR	Residual Heat Removal
RPS	Reactor Protection System
SCAR	Significant Corrective Action Report
SD	System Description
SEP	Site Engineering Procedures
SER	System Evaluation Report
SI	Surveillance Instruction
SOER	Significant Operating Experience Report
SOI	System Operating Instruction
SP	Special Program
SSER	Supplemental Safety Evaluation Report
SSP	Site Standard Practice
SWBP	Sidewall Bearing Pressure
SWEC	Stone and Webster Engineering Corporation
TDN	Test Deficiency Notice
TER	Technical Evaluation Report
TI	Temporary Instruction
TROI	Tracking and Reporting of Open Items
TVA	Tennessee Valley Authority
UHI	Upper Head Injection
URI	Unresolved Item
VIO	Violation
VSR	Vertical Slice Review
WBN	Watts Bar Nuclear Plant
WD	Walkdown
WO	Work Order
WP	Workplan
WR	Work Request

SUMMARY OF NRC RESIDENT REVIEW OF AREA/ROOM TURNOVERS					
ROOM	DESCRIPTION	ACCEPTED BY PLANT	IRs	NRC REVIEW COMPLETE	COMMENTS
A208	Containment Spray Pmp 1B-B	02-14-95	95-17	Y	
A209	Containment Spray Pmp 1A-A	02-14-95	95-17	Y	
A210	RHR Pmp Room 1B-B	01-27-95	95-17	Y	
A211	RHR Pmp Room 1A-A	02-21-95	95-17	Y	
A216	U1 676' Pipe Chase	05-12-95	95-38	Y	
A306	Turbine Driven AFW Pmp Room	04-18-95	95-45 95-06	Y	
A307	U1 Pent Room	09-29-95	95-72	Y	
A308	U1 Pipe Chase	07-14-95	95-57	Y	
A309	CHG Pmp 1A-A	02-21-95	95-38	Y	
A310	CHG Pmp 1B-B	02-21-95	95-38	Y	
A311	CHG Pmp 1C	02-21-95	95-45	Y	
A312	SI Pmp Room 1B-B	09-23-94	94-75	Y	
A313	SI Pmp Room 1A-A	09-23-94	94-75	Y	
A406	U1 Pent Room	09-27-95	95-72	Y	
A407	VCT Room	11-21-94	95-38	Y	
A408	U1 RX Bldg Access Room	07-01-95	95-57	Y	
A410	Seal Water HXCH 1A	11-21-94			
A411	RHR & CS HXCH Room 1B-B	03-07-95	95-06 95-38	Y	
A412	RHR & CS HXCH Room 1A-A	03-08-95	95-45 95-06	Y	Breached Penetration Seal
A423	El 713 CVCS Valve Gallery	01-29-95	95-38	Y	
A428	U1 713 Pipe Chase		95-06		
A501	U1 S MS Valve Room	09-13-95	95-72	Y	
A502	U1 S MS Valve Room	09-29-95			
A508	U1 PASS Room	09-01-95	95-72	Y	
A516	U1 Shield Bldg Rad Mon Room	08-18-95	95-72	Y	
A703	HVAC Room	10-06-95	95-72	Y	
A706	Airlock to U1 S MS Valve Room	07-30-95	95-72	Y	
A707	Letdown HXCH Room	05-12-95	95-45	Y	

SUMMARY OF NRC RESIDENT REVIEW OF AREA/ROOM TURNOVERS					
ROOM	DESCRIPTION	ACCEPTED BY PLANT	IRs	NRC REVIEW COMPLETE	COMMENTS
A713	Airlock to U1 UHI Room	07-01-95	95-72	Y	
A801	Aux Ctr Room	07-01-95	95-45	Y	
A802	6.9KV SD Room A				
A803	125V Vital Battery BD Room II	04-07-95	95-38	Y	
A804	125V Vital Battery BD Room I	04-24-95	95-38	Y	
A805	480V SD BD Room 1B				
A809	U1 Personnel & Equip Access				
A811	U1 RX Bldg Equip Hatch	05-19-95	95-45	Y	Caulking
A812	U1 RX Bldg Access Room	08-18-95	95-64	Y	
A813	Refueling Room				
A816	EGTS Filter Room	09-01-95	95-72	Y	
A821	480V SDBD Room 2A	09-15-95	95-72	Y	
A822	125V Vital Battery Bd Rm IV	04-18-95	95-38	Y	
A823	125V Vital Battery Bd Rm III	04-18-95	95-38	Y	
A824	6.9KV SDBD Room B				
A825	Aux Control Inst Room 1A	07-03-95	95-45	Y	
A826	Aux Control Inst Room 1B	04-24-95	95-38	Y	Housekeeping poor
A827	Aux Control Inst Room 2A	03-25-95	95-38	Y	
A828	Aux Control Inst Room 2B	03-25-95	95-38	Y	
A851	480 BD Room 1A	07-22-95	95-72	Y	
A852	480 BD Room 1B	09-27-95			
A853	125V Vital Battery Room II	09-09-94	94-61	Y	
A854	125V Vital Battery Room I	09-09-94	94-61	Y	
A855	480V XFMR 1B	09-01-95	95-64	Y	
A856	480V XFMR 1A	08-04-95	95-64	Y	
A858	5th Vital Battery & BD Room	08-26-95	95-64	Y	
A861	480V XFMR 2B				
A862	480V XFMR 2A	08-04-95	95-57	Y	
A863	125V Vital Battery Room IV	09-09-94	94-61	Y	
A864	125V Vital Battery Room III	09-09-94	94-61	Y	
A865	480V BD Room 2B	09-08-95	95-72	Y	

SUMMARY OF NRC RESIDENT REVIEW OF AREA/ROOM TURNOVERS					
ROOM	DESCRIPTION	ACCEPTED BY PLANT	IRs	NRC REVIEW COMPLETE	COMMENTS
A866	480V BD Room 2A	07-22-95	95-57	Y	
A901	U1 MG Set Room	07-30-95	95-57	Y	
A902	PZR HTR XFMR Room Train A	07-07-95	95-57	Y	
C107	24/48V Battery Room	05-18-95	95-38	Y	
C108	24/48V Battery BD & Charger Rm	05-19-95	95-38	Y	
C201	U1 Aux Inst Room				
C301	Cable Spreading Room				
C412	Main Control Room	07-21-95	95-45	Y	
C413	Relay Room	09-08-95	95-72	Y	
D104	D/G 1A-A	03-20-95	95-33	Y	
D105	D/G 2A-A	03-20-95	95-33	Y	
D106	D/G 1B-B	03-20-95	95-33	Y	
D107	D/G 2B-B	03-18-95	95-33	Y	
D109	Pipe Gallery & Corridor	04-21-95	95-33	Y	
D203	Air Exh Room	04-18-95	95-33	Y	
D204	480V BD Room 1A	04-21-95	95-33	Y	
D206	Air Exh Room	04-18-95	95-33	Y	
D207	480V BD Room 2A	04-21-95	95-33	Y	
D209	Air Exh Room	04-18-95	95-33	Y	
D210	480V BD Room 1B	04-21-95	95-33	Y	
D212	Air Exh Room	04-18-95	95-33	Y	
D213	480V BD Room 2B	04-21-95	95-33	Y	
E101	U1 UHI Room	08-04-95	95-72	Y	
E102	U1 Add Equip Bldg 740'	08-04-95	95-72	Y	
E103	U1 Add Equip Bldg 752'	08-04-95	95-72	Y	
I101	Electrical BD Room	07-03-95	95-57	Y	
I102	ERCW Strainer Room A	07-03-95	95-57	Y	
I103	ERCW Strainer Room B	07-03-95	95-57	Y	
I105	ERCW Pump Room A	07-09-95	95-57	Y	
I106	ERCW Pump Room B	07-09-95	95-57	Y	
I107	HP FP Pump Room A	07-09-95	95-57	Y	
I108	HP FP Pump Room B	07-09-95	95-57	Y	

SUMMARY OF NRC RESIDENT REVIEW OF AREA/ROOM TURNOVERS					
ROOM	DESCRIPTION	ACCEPTED BY PLANT	IRs	NRC REVIEW COMPLETE	COMMENTS
M101	Manhole 1	08-11-95	95-64	Y	
M102	Manhole 2	08-11-95	95-64	Y	
M103	Manhole 3	08-11-95	95-64	Y	
M104	Manhole 4A	06-08-95	95-64	Y	
M105	Manhole 5A	06-08-95	95-64	Y	
M106	Manhole 6A	08-18-95	95-64	Y	
M107	Manhole 7A	08-18-95	95-64	Y	
M108	Manhole 8A	08-24-95	95-64	Y	
M118	Manhole 18	06-08-95	95-64	Y	
M119	Manhole 19	08-24-95	95-64	Y	
M120	Manhole 20	09-01-95	95-64	Y	
M121	Manhole 21	09-01-95	95-64	Y	
M122	Manhole 22	08-18-95	95-64	Y	
M123	Manhole 23	08-25-95	95-64	Y	
M124	Manhole 24	08-25-95	95-64	Y	
M125	Manhole 25	08-25-95	95-64	Y	
M126	Manhole 26	05-12-95	95-64	Y	
M127	Manhole 27	08-24-95	95-64	Y	
M204	Manhole 4B	06-08-95	95-64	Y	
M205	Manhole 5B	06-08-95	95-64	Y	
M206	Manhole 6B	08-18-95	95-64	Y	
M207	Manhole 7B	08-19-95	95-64	Y	
M208	Manhole 8B	08-11-95	95-64	Y	
M209	Manhole 9B	08-18-95	95-64	Y	
R101	SW Quad, Loop 1 702'-713'	06-12-95	95-45	Y	Poor Housekeeping
R102	NW Quad, Loop 2 702'-713'	06-12-95	95-45	Y	Poor Housekeeping
R103	NE Quad, Loop 3 702'-713'	06-12-95	95-45	Y	Poor Housekeeping
R104	SE Quad, Loop 4 702'-713'	06-12-95	95-45	Y	Poor Housekeeping
R105	Outside Crain Wall 702'-713'	06-28-95	95-45	Y	
R110	Reactor Cavity & Refueling Canal/Pit	05-11-95	95-45	Y	
R111	SW Quad, Loop 1 713'-755'	05-26-95	95-45	Y	Poor Housekeeping

SUMMARY OF NRC RESIDENT REVIEW OF AREA/ROOM TURNOVERS					
ROOM	DESCRIPTION	ACCEPTED BY PLANT	IRs	NRC REVIEW COMPLETE	COMMENTS
R112	NW Quad, Loop 2 713'-755'	05-26-95	95-45	Y	Poor Housekeeping
R113	NE Quad, Loop 3 713'-755'	06-02-95	95-45	Y	Poor Housekeeping
R114	SE Quad, Loop 4 713'-755'	06-02-95	95-45	Y	Poor Housekeeping
R116	Accum Room 1	05-19-95	95-45	Y	Poor Housekeeping
R117	Accum Room 2	05-26-95	95-45	Y	Poor Housekeeping
R118	Accum Room 3	06-15-95	95-45	Y	Poor Housekeeping
R119	Accum Room 4	07-17-95	95-45	Y	Poor Housekeeping
R120	Fan Room 1	06-16-95	95-45	Y	Poor Housekeeping
R121	Fan Room 2	07-10-95	95-45	Y	Poor Housekeeping
R122	Regen/Letdown HXCH Room	05-02-95	95-45	Y	
R123	Airlock	06-25-95	95-45	Y	
R124	Seal Table Area	06-28-95	95-45	Y	
R125	SW Quad, Loop 1 756'-819'	03-25-95	95-45	Y	Poor Housekeeping
R126	NW Quad, Loop 2 756'-819'	04-01-95	95-45	Y	Poor Housekeeping
R127	NE Quad, Loop 3 756'-819'	04-01-95	95-45	Y	Poor Housekeeping
R128	SE Quad, Loop 4 756'-819'	04-07-95	95-45	Y	Poor Housekeeping
R129	Ice Condenser	04-05-94	95-45	Y	Poor Housekeeping
R131	Airlock 757'	05-11-95	95-45	Y	
R150	Annulus	07-07-95	95-45	Y	Poor Housekeeping
Y121	U1 RWST	02-23-95	95-33	Y	
Y122	U1 CST	07-30-95	95-72	Y	