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REGION I

Report No. 50-410/86-13

Docket No. 50-410

License No. CPPR-112 Priority -- Category A

Licensee: Niagara Mohawk Power Corporation
300 Erie Boulevard, West
Syracuse, New York 13202

Facility Name: Nine Mile Point, Unit No. 2

Inspection At: Scriba, New York

Inspection Conducted: April 14-25, 1986 and May 6, 1986

Inspectors: K. Manoly, Lead Reactor Engineer — 5/29/86 date

S. Chaudhary, Lead Reactor Engineer — May 28, 1986 date

A. Lodewyk, Reactor Engineer — May 28, 1986 date

J. Hunter, Reactor Engineer — May 28 1986 date

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Approved by: J. Wiggins, Chief, Materials and Processes Section, EB, DRS — 5/29/86 date

Inspection Summary: Announced As-Built Team Inspection on April 14-25, 1986 (Report No. 50-410/86-13)

Areas Inspected: As-built team inspection in the areas of Mechanical, Electrical, and Instrumentation and Control. The inspection covered the following safety related plant systems: residual heat removal, service water, scram discharge volume, control room heating ventilation and air conditioning, reactor protection and AC/DC power and instrumentation associated with these systems. Additionally, the team conducted a follow-up inspection of outstanding open items and IE Bulletins.

Results: Four violations and five unresolved items were identified. However, the inspection team, determined that the systems selected were constructed substantially in conformance to their FSAR descriptions.

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1.0 Inspection Objective and Scope

The objective of this team inspection was to verify that selected systems were constructed substantially in conformance to the description contained in the Final Safety Analysis Report (FSAR) and in the NRC's Safety Evaluation Report (SER) and to verify that the system designs met their functional requirements. To accomplish the objective, the team focused its inspection activity on the as-built condition of these systems with regard to:

- Consistency between the FSAR, SER description of the systems and the design specification, drawings and Technical Specifications.
- Consistency between the design documents and the physical installations of the systems.

The inspection included examination of fluid systems, HVAC systems, AC and DC power systems and instrumentation and control systems. In general, the systems selected for inspection were those associated with meeting reactor safe shutdown and core cooling requirements.

In the course of conducting this inspection, the team reviewed various project specifications, operating procedures, design calculations and quality assurance related documents. In addition, the team performed extensive system walkdowns during which independent dimensional measurements were made. The primary objective of the system walkdown was to verify the general configuration and functionality of the selected systems, rather than to carry out a detailed inspection typically associated with ongoing construction inspection efforts.

2.0 Persons Contacted

2.1 Niagara Mohawk Power Corporation(NMPC)

*P. B. Abbott, Station Superintendent
*C. G. Beckham, QA Projects
*J. J. Dominey, Nuclear QA
*W. A. Hansen, Manager of Nuclear Quality Assurance
*M. Jones, Superintendent - Operations NMP2
*T. Lee, Special Projects
*D. L. Quamme, Project Director
*M. J. Ray, Manager of Special Projects
R. Hammelmann, Lead Mechanical Engineer

2.2 Stone & Webster Engineering Corporation(SWEC)

*T. T. Arrington, Resident Manager F.Q.C.
R. Casella, Senior Mechanical Engineer
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*B. Charleson, Project Director
P. Conte, Lead Control Engineer
C. Corso, Principal Electrical Engineer
*C. E. Crocker, Superintendent of Engineering
M. Fachada, Senior Power Engineer
*T. S. Farrell, Assistant Superintendent of Engineering
A. Gwal, Lead Electrical Engineer
*C. L. Terry, Project Quality Assurance Manager

2.3 U.S. Nuclear Regulatory Commission(USNRC)

*R. A. Gramm, Senior Resident Inspector
*W.V. Johnston, Deputy Director, Division of Reactor Safety

*Denotes those individuals present at exit meeting

Throughout the course of the inspection other SWEC and NMPC engineers, supervisory and technical personnel were contacted.

3.0 Mechanical Systems

3.1 General

The scope of inspection in the area of mechanical systems covered piping components, equipment and HVAC systems and their respective supports. The specific systems which were inspected in the piping area included:

- Residual Heat Removal System
- Service Water System
- Scram Discharge Volume System
- Control Room Heating, Ventilation and Air Conditioning System

The inspection in the HVAC area focused on the control room habitability system in the normal and emergency operating modes.

The objective of this inspection was to verify, by sampling review, that the above systems were designed and fabricated such that they

were capable of performing their intended functions as described in the Final Safety Analysis Report (FSAR) and whether the as-built configurations were in conformance with the FSAR, the SER and system specifications and drawings.

3.2 Piping Systems

The inspection in this area included piping components, equipment, and supports from three fluid systems identified above. Two of these systems (RHR and Service Water) were fabricated and installed by ITT-Grinnell, and the third (Scram Discharge Volume) by Reactor Controls Incorporated (RCI).

3.2.1 Walkdown Verification of As-Built Piping Components, Equipment and Support Installations

The verification of as-built installations was performed either by visual inspection or by independent measurements of accessible components and supports.

The criteria used for the assessment of piping components and supports were those described in the installation specifications for these components. The inspection attributes typically included selective verification of the following:

- pipe routing, outside diameter, and support locations along the piping runs;
- branch connection types and locations;
- piping bend and elbow radii;
- support mark numbers, functions orientations and locations in relation to the building;
- proper flow direction marks on valves;
- correct sequential location of valves on piping runs; and,
- proper identification and orientation of valves and Limitorque operators.

The inspection attributes for equipment (pumps, heat exchangers, etc.) included verification of the following:

- manufacturer specification and purchase orders;
- name plate data consistency with FSAR requirements and manufacturer's data (capacity, type, service rating, power); and,

- heat exchanger component class (tube side and shell side).

The inspection attributes for pipe supports typically included selected verification of the following:

- as-built configuration against support detail drawing (BZ series) including dimensions of members;
- connection to the proper structure;
- general conditions of welds on hangers, including welded attachments to piping;
- baseplate dimensions and location of structural attachment to baseplates;
- baseplate concrete expansion anchor tightness, edge distance and bolt mark identification for anchor bolts;
- restraint bleed holes open and free of foreign material;
- pin-to-pin dimensions of snubbers;
- jamming of snubbers;
- load setting of spring hangers;
- grouting of floor mounted baseplates and gap sizes for wall mounted plates; and,
- pipe routing and support locations such that movements of piping due to vibration, thermal expansion, etc., would not cause interferance with other pipes, supports, equipment or components.

3.2.2 Residual Heat Removal System (RHR)

The RHR system at NMP#2 consists of three independent loops. Each loop contains a motor driven pump, piping, valves, instrumentation and controls. The normal operational mode of the RHR system is shutdown-cooling for removing decay heat from the reactor core to achieve and maintain a cold shutdown condition. Shutdown cooling

loops, A and B, have two separate heat exchangers that are cooled by service water. The shutdown cooling is one of five different RHR system modes. In this mode, the loops take suction from the reactor recirculation system and discharges through the RHR pump and heat exchanger to the recirculation system inside the primary containment.

The inspection team selected loop B of the RHR system in the shutdown cooling mode and a portion of the intake from the suppression pool for the purpose of as-built verification. The walkdown was conducted from the suction side at suppression pool penetration Z-5B, to RHR pump 2RHS*P1B to the heat exchanger 2RHS*E1B and through the containment penetration Z-10B where it discharges in the recirculation piping 2RCS-024-20-1. The system walkdown was conducted in accordance with the criteria in section 3.2.1 above on the accessible portions of the system.

Documentation of the piping components and support drawings used in this verification is provided in attachment 1-1 to this report.

3.2.2.1 <u>Equipment Support Verification</u>

Verification of the supports for the RHR loop B pump P1B and heat exchanger E1B was conducted during the course of this inspection. The inspection attributes for the above equipment supports included selected verification of the following:

- as-built support or foundation configuration;
- support member sizes, connections and attachments to the building;
- hold-down anchor bolt sizes, location and tightness;
- identification of cracks in the concrete foundation;
- visual inspection of weld quality, size and length;

Drawings associated with these equipment, and utilized for performing this verification are identified in attachment 1-1 to this report.

3.2.3 <u>Service Water System (SWP)</u>

The system was examined to compare the completed piping and pipe support configuration, associated mechanical equipment and their physical installation of trains A and B, Lines A

and F to the approved design, specifications, and other commitments documented in the Final Safety Analysis Report (FSAR). The inspection was performed by physically tracing the piping layout from the service water pump house to the discharge bank of the SWP system.

The inspector visually examined the installed piping and structural supports. The examination consisted of verification of piping run, location, orientation, and protective maintenance of supports, hangers, valves, taps and fittings, and the adequacy of overall workmanship of the installation.

The system was compared with FSAR descriptions and Piping and Instrumentation Diagrams (P&IDs) included in the FSAR, and approved changes not yet formally incorporated in the safety analysis report. Acceptance criteria for materials and components were derived from the applicable specifications, code of record (i.e. ASME) industry standards, and regulatory guides. The inspectors performed dimensional checks and detailed physical measurements of piping and pipe supports on a selected basis. These measurements were compared to the detailed isometric drawings of the piping, and seven (7) BZ drawings. In addition to this detailed independent verification, the inspectors also examined approximately two hundred (200) other pipe supports, restraints, and guides shown on the "as-built" piping isometric drawings for general workmanship, locations, orientation, and intended function. The above information was compared with applicable regulatory requirements and FSAR commitments for conformance.

Mechanical equipment was inspected for proper installation, functionality, and suitability for use, e.g., rating, flow characteristics, mechanical properties, traceability and identification. These items (valves, pumps, motors and heat exchangers, etc) were examined for location, orientation, and name plate data. The document review encompassed verification of manufacturers data and operability characteristics of the equipment with design requirements.

The piping system isometric drawings used for this inspection were the same "as-built" drawings used for the stress reconciliation effort by the licensee. Documentation for the Service Water System inspection is provided in attachment 1.2 to this report.

3.2.4 <u>Scram Discharge Volume System (SDV)</u>

The system was examined to compare the completed piping, pipe supports, valves, and miscellaneous mechanical equipment installations in train A (the 90° side) to the ap-

proved design, specifications, commitments in FSAR, and the requirements discussed in NRC IE Bulletins 80-14 and 80-17. Only safety-related portions of the system between the SDV vent and drain valves were inspected. The system was examined by a walkdown inspection for general workmanship, piping geometry, and configuration of approximately seventy (70) supports. Valves and other miscellaneous equipment including a vacuum breaker, and a discharge volume tank were examined for correct orientation, size and rating. The above information was compared with system description in FSAR, and approved P&IDs and "as-built" drawings.

The inspectors performed dimensional checks and detailed physical measurements of selected pipe supports. These measurements were compared with data on "as-built" support detail drawings. A total of thirteen (13) supports were examined in detail.

Mechanical equipment were inspected for proper installation, functionality, and suitability for use. Proper identification of valves was also verified.

The piping isometric drawings and the support detailed drawings used for the inspection were copies of approved and certified "As-Built" drawings from the constructor as filed in the licensee's document control center.

Documentation of SDV system inspection is provided in attachment 1.3 to this report.

3.2.5 Piping As-built and ASME Certification

The status and results of the as-built walkdown verification prior to turnover and N-5 certification of category I piping components and supports installed by SWEC and ITT-Grinnell were reviewed during this inspection.

The total number of large bore pipe supports inspected by ITT-G Field QC during system walkdown was approximately 6000 installations. The number of piping isometrics verified in this effort was approximately 450. This final system walkdown prior to turnover was conducted according to ITT-G procedure FQC-4-2-26-7. A review of the programs for final system walkdown by ITT-G and the second phase of the stress reconciliation effort by SWEC, was addressed in NRC Inspection No. 50-410/85-31. At the time of that inspection (October 1985) the system final walkdown effort by ITT-G had just begun. The team was informed that this effort was concluded in March 1986. Results of the ITT walkdown and SWEC stress reconciliation were incorporated

in the N-5 documentation. At the time of this inspection, only three (3) out of fifty-five (55) piping systems were found not to have received the ASME N-5 certification. The Residual Heat Removal and Service Water were among these three systems.

The balance of category I piping and supports, which were fabricated and installed by RCI, received final ASME N-5 certification in December 1985.

3.2.6 Findings and Conclusion

The NRC inspection team concluded that the quality of installation and workmanship in the mechanical area was generally acceptable. The team also found that the as-built configurations of mechanical installations, with the exception of some RCI scram header supports, were generally consistent with the FSAR descriptions, the project specifications and design drawing requirements.

3.2.6.1 Residual Heat Removal System Findings

Based on the review and examination of the RHR system, the following findings were identified:

1. Several cases of closely spaced rigid supports were identified during the walkdown of the RHR piping from the intake of the suppression pool at containment penetration Z-5B to the discharge the recirculation piping 2RCS-024-20-1:

   a) East-West snubbers restraints BZ-71 SU and BZ-71 AG-X on line number 2-RHS-024-332-2 were located approximately 3'-7" apart.

   b) East-West snubber restraints BZ-71 AG-X and BZ-71 AG-Z on the same RHR line above, were approximately 6'-0" apart.

   c) East-West snubber restraints BZ-71 AG-Z and BZ-71 SP on the same RHR line above, were located approximately 7'-4" apart.

   d) Vertical snubber restraints BZ-71 SP and BZ-AG-4 on the same RHR piping above were spaced approximately 6'-7" apart.

   e) Vertical snubber restraints BZ-71 SR and BZ-71 AG-4 on the same RHR piping above, were located approximately 7'-6" apart.

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f) On RHR line No. 2RHS-024-22-2 two east-west restraints (BZ-71 SS and BZ-71 RJ) were located approximately 4'-7" apart and two vertical restraints (BZ-71 SM and BZ-71 SL) were spaced approximately 6'-6" apart.

g) On RHR line No. 2RHS-012-30-1 two east-west snubber restraints (BZ-71 AMN) and BZ-71 MY) were located approximately 4'-0" apart, and two vertical snubber restraints (BZ-71 NA and BZ-71 MV) were spaced approximately 3'-9" apart.

h) On the RHR line above, snubber restraint BZ-71 AMN was installed approximately 8'-0" from the anchor at the primary containment penetration Z-10B.

The installation of snubbers in proximity to other snubbers, rigid restraints or anchors could result in the inoperability of these snubbers if the dead band in a snubber is larger than the pipe translation between the two successive close supports. A similar problem could also exist if rigid supports were installed in proximity to other rigid supports or anchors. Typically, this would be caused by the same circumstances which resulted in the closely spaced snubbers identified above and would result in an overloading of the supports and/or the piping if the gaps between piping and supports exceeded certain limits. The inspectors presented these concerns to the licensee and discussed the need for the identification of similar cases in which rigid supports (including snubbers) were placed in proximity to other rigid supports (including snubbers) or anchors.

SWEC started an engineering evaluation of the closely spaced rigid supports for category I piping attached to the primary containment wall on a sampling bases. The choice of piping connected to the primary containment was influenced by the likelihood of encountering more closely spaced supports in piping systems subjected to most severe loading conditions (i.e. seismic and hydrodynamic).

The sampling evaluation included 93 large bore piping isometrics approximately containing 1400 supports from a total of 163 large bore piping isometrics containing approximately 2500 supports. Evaluation of small bore

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piping included 156 isometric drawings (DP) containing approximately 750 supports from a total of 453 isometrics containing approximately 2000 supports. The criteria for identification of closely spaced supports was selected as five pipe diameter (5D) for large bore piping and (10D) for small bore piping. The sample was selected from piping in the RHR, LPCI, HPCS, FW, HCS, SVV, SLS, and ICS systems.

Results of SWECs evaluation, as observed by the inspector on May 6, 1986, indicated the following:

a) Large bore piping

- Total number of supports found acceptable per 5D criteria was 1376.
- Review of the dynamic piping displacements at the support locations for the remaining 24 supports indicated the acceptability of 12 supports as the dynamic displacements exceeded the support dead bands or gaps.
- Reanalysis of the piping systems with the other 12 supports removed from the model indicated that the piping displacements at 8 support locations exceeded the dead band or gap.
- At the locations of the remaining 4 supports where piping displacement was less than .05", the resulting piping stresses, adjacent support loads and valve accelerations were found to be acceptable.

b) Small bore piping

- Review of the in-line support spacing in 127 DP's per the 10D criteria, identified supports in 4 DPs with less than the minimum spacing. In all four cases, reanalysis of the piping with supports removed from the model, showed that piping stress, adjacent support loads and valve accelerations were satisfactory for the applied loads.
- Review of support spacing at active valves for spans less than 10D involved 48 DP's. All were found acceptable per the criteria.

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- Review of support spacing at braced valves identified 7 DP's which required further evaluation. Reanalysis of the piping without the restraints located at the operator indicated that the piping movement at the restraint point exceeds 1/16", the minimum support gap.

- 11 DP's evaluated for support spacing between snubbers and rigid restraints were found to be acceptable.

- 38 DPs were evaluated for support spacing at T-connections, 57 DP's for support spacing between rigid restraints and equipment nozzles, 9 DP's for support spacing between rigid restraints/anchors and large bore piping connection, and 12 DP's for support spacing on vent/drain supports between rigid restraints/anchors and large bore connections. Of all the above, supports in 5 DPs were found not to meet the criteria. Further, piping reanalysis with the proximate supports removed indicated acceptable piping stresses, adjacent support loads and valve accelerations.

The results of SWECs sampling evaluation were considered sufficient to resolve the team's concerns.

2. During the plant walkdown the team identified several instances where limitorque valve stems did not have protective covers. The stem protectors are required for category 1 MOVs to prevent debris from entering the housing and damaging the stem mechanism. The licensee indicated that the actuators were supplied with plastic end caps by the vendor to protect the stem. However, the plastic caps for some rising stems had to be removed during pre-operational testing of the MOVs. The inspectors reviewed NMPC/NMP#2 problem report No. 3116 on February 1986, and SWEC's E&DCR No. 12187 which addressed this concern. The disposition required the procurement of appropriate protectors for fixed and rising stems of actuators. Both types were found to be available from Limitorque. The requirement for installation of the stem protectors was addressed on a case by case basis. A list of the stem protectors ordered was included with the E&DCR. The licensee further indicated that the installation of required protectors will be completed prior to fuel load.

3. During the plant walkdown the team identified two instances of unauthorized construction related activities affecting permanent plant systems which were already turned over to NMPCs start-up organization:

   a) The blind flange for strainer No. 2RHS*STRT-1B was rigged from a 3" OD safety related piping No. 2RHS-003-218-4. A one ton chainfall was attached to the line 1'-2" west of existing pipe support No. BZ-71 XW. A small bore drain valve No. 2RHS*V313 was also attached to the blind flange. The blind flange OD is 3'-0" and thickness is approximately 3". This rigging activity was conducted without authorization and in violation of:

      1) Section 2.0 of specification No. NMP2-P301C for field fabrication and erection of ASME III piping (Classes 1,2,3) which requires that all hoisting forces imposed on building or pipe support steel be reviewed prior to making a lift to ensure the adequacy of the supporting member.

      2) Section 5.0 of start-Up Administrative Procedure No. N2-SAP-117 which requires that all work on equipment and systems released to NMPC be conducted in accordance with approved engineering design documents and/or maintenance and test procedures via Work Control Report (WCR).

   b) A scaffolding safety bar was found to be tied from a safety related pipe support variable spring hanger No. BZ-71-BW-1. The finding was identified in the south auxiliary bay at elevation 175'-0" near the RHR heat exchanger. The other safety bar for the same scaffolding was attached to a 1" OD non-safety electrical conduit No. 2CCI-G1NE3. These attachments were made in violation of section 4.3 of SWEC's Construction Site Instruction No. CS1 20.16 titled "Protection for Permanent Plant Equipment" which requires that scaffolding shall not come in contact, rest or be supported by permanent plant equipment and that cable tray piping supports not be used to support scaffolding or handrails.

In the above two instances SWEC provided the team with records of personnel training which addressed the above findings. The records were identified as "Craft

Awareness Training" - CTRs # NMC-HB-OC-0300 and "Protection of Permanent Plant Equipment" - CTRs # NMC-DA-CH-0300. The records indicated that the training was conducted on March 28 and April 1, 1986 respectively.

In response to these findings, the licensee issued memoranda to all piping/mechanical department supervisors to emphasize the need for adherence to established project procedures and job rules related to the protection of permanent plant equipment. Further, SWEC issued an E&DCR No. C04023 for the revision of specification No. P301P for field fabrication and erection of piping by SWEC. The revision of the specification would clearly prohibit rigging off permanent plant piping or other components unless otherwise approved by engineering.

The above findings are in violation of criterion V of Appendix B to 10 CFR 50 (410/86-13-01).

4. Walkdown inspection of both the RHS and SWP systems identified that vent and drain valves were not always shown on system P&IDs or FSKs. In one instance, the team noted that drain valves between the RHS suction penetration to the suppression pool and the first remotely operated valve were not shown. The team questioned licensee representatives regarding the plans for showing these types of valves on drawings. Personnel from the licensee's Startup organization described these plans.

   The licensee's plans involved a walkdown inspection performed jointly by Startup and Operations personnel. Features such as vents and drain valves, valve identifications and other components would be compared to existing FSKs. Revisions, as found to be necessary from these walkdowns, would be made to the FSKs and an Interim FSK would be issued by the site to the Control Room. The Interim FSKs would also be forwarded to the SWEC Cherry Hill office for incorporation into final FSKs and P&IDs. This walkdown effort is being conducted in parallel with system release to the operating organization.

   The team had no further questions.

5. In general, each pump, valve and component involved in this inspection was found to be identified and labeled with a stamped metal tag. However, the team was concerned that these metal tags were difficult to read

and, in some cases, had been covered by insulation. Consequently, the team inquired about the licensee's plans for permanent tagging.

A representative of the licensee's Operations organization provided the team with a copy of the permanent labelling program document. The program, which references INPO Good Plant Practice OP-208, involves the affixing of reasonably large and clearly readable plastic covered tags on valves. These tags will identify the valve by number, and will show the valve power supply. Further, the tag will be color-coded to show the normal valve position.

The program will address all plant valves. The team understood that stencils would be used in components, such as pumps and motors. However, the team was also informed that the licensee currently does not plan to identify piping by line number or system. The licensee feels that such labelling is not warranted because, in general, there would be a labelled valve or component in close proximity to the pipe to aid in identification.

The team had no further questions.

6. During a walkdown of the RHS system near the inlet to the B RHS Heat Exchanger (HX), the team questioned the configuration of a temperature element installed in a tee above the HX. The team noted that the P&ID and FSK for this section of the system called for temperature element (TE) 2 RHS*TE10B to monitor the HX inlet RHS water temperature. However, in the field, the team noted that the TE was mounted in the horizontal section of the tee toward the line from the RCIC steam line (i.e., the steam condensing mode line). The team questioned the ability of this TE to accurately indicate RHS HX inlet temperature in its current location. Further, the team questioned how the field installation was controlled. Similar concerns were raised regarding 2RHS*TE10A on the A HX.

   In response to these concerns, the licensee provided drawings EP-71F-10 and 11 and the ITT Grinnell piping isometrics which depicted the as-found field condition. Further, the licensee indicated that each TE was mounted approximately 7.5" from the vertical centerline of the tee. SWEC engineering representatives stated that placement of these TEs was adequate to assure accurate temperature readings.

The team also noted that the cabling and raceway associated with these instruments was non-1E; however, the nomenclature of the TE's appeared to indicate that the TEs were safety-related (i.e., an asterisk vice a dash was used in their identification). The licensee resolved this apparent discrepancy by informing the team that the safety-related aspect of the TEs involved the pressure retaining parts of the respective penetrations, not the indications themselves.

The team noted that both TE's provided indications in the Main Control Room and at the Remote Shutdown Panel. Based on licensee information, the team learned that these indications were classified as Type D in Regulatory Guide 1.97. The team also reviewed the Remote Shutdown System Interim Operating Procedure (IOP) N2-IOP-78 to determine the use of these instruments and examined the Remote Shutdown System control boards to determine what other instrumentation was provided. The team determined that the 2RHS*TE10A and B (shown as 2RSS*TE10A and B on the panel and in IOP-78) are used by the operator to indicate reactor coolant system temperature during a cooldown to achieve cold shutdown. However, the team determined that other safety-related instruments such as reactor vessel pressure, reactor water level, RHS HX flow and service water flow to the RHS HXs could be used if TE10A and B were unavailable.

The team had no further questions.

3.2.6.2 Service Water System Findings

Based on the above inspection, review of documentation, and discussions with cognizant personnel, the team determined the following:

1. The piping and pipe support installation generally conformed to requirements of the design basis and analyses. The system layout was in accordance with the system description and approved P&IDs. The workmanship of installation, and measures to prevent inadvertent damage to items during construction were adequate.

2. Valves, pumps, motors, heat exchangers, and other miscellaneous mechanical items in the system were generally acceptable. In one instance valve number V1027 in FSAR Figure 9.2-1A was shown to be in the reverse direction. However, the valve was actually installed

correctly, and the "as-built" verified drawing also showed the correct orientation of the valve in question. The licensee has initiated a Licensing Document Change Notice (LCN 215Y2) to update FSAR Figure 9.2-1A to indicate the proper orientation of V1027.

3. The inspector observed "Reject" tags on several pipe supports in the service water system. However, by review of Nonconformance and Disposition Reports (N&Ds) and Quality Assurance Inspection Reports (QAIRs), it was determined that the nonconformances and unsatisfactory conditions were properly dispositioned and resolved, and the N&Ds and QAIRs were closed. The reject tags in question were inadvertently left on the supports. The licensee stated to the inspector that the SWEC quality control organization was currently in the process of walking down and removing any unnecessary tags that might have been left on any item erroneously.

4. One item was identified that pertained to the operational phase of the plant. NRC Regulatory Guide 1.29 recommends that the Seismic Category I and non-category I system interface be extended to the first anchor or triaxial support system beyond the code class boundary, and that supports in these sections be designed to the requirements of seismic system. The licensee was not committed to this Regulatory Guide during construction. Therefore, the supports, although designed as seismic supports, were classified as QA Category II (non-seismic, non-safety related) items on drawings. The licensee, however, has committed in the FSAR to Regulatory Guide 1.29 to treat these supports in the Operational QA Plan as Category I. The licensee has committed to include these supports into the plant "Q" list (an automated computer listing of Category I safety-related items) for plant operations. This item remains unresolved pending review of the "Q" list by NRC to assure the associated piping and supports are included (410/86-13-02).

5. FSAR, Amendment 23, Figure 9.2-1J does not correctly reflect the as-built design of the temperature controlled valves 2SWP*TVA and 2SWP*TVB. The FSAR depicts the valves with red and green position indicators. However, the loop diagram 2SWP*35 does not show any position indication wiring or components and the limit switches on the installed valves are not

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wired for position indication. The team learned that the licensee does not intend to connect the limit switches for position indication, and has initiated a Licensing Document Change Notice (LCDN 2169) to ensure FSAR figure 9.2-1J appropriately reflects the as-built design.

6. As the team examined the installation of the Service Water pumps, it identified a condition of concern regarding the clearance between the coupling guard and the motor and pump couplings of 2SWP*P1A. The guard on the pump, which was attached in two points to the pump casing, appeared to being close to the motor end coupling. The concern involved the possibility of the guard impacting the coupling and this becoming a minor missile in close proximity to a motor oil sight glass.

   The licensee determined that the coupling guards had been provided by the vendor with the skid-mounted pumps according to the pump specification. However, it also found that no clearance information had been provided. The actual measured clearance for the A pump indicated about 1/8" between the cover and the motor coupling.

   The licensee discussed this matter with the vendor during the course of this inspection. The vendor recommended a ½" spacing all around. Subsequently, the licensee issued E&DCR C53775 to revise vendor instruction 02.170-5000G to incorporate the required clearance. Also, the guards on the pumps would be inspected and a minimum ½" clearance would be achieved.

   The team had no further questions.

3.2.6.3 <u>Scram Discharge Volume System Findings</u>

Based on the above inspection, review of documentation, and discussions with cognizant personnel, the team determined the following:

1. The scram discharge volume piping header and branch line installation generally conformed to the requirements of the design bases and analyses. The system layout was in accordance with approved P&IDs and the system description in FSAR. The workmanship of piping installation,

and access control measures to prevent any damage and/or unauthorized work were adequate.

2. Valves and miscellaneous equipment were correctly installed, and properly identified. The discharge volume tanks were of adequate size and properly tagged/labelled for traceability. The sequencing of opening and closing of vent and drain valves, as discussed in IE Bulletin 80-14, was found to have been properly specified in General Electric specification (21A9236). The licensee preoperational procedure included steps to verify valve sequencing and timing.

3. The team noted that a portion of the vent line of the system crossed over a safety-related cable tray. Project specifications dictate that in such cases, hot piping (SDV design temperature 70-450°) shall be separated at least six inches, or insulated to prevent degradation of electrical cables. In this case, the SDV piping was less than six inches from the cable tray, and was not insulated. However, the team verified that there was no electrical cable in the raceway, and there were no plans to route any cable through that raceway in the near future. The licensee, however, initiated an E&DCR (#F13536) to include this portion of the SDV pipe in the insulated pipe schedule to prevent any future problem. The licensee's action was acceptable and the team had no further questions.

4. In the course of detailed measurement and independent verification of orientation, dimension and location of pipe supports in the SDV system, the team determined that two of the selected thirteen (13) supports (#1A&11A) did not conform to the "requirements shown on approved and certified "as-built" drawings, the details are as follows:

   In a previous inspection (IR 50-410/85-06-04) the NRC had identified that SDV header pipe supports did not have gaps for thermal growth of the pipe. This item was considered unresolved pending a licensee analysis for gap requirements. Apparently, an analysis was performed by Reactor Controls Inc. (RCI) which found that no gaps were required. However, the associated drawings were revised to incorporate minimum gap requirements for the supports. RCI modified/erected and/or otherwise implemented gap requirements in SDV piping supports.

[illegible]

RCI updated the support drawings incorporating all "as-built" data, and issued the drawings as "Final As-Built" Drawings. These drawings were approved and certified by RCI as such. Additionally, a "type C" inspection by Stone and Webster Engineering Corporation (SWEC) was performed to fulfill the requirements of SWEC's ASME QA program to verify the acceptability of RCI's "as-built" drawings. The stated purpose of the inspection was to assure that conditions depicted on RCI "As-Built" drawings corresponded with the installed system. This inspection by SWEC (IR#QP-GS0073) identified some unsatisfactory conditions which were subsequently dispositioned by SWEC as "use-as-is."

On April 24, 1986, during independent verification and measurement of selected SDV supports, the inspector discovered that support number 1A had no measurable lateral gap, although the RCI design and "As-Built" drawings indicated it to have a minimum of 1/16". During the same inspection it was identified that support number 11A, had no measurable gap in the vertical direction. The applicable drawings indicated it to have at least a 1/32"gap. The team informed the licensee of their findings. Later, the licensee representatives stated that they did reverify the validity of the team's findings regarding the two supports and that the gaps appeared to be zero. The team informed the licensee that not meeting the minimum gap requirements shown on the drawing was a violation of NRC requirements (410/86-13-03).

3.3 Heating, Ventilation and Air Conditioning Systems (HVAC)

3.3.1 Control Room Habitability

The inspection of Control Building HVAC systems consisted of a walkdown examination of ducts, filters, dampers, fans, supports and components for the control room HVAC system normal and emergency operating modes. Accessible portions of the system examined included areas from the two make-up air inlets in the Control Building, through the redundant tornado dampers and the normal ventilation path to the control room, and, through the emergency mode air path through the special filter train to the control room. The walkdown inspection focussed on train "A" of the redundant HVAC subsystems except where there was much greater accessibility to identical components in the "B" train.

The team verified that the outside air isolation dampers were manually operable from within the control room envelope, as described in the FSAR and SER, in the event normal remote operation would not be possible. The main control room envelope boundary was also reviewed to assure isolation capability at system interfaces. Further, a review was made to ensure that FSAR and SER licensing commitments were properly translated into procedures, specifications and drawings.

The FSAR Control Building HVAC system drawings were utilized for the as built verification walkdown along with the specific SWEC air conditioning and ventilation drawings and duct support detail drawings listed in Attachment 1.4 of this report.

3.3.1.1 System Operability

The team examined those licensee documents which would serve as the basis for determining the operability of the Control Room Habitability Envelope. These documents included the associated engineering calculation , the preoperational tests for the habitability system (N2-POT-53-1 and 53-3), the Interim Operating Procedure (IOP) for the system (N2-IOP-53A) and the draft surveillance procedure (N2-OSP-HVC-R001).

The team sought to verify that the information contained in the above documents was consistent with the system design bases and was in agreement with Section 6.4 of the FSAR and SER and with Technical Specification 3/4.7.3.

Based on this review, the team determined that the envelope includes approximately 381,000 cubic feet of free air encompassing the Main Control Room, the directly adjoining spaces and the rooms in which the two trains of the emergency filtration system are installed. Upon automatic initiation of the habitability system in response to the detection of high radiation in the air intake ducting or on a LOCA signal, two motor-operated valves (MOV-1A and 1B) close and the lead train of the emergency filtration system starts. By design, approximately 2250 cfm of air can be processed through the filtration system; no more than 1500 cfm will be intake air to compensate for losses due to leakage or exhaust out of the control room envelope and the balance will be recirculated air from within the envelope.

[illegible]

The team concluded that operability of the habitability system would require, as a minimum, a controlled leakage envelope (i.e., less than 1500 cfm outleakage), two emergency filter trains, two control room air conditioning units, valves 2 HVC*MOV1A and 1B, and the associated ducting and supports.

3.3.1.2 Walkdown Verification of As-Built Installation

The criteria utilized for inspection of the duct, system components and supports included the design and construction installation specifications listed in Attachment 1.4. The specific attributes for the walkdown includes selected verification of the following:

Duct Inspection

- proper size and location of ducting
- branch connection type and location
- Lack of excessive sheet metal deformation
- proper location and installation of flow, radiation, smoke and temperature sensing devices
- completeness of bolted flange connections, welds, insulation and seal material
- access door location, size and operation

Damper, Valve, Fan and Filter Inspection

- name plate data consistency with FSAR and purchase order specifications
- sequential location as required by SWEC flow diagrams and EB drawings
- equipment accessibility for manual operation
- component identification marking
- proximity of components and potential operability interferences
- installation of supplemental hardware including air operated solenoid valves, limit switches, power supplies, etc.

System Supports

- actual as-built configuruations against hanger drawings including some dimensional verification

- direction in which hangers restrain ductwork
- connections to the proper structure
- weld sizes and profiles
- baseplate dimensions and location of structural attachment on the baseplates
- baseplate bolt tightness and edge distance
- gaps between the hanger baseplate and concrete wall

The control room HVAC system supports that have been inspected in detail are listed in Attachment 1.5 to this report. The as-built details inspected were compared with the design requirements on reference drawings noted with an asterisk (*) in Attachment 1.4.

3.3.1.3 Equipment Supports

The control room HVAC equipment supports selected for this inspection included:

- 2HVC*ACU-1B
- 2HVC*FLT-1B
- 2HVC*FN-2A
- 2HVC*FLT-2B

The inspection attributes for the above equipment supports included:

- verification of as-built support or foundation configuration dimensions
- verification of hold-down anchor bolt sizes, location and tightness
- identification of cracks in concrete foundations
- visual inspection of welded joints

3.3.2 HVAC Findings

3.3.2.1 Findings Relative To System Operability

To verify consistency among Section 6.4 of the FSAR, SER, Technical Specification (TS) 3/4.7.3 and the operating and test procedures for the control room habitability system, the team examined the associated preoperational procedures, the interim operating procedure (N2-IOP-53A) and the draft surveillance procedure (N2-OSP-HVC-R001).

1. The team noted both the FSAR and SER indicated that, following automatic system initiation, makeup air would be supplied to the control room envelope from two external intakes through one of two filtration systems. The operator could isolate one of the two intakes to limit the intrusion of radioactive material into the habitablity system by selecting the in service intake to be the intake vent away from the release plume. However, the system IOP did not discuss this isolation action nor did it tell the operator how to select the appropriate in-service intake.

2. The team also questioned how the system was to be balanced during preoperational testing to assure that the control room envelope maximum intake air flow would be less than 1500 cfm, regardless of whether either or both intakes were open. The team noted that this aspect had not yet been addressed by the licensee's Startup group or by SWEC engineering.

3. The team reviewed preoperational test procedures N2-POT-53-1 and 53-3 and draft surveillance procedure N2-OSP-HVC-R001 to assure that they included measurements to verify that a +1/8" wg pressure could be maintained in the control room with less than 1500 cfm intake air. None of these procedures contained this requirement.

As a result of the above concerns, the licensee revised the system air balancing plan to assure an air intake less than 1500 cfm for cases in which either or both makeup air intakes are in service. Further, the IOP and OSP were revised to make them consistent with the system design calculation assumptions and with TS 3/4.7.3. Also, a Licensing Document Change Notice (LDCN) was initiated to update the FSAR to indicate the licensee's current planned methods to operate the system.

The team had no further questions at this time. However, at the exit meeting the team leader emphasized to the licensee and to SWEC the need to assure consistency between design assumptions, TS requirements, and operating and surveillance procedures.

[illegible]

3.3.2.2 Findings Relative To Supports, Ducts Piping and Components In The Main Control Room HVAC System

The team concluded the general quality of field workmanship for the HVAC system was good. The walkdown inspection verified the adequacy of the system and support installations with a few minor observations.

1. The licensee has established a program to address the close proximity and potential operability interferences of system components. During the system walkdown, the team noted equipment installations which appeared to be close to other equipment or components. A sample of these HVAC installations was chosen to assess the licensee's program. The inspector verified the installations had been evaluated by engineering for operability, dispositioned and tagged accordingly. From this sample, it appeared the program to review the close proximity of HVAC system components and equipment is adequate.

2. During the system walkdown it was noted that backdraft damper 2HVC*DMP63 was not functional as installed. It appeared the damper was inoperable due to (a) the close proximity of surrounding components and/or (b) the absence of the damper counterweight. Further investigation revealed the licensee had issued various deficiency reports and problem reports to address this inoperable damper.

   Currently, problem report No. 03877 is open and addresses the inoperability of 2HVC*DMP63. Requirements for equipment temporary modification are addressed in start-up Administrative Procedure N2-SAP-118. Yet, prior to this inspection, documentation had not been issued to address the removal of the damper counterweight. This item is unresolved pending licensee review to determine if this inconsistency with N2-SAP-118 is acceptable. (410/86-13-04)

3.3.2.3 Findings Relative To Equipment Supports

Components and equipment supports and foundations verified during the inspection were found to be in conformance with the installation drawings.

No violations were identified.

4.0 Electrical Power System

4.1 General

The scope of this inspection covered selective examinations of portions of the Class 1E ac and dc power systems to verify the as-built systems were in compliance with Technical Specifications, FSAR and SER descriptions and commitments, and to verify the systems were installed in accordance with licensee project specifications and drawing requirements. The portions of the ac system selected for inspection were those portions associated with Division I and II power distribution to RHS pumps, service water pumps and control room HVAC equipment. The portions of the dc system selected for inspection were associated with power to operate the circuit breakers for the ac powered equipment involved in this team inspection.

The inspector observed workmanship and the as-built condition of equipment switchgear, cable, conduit and cable trays and noted the following:

- equipment, switchgear, cable and wiring were of the proper size and rating.
- cable, cable trays, and wiring were properly identified (including color coding)
- electrical separation was maintained between redundant trains and between class 1E and nonclass 1E
- cable tray and conduit filling was proper
- cable tray and conduit were properly routed
- cable support was proper (including spans, and tie downs)
- cable and wire terminations are proper (including identification)
- overall equipment condition was good

The governing licensee electrical specifications, drawings, standards and procedures for installation and acceptance of the electrical power system are listed in Attachment 1.6 to this report.

4.2 Safety-Related Class 1E AC Power

The inspector conducted a field walkdown of the power feeds from 4160 volt ac switchgear panel 2ENS*SWG103 to service water pump 2SWP*P1B and to residual heat removal pump 2RHS*P1B. and from 4160 volt switchgear bus 2ENS*SWG 101 to service water pump 2SWP*P1A.

[illegible]

The inspector performed field walkdown of the 600 volt ac distribution from motor control center 2EHS*MCC303 to control room HVAC chiller 2HVK*P1B, to control room HVAC Fan 2HVC* ACU1B, and to residual heat removal system motor operated valve 2RHS*MOV24B.

4.3 Safety Related Class 1E DC Power

The 125 volt dc power feed was walked down from dc distribution panel 2BYS*SWG002B to the 4160 volt switchgear panel 2ENS*SWG103. The inspector observed the 125 volt dc distribution bus feeds to each of the 4160 volt circuit breaker operating coils within this panel, including those for service water pump 2SWP*P1B and residual heat removal pump 2RHS*P1B.

4.4 Findings

1. The team determined that the identification of cables, raceways, trays, and rigid conduit was as required by the associated specifications and drawings. However, licensee specification E-061A, paragraph 2.1.5.18 required that where a duct terminates with an above ground extension, markers shall be applied. Contrary to this, the inspector noted flexible conduit which extended above the floor from a duct to provide power to the heaters of service water pump 2SWP*P1A, was not identified. Subsequent to this finding, inspections were made by the licensee in which a total of 42 similar installations were noted to be without proper identification. The licensee took prompt corrective action to inspect and properly identify these duct extensions. However, the team considered that not previously identifying these conduits constituted a violation of Criterion V of 10 CFR 50 Appendix B (410/86-13-05).

2. The team questioned the licensee's identification of field installed control wiring in 4160 volt switchgear cubicle 2ENS* SWG103 and Motor Control Center 2EHS*MCC303. A mixture of wires existed with colored jackets and with black jackets with a color code permanently printed on the jacket (i.e., black, red, white, green, orange, etc.). The licensee indicated that the latter type of color code identification is widespread throughout the plant. The wiring diagrams for these panels used color code as a means of identification of wiring to specific terminal block locations. The licensee's policy of identification by actual wire color or by a marked color designation on the black jacket, was found to meet the identification requirements of IEEE 279 and licensee specification E061A. The inspector expressed concern for possible confusion of plant and contract electricians with the mixed system of color coding wires and the fact

that a black jacketed wire is called white, red, etc. The licensee stated that this type of color coding had not proven confusing in either Unit 1 or Unit 2; however, the licensee agreed to incorporate color code training in the plant electricians training program.

4. Electrical separation and support in the areas inspected were found to be in accordance with licensee specification E-061 requirements except for two isolated cases. During this inspection licensee QA personnel identified and took prompt action to provide proper separation between adjacent service water power cables in cable tray 2TH852Y. In walking down the service water pumps and RHS pumps power cable the team noted an isolated instance where the unsupported cable span exceeded the four foot specification requirement. The licensee took prompt action to provide the additional support.

4. The team note that circuit changes made in the 4160 volt switchgear panels 2ENS*SWG101 and 2 ENS*SWG103 to comply with Appendix R requirements had caused excessive voltage drop in the 125 volt dc closing coil circuits for the circuit breakers. The licensee had addressed this problem in calculations and tests contained in EC-133 and in E&CDR No. Z63304. The wiring for these circuits was changed to correct the problem and circuit breakers were tested for closing under projected worst case low voltage conditions to verify coil pick-up. The team had no further questions in this area.

5. The team examined the licensee's provisions for shutdown of a diesel generator after automatic start (from a LOCA or other signal without LOP). The licensee's procedure allows up to 4 hours for manual shutdown in accordance with manufacturer's instructions.

6. The team examined circuit breaker protective relay coordination to prevent the diesel generator from attempting to carry the grid in the event the grid decays during periods of testing, etc. The inspector found that the licensee has provided automatic protective relaying which trips the grid off in such cases thus permitting the diesel to pick-up plant safety loads.

7. The diesel fuel system for each diesel was found to be independent of each other with no cross-over valving. The main tanks are below grade and the day tanks are in the diesel rooms above the engines. The fill for each main tank was outside the diesel building within the protected security area with each fill separate, protected, covered and locked.

8. The team was concerned that because the diesel exhaust piping through the roof deck and through the muffler would be hot during operation and was in proximity to the asphaltic roof, a potential for melting or possible fire existed. The team

determined, however, that the licensee had identified these problems and had generated and E&CDR to provide for insulating the exhaust lines where they come through the roof and to provide insulation around the exhaust muffler.

9. The team observed that both the diesel air intake and exhaust openings were covered with screen to prevent the entry of foreign objects and/or birds.

10. The team found that the motor nameplate instructions on the service water pumps, the RHS pumps and the control room HVAC chiller compressors included operating cautions which limited the number of successive cold and hot starts and provided minimum time intervals between certain restarts. The licensee provided copies of operating instructions that complied with the manufacturer's cautions for the RHR and service water pumps. The team determined that the starting circuit for the HVAC chiller incorporates appropriate time delays to provide protection for the motor. The licensee stated that this concern has also been addressed for the other class 1E motors in the plant.

5.0 Instrumentation and Control Systems

5.1 General

The scope of inspection in the area of instrumentation and control (I&C) systems covered the following:

- impulse lines
- instruments
- instrument cable, cable routing and terminations
- control panels
- switchgear and motor starter controls
- control cable, cable routing and terminations
- control functions

The specific systems which were inspected in the I&C area included:

- Reactor Protection (RPS)
- Residual Heat Removal (RHS)
- Station Service Water System (SWP)
- Control Room Habitability HVAC Systems (HVS)

The objective of this inspection was to verify, by sampling review, that the above systems were designed and installed to meet their intended safety function as specified in the Final Safety Analysis Report (FSAR) and the Safety Evaluation Report (SER). Further, the as-built systems were examined to verify they were installed in conformance with controlled specifications, controlled drawings and implementation of the Quality Assurance program.

5.2 Visual Inspection Details

The team performed the walkdown of the following safety systems and components:

5.2.1 Instrument Impulse Lines

The visual inspection during the walkdown of the instrument and impulse lines included checks for the following technical requirements:

- tubing and fitting cleanliness was as required;
- tubing and instrument identification was as required;
- minimum slope, bend radius and separation requirements were maintained;
- tubing defects and damage were within allowable levels;
- there were no carbon steel deposits on stainless steel tubing from welding arcs;
- tubing, tubing restraints (guides) and anchors were located in accordance with the drawings and no tubing was located in walkways;
- protection of redundant channels was maintained by physical separation or barriers designed to withstand the specific hazard;
- stainless steel tubing minimum clearance from inside steel and concrete surfaces of inside building members maintained;
- instrument line minimum clearance from outside walls, doorways, and insulated components (i.e., pipe, duct, equipment tank, ect.) was maintained;
- instrument lines did not impede access to other control devices; and
- instrument lines operating at temperatures equal to or greater than 150°F, as listed in Engineers Line Designation Table (NMP2-PSLOT), were routed to protect personnel or equipment.

5.2.1.1 Reactor Vessel Level Common ECCS & RPS

The impulse line 2-ISC-001-22-1, was visually inspected from the reactor vessel nozzle, N14B elevation

317'-10", reference AZ 200 degrees, to the drywell penetration Z-316-2. This inspection continued from outside of the drywell, at Z-316-2, where downstream from the excess flow check valve the line changed to tubing. The walkdown continued to low side connections of level transmitter 2ISC*LT7B(B) which is channel B of RPS system input to B1 trip channel. The transmitter is located on instrument rack 2CES*RAK027 in the Reactor Building, column 254, at elevation 261 feet.

5.2.1.2 Reactor Vessel Level (RPS)

The impulse line 2-ISC-104-PSR-01-C-1, was visually inspected from the reactor vessel nozzle, N13B, elevation 311', reference AZ 190 degrees, to the drywell penetration, Z-318-3. The inspection continued from outside the drywell at Z-318-3 to the high pressure connection of level transmitter 2ISC*LT7B(BY).

5.2.1.3 Drywell Pressure (RPS)

The impulse line, 2 ISC-750-362-2, was visually inspected from inside the drywell to the drywell penetration, 2Z-322-4. The inspection continued from outside the drywell at 2Z-322-4 to pressure transmitter 2ISC*PT15B(BY). This transmitter is channel B of the RPS system input to B1 trip channel. The transmitter is located on instrument rack 2CES*RAK027.

5.2.1.4 Control Rod Drive Scram Discharge Volume Tank Level (RPS)

The impulse line, 2-RDS-750-245-2, was visually inspected from the tank, 2-RDS-012-108-2, at elevation 268' to the low side of level transmitter, 2RDS*LTX12B. The level transmitter is located about 6' from the tank on its local mounting at elevation 306'.

The impulse line, 2-RDS-750-246-2, was visually inspected from the tank to the high side of the level transmitter, 2RDS*LTX12B.

5.2.1.5 Control Room HVAC Radiation Monitors

The sample lines for radiation monitors 2HVC*RE18A(-G), 18B(-Y), 18C (-G) and 18D (-Y) were visually inspected from the ventilation duct to the radiation monitor. This duct is located at the emergency filter unit, 2HVC*FLTA(-G), located at elevation 288 feet in the Control Building. The radiation monitors are located

at elevation 308 feet in the Control Building. Particular note was taken to assure these lines had no 90° bends and were heat traced.

5.2.2 Instrument Cables

The visual inspection during the walkdown of the instrument cables, cable terminations and the raceway included checks for the following technical requirements:

- safety related instrument and control cables were identified at each terminating end and at each 15 feet;
- the cables were supported in the vertical direction by Kellem's grips every twenty five (25) feet;
- there was no visual damage to the cables;
- The conductors were connected to the terminal point and terminal block as shown on the wire termination diagrams;
- the wire termination terminals were tight;
- the conductor terminations were in accordance with the licensee visual acceptance criteria;
- redundant cables and raceways were separated in accordance with the electrical installation specification;
- raceways were identified as required; and
- cables were installed in their respective raceways in accordance with the cable schedule.

5.2.2.1 Reactor Vessel Level (RPS)

The instrument cable for reactor vessel level transmitter 2ISC*LT7B(BY) was visually inspected where it was spliced to cable 2RPSBYX500. The splice was in a junction box located on rack 2CES*RAK027. This cable entered conduit 2CX197YD. The cable at the transmitter end was not visually inspected because it terminated within an environmental barrier. The conduit leaving the terminal box was verified and visually inspected to where the cable entered cable tray 2TX1574.

The cable 2RPSBYX500 was visually inspected where it terminated in panel, 2CEC*PNL706, Bay A terminal block M109. The inspector further verified that this cable

[illegible]

was routed through conduit, 2CX5474A, junction box, 2*JB5289, and wall sleeve, 2WX562477, located in the vertical cable spreading area of the Control Building, at elevation 306 feet. The termination panel is located within the control room at elevation 306 feet. The signal wires for reactor vessel level transmitter 2ISC*LT7B, drywell pressure transmitter, 2ISC*PT15NB, and CRD Scram Discharge Volume tank level transmitter 2RDS*LTX12B, which are connected to cable jack 109 were visually inspected. The inspector visually inspected the cable, C72A-W060, which plugged into cable jack 109. Also, the other end of the cable which plugged into cable jack, J415, located in reactor trip panel, 2CEC*PNL611, bay A, was visually inspected. The wires from the cable jack J415 were visually inspected where they terminated on terminal block, TB-N.

5.2.2.2 Drywell Pressure (RPS)

The instrument cable for drywell pressure transmitter, 2ISC*PT 15B(BY), was visually inspected where it was spliced to cable 2RPSBYX500. The cable was not inspected at the transmitter because of EQ sealing as stated for reactor vessel level above. The visual inspection of the other end of cable 2RPSBYX500 was discussed above.

5.2.2.3 Control Rod Drive Scram Discharge Volume Tank Level (RPS)

The instrument cable, 2RPSBYX650, for the scram discharge volume tank level transmitter, 2RDS*LTX12B, was not visually inspected at the transmitter because of the EQ sealing as stated for reactor vessel level above. The conduit, 2CX157YC, through which the cable was routed, was visually inspected from the transmitter to where the cable entered the cable tray system. The cable was visually inspected where it terminated in panel 2CEC*PNL 206, Bay A, terminal block M109. The continuation of this circuit was discussed above.

5.2.3 Control Cables

The visual inspection during the walkdown of the control cables, cable termination and routing included checks for the technical requirements which are the same technical requirements listed in paragraph 5.2.2 for instrument cables, cable termination and raceway.

5.2.3.1 RHR LPCI Motor Operated Valve

The low pressure coolant injection valve, 2RHS*MOV24B(BY), control cable, 2RHSBYC019, was visually inspected at motor control center 2EHS*MCC303D. The other end of the cable was visually inspected at junction box J065, located in the reactor building at elevation 289 feet. Cable routing to the control room via termination cabinet 2CES*PNL704 was then checked. Control cable, 2RHSBYC015 was visually inspected at junction box J065. The other end of this cable was inspected where it terminated at the motor operated valve. The auxiliary relays 74 and 49X associated with the valve controls were visually inspected. These relays are located at rear section of the motor control center.

5.2.3.2 Service Water Motor Operated Valve

The inspector visually inspected the control cable, 2SWPBYC031, for valve 2SWP*MOV66B. This block valve is located on, the emergency diesel generator EDG 3 (division 2) heat exchanger discharge. The inspection for the control cable was at the valve motor starter located in motor control center 2EHS*MCC303.

5.2.4 Equipment

The reactor trip panel, 2CEC*PNL611, was visually inspected to confirm the location, identification, and to verify the wiring connection to the following devices:

- reactor vessel water level 3, 2ISC*4LT-7B, trip unit, 2ISC*US-16808(B22-N680B1), and logic trip auxiliary relay C72A-K6B.

- drywell pressure, 2ISC*PT-15B, trip unit, 2ISC*PIS-1550B (C72-N550B1), and logic trip auxiliary relay C72A-K4B.

- CRD scram discharge volume water level, 2RDS*LTX-129, trip unit 2ISC*LISX-12B (C72-N601B) and logic trip auxiliary relay C72A-K55B.

5.3 Controls

The logic diagrams, elementary diagrams, and field installations were reviewed to check for the following technical requirements:

- redundant components were properly identified;

- the functional requirements for the controls were achieved;

- resetting of a protective system actuation, at the system level, would not cause a component action;
- there was a system bypass status alarm;
- the valve motor thermal overload protection was bypassed by an accident signal; and
- the valve torque switch was bypassed for ninety five percent travel in the safe direction.

The controls were reviewed for the following components:

- RHR pump, 2RHS*PIB
- RHR Injection valve, 2RHS*MOV24B
- Service water valve, 2SWP*MOV66B
- reactor trip logic channel, B1
- control building A/C booster fan, 2HVC*FN2A
- special filter train bypass valve, 2HVC*MOV1A&1B
- control building air inlet isolation damper, 2HVC*AOD61A&B
- control building ventilation radiation monitor
- control room A/C fan, 2HVC*ACU1B
- control room A/C fan, 2HVC*ACU1B, discharge damper, 2HVC*AOD6B

5.4 Documentation

The documents reviewed during this inspection are listed in Attachment 1.7. In addition, the applicable outstanding Engineering and Design Change Reports and nonconformance and disposition reports were reviewed.

5.5 Findings Related to I&C

The team found that the state of workmanship in the area was generally good and the instrumentation and control systems inspected conformed to the criteria. However, as a result of the as-built inspection, the following specific findings were noted for which licensee corrective actions were in progress at the end of the inspection.

1. During the walkdown of the instrument and control cable systems, the inspector observed that, two vertical cable trays contained cables which were not supported with Kellems grips. These cable

trays were numbered 2TK522G and 2TC567G. The trays are located in the west side of the Control Building between elevation 261 and 288 and were observed to have vertical drops greater than 25 ft.

Electrical Installation Specification E061A-0-11, section 3.47, paragraph 3.2.4.7 states that instrumentation and control cables with vertical lengths over 25 feet should be supported every 25 feet by Kellens grips. Because cables in the trays 2TK522G and 2TK567G exceeded 25 feet and were not supported by Kellems grips, the team considered this situation, along with that described regarding flexible conduit labelling, as violations of procedure E061A (410/86-13-07).

The licensee has issued nonconformance and disposition (N&D) reports 16260 and 16261, dated April 22, 1986, to initiated corrective action for the above violation.

2. The inspector observed instrument impulse lines that penetrated the drywell which were not identified on either side of the drywell. The specific impulse lines observed were: 2ISC-750-362-2 at drywell penetration Z-322-4; 2ISC-750-152-2 at drywell penetration Z-316-2; and 21SC-750-154-2 at drywell penetration Z-318-3.

   The Instrumentation Installation Specification C081A, revision 5, states that instrument impulse lines shall be identified where the line passes through walls or floors on both sides of the wall or floor. The above impulse lines which were not identified constitute a violation of procedure C081A(410/86-13-08).

   The licensee issued Engineering and Design Coordination Report No. F13539, dated April 24, 1986, to provide for corrective action for the above violation. Discussion with the licensee indicated that specification, C081A, will be revised to add "on the secondary containment side of the drywell wall in the reactor building, it is acceptable to tag the instrument line immediately after the excess flow check valve which is an approximate distance of 6 feet from the wall." This revision meets the intent of the identification requirement.

3. The inspector's review of the draft Technical Specification dated section 4.8.4.4 Reactor Protection System Electrical Power Monitoring (RPS Logic) Surveillance Requirements, found that the 132 VAC over-voltage setpoint may not protect the scram solenoids from a over-voltage condition. The solenoid's electrical tolerance for operability is 115 volts plus or minus 10 percent. Thus, the over-voltage setpoint value 132 volts appeared at least 5 volts too high. The inspector noted that, apparently neither value accounts for the voltage drop between the Electrical Protective Assembly and the nearest solenoid for over-voltage protection.

[illegible]

The inspector reviewed licensee calculation, 12177 EC-125, dated March 13, 1986 "Scram pilot solenoid cable sizing," which verified the adequacy of the specified cable sizes, this calculation indicated that under high voltage conditions, the voltage at the nearest group A scram solenoids would be 123 volts. The group B solenoid voltages are 125 volts.

This items remains unresolved pending the licensee actions to verify the voltages shown in calculation EC-125 at the nearest solenoid of each group. Further, the selection of the overvoltage trip setpoint, tolerance and Technical Specification allowable value reviewed by the NRC (410/86-13-09).

4. The inspector's review of logic diagrams, 12177-LSK-27-19G, revision 6 and 19H, revision 6, showed that the source instruments for the balance of plant ESF Actuation were identified with General Electric (GE) instrument numbers. The inspector noted that Stone and Webster Engineering Corporation (SWEC) has reidentified all of the other GE instruments using SWEC nomenclature. Some SWEC documents, such as cable pull tickets, only used SWEC instrument identifications. Other documents reflected both GE and SWEC identifications.

   Logic diagrams are key documents which are stored in the control room for use by the operators. The inspector was concerned that not using the SWEC nomenclature could confuse the users of this drawing. The licensee, in response agreed to add SWEC instrument identification to the above logic diagrams. A Engineering Change Notice (ECN) ISC-606 was issued to provide the changes noted above however, the ECN only addressed LSK-19G but not ESK-19H. This concern will remain unresolved pending the licensee's completion of corrective actions (410/86-13-10).

5. The inspector verified the jumper wires used in motor operated valves were environmentally qualified. This was a concern identified in IE Information Notice 86-03.

6. The inspector's review of elementary diagrams for selected motor operated valves identified that a motor thermal overload alarm would be received with the thermal overload active or bypassed. This was a concern of IE Information Notice 84-13. Further, the inspector verified that the 2RHS*MOV24B, (RHR LPCI valve) opening torque switch was bypassed by a limit switch for 95% of the open travel to assure the valve opened during a LOCA condition. Also, the inspector noted that the control circuit potential is monitored by the 74 relay which would provide an alarm if either the 600 volt power is removed from the motor starter or the

control circuit potential is lost by the auto or manual opening of its associated control fuse. A similar review of the RHR pump elementary diagrams identified a similar 74 alarm relay. This relay would provide an alarm for the following conditions:

- positive or negative fuse failure
- manual opening of fuse circuit
- removing the breaker from the operating position
- transfer of valve control to the remote shutdown panel
- locking out of the control switch on the main control board.

The inspector noted that the 74 alarm relays in both the RHR pump motor breaker control circuit and the RHR MOV control circuit meet the requirements of Regulatory Guide (RG) 1.47, System Bypass Status and RG 1.17, Industrial Security.

7. The inspector's visual inspection of the reactor protection system panel, 2CEC*PN611, showed that most of the logic auxiliary relays were Agastat type FGP. However, there were a few Agastat type EGP relays in the panel. The inspector noted, however, that the associated logic diagram lists these relays as Agastat GP.

   The inspector determined that the General Electric documents for the panel depicted the correct relay type as EGP or FGP. However, the inspector questioned why both relay types were located in the panel.

   The vendor, Amerace Corporation, indicated that the FGP relay was a standard general purpose catalog item. Amerace did not qualify the FGP relay to the IEEE standards, but did provide the traceability required by 10 CFR Part 21. The qualification to the IEEE standards was provided by General Electric Corporation. The EGP relay has been qualified by Amerace and became available in 1979 to upgrade the FGP type.

8. During the walkdown of the impulse lines inside of the drywell, discussed in paragraph 5, the inspector observed that lines, 2-ISC-001-22-1 and 2-ISC-104-PSR-01-C-1, near the reactor vessel, were not installed with the slope of 1/2 inch per foot required by Instrumentation Installation Specification C081A. The slope on the above lines was 5/16 inch per foot. This is similar to slope deviations previously identified during an inspection conducted from March 3 - 7, 1986 as unresolved item 50-410/86-08. The adequacy of the slopes of the two lines identified above will be addressed during followup to this unresolved item.

6.0 Independent Verification

6.1 Field Measurements of Piping and Pipe Support As-Built

The inspection team performed field verification on selected piping and pipe support components associated with the Residual Heat Removal, Service Water and Scram Discharge Volume Systems. The selected components are identified in Attachments 1.1, 1.2 and 1.3 of this report. The measurements verified included:

-- linear pipe run dimensions between supports and/or fittings

-- mechanical component locations

-- pipe support locations

-- pipe support number size and length

-- concrete expansion bolt size

-- pipe support weld size and length

-- gaps between piping and supports

With the exception of the discrepancy identified on the scram discharge header piping as discussed in Section 3.2.6 of this report, the independent measurements were in agreement with the licensee's design drawings and specifications.

6.2 Adequacy of Electrical Power Supplies and Distribution

The inspector evaluated the adequacy of the class 1E electrical power supplies and distribution to provide normal running voltages to all Class 1E motor within ±10 percent of motor nameplate voltage and to provide voltage at the motor terminals of not less than 80% of motor nameplate voltage during starting. The inspector reviewed licensee voltage profile calculations in EC-40-2 and the requirements of Technical Specification Section (TS) 3/4 Table 3.3.3-2. The inspector found in the calculations that running voltage was provided to all Class 1E motors less than 110% of rated nameplate voltage for all variations in power feed and for all combinations of load.

However,. in reviewing the licensee calculations for voltage available at Class 1E motor terminals during degraded grid conditions, the inspector found that the licensee's degraded grid voltage relay trip setpoint TS Table 3.3.3-2 (3843±77 volts with an allowable value of 3843±192 volts) did not provide for 90% running voltage to 575 volt motor terminals (90% = 517.5 volts) when the lower allowable value of Technical Specifications was used. In fact, the voltage provided to the motor terminals was calculated by the licensee to be 492 volts

[illegible]

which is 86% of nameplate voltage. In order to provide 90% running voltage to the 575 volt motors, the minimum allowable degraded grid voltage trip point would have to be 3843 volts based upon licensee values of voltage drop and impedance.

In FSAR Section 8.2.2, the licensee committed to conduct additional field tests and analyses to determine the lowest voltage at which this relay could be set and still ensure adequate voltage at the 600 volt motor terminals. The licensee has scheduled preoperational tests in accordance with test procedure NMP2 ES.0300.001 in order to qualify the voltage profile calculations of EC-40-2 and to determine the proper setting of the degraded grid trip undervoltage relays on the 4160 volt emergency busses. Pending conduct of this test and appropriate revisions to the grid undervoltage relay settings in Technical Specifications, this item is unresolved (410/86-13-06).

The voltage available at the 4000 volt RHR pump motor terminals was shown to be above the 90 percent minimum running and 80 percent minimum starting voltage dip by inspection independent calculations.

6.3 Motor Operated Valve Operability

The RHR low pressure system injection (LPSI) motor operated valve (MOV), 2RMS*MOV24B, was selected by the inspector to verify control operability during a degraded grid voltage condition coincident with a loss of coolant accident (LOCA) condition.

The 4.16 KV Class 1E bus 2ENS*SWG103 supplies power through a load center transformer where the 600 volt side in turn supplies power to motor control center (MCC) 2EHS*MCC303D. The MOV is controlled and supplied power from this MCC.

During a degraded grid voltage condition, the bus 103 normal supply breaker is tripped at 92% bus voltage. Under these conditions, the bus would be reenergized from the standby emergency diesel generator associated with this bus. This trip setpoint is identified in the Technical Specification Table 3.3.3-2.

The degraded grid voltage study Electrical Calculation EC-40-2 was used by the inspector to calculate the minimum voltage at the motor control center under the degraded grid voltage. Based on this calculation, the inspector concluded that this MOV would function as required.

7.0 Quality Assurance

During the course of the inspection, the team reviewed various QA Inspection Reports pertaining to pipe supports and mechanical and electrical installations. The reports were found to adequately specify the identity of the inspector, the type of observation, the results, the acceptability and action taken to address identified deficiencies. QA/QC involvement

was also observed in the Nonconformance and Disposition reports, Engineering and Design Coordination Reports, Final Stress As-Built inspections, and Quality Control Procedures. The areas of nonconformance, design change control, and quality control procedures are addressed below in more detail.

7.1 Quality Control Procedures

Selected Field Quality Control (FQC) procedures and Quality Control Inspection (QCI) instructions were reviewed. The quality control documents reviewed are identified in Attachments 1.1 through 1.7. The review was performed to ascertain: the technical adequacy and completeness of the procedures and instructions; the adequacy of accomplishing their intended function; and, the inclusion of the appropriate quantitative and qualitative acceptance criteria as defined in the applicable specifications.

The team determined that the quality control procedures were technically adequate and clearly written. They incorporated valid acceptance criteria from the design specifications, and were satisfactory for performance of the intended function.

No deficiencies were identified during this review.

7.2 Engineering Assurance

Evaluation of some of the engineering assurance aspects in the quality assurance program was conducted during this inspection. The team selected two areas from ANSI N45.2.11 for the purpose of this review. These areas included Design Verification and Design Change Control. The objective of this review was to insure that the requirements in the ANSI standard had been implemented in the various project procedures. The inspector reviewed specific Engineering Assurance Procedures (EAPs) by SWEC and the implementing Project Procedures (PPs) by NMPC/SWEC which addressed these areas. The documents reviewed included:

- Verification of nuclear power plant designs (EAP 3.1)
- Advance change notices - ACN (SWEC PP 77)
- Preparation, review, approval and control of engineering and design coordination reports - E&DCR (EAP 6.5 and PP. 16)
- Handling of nonconformance and disposition reports (N&Ds) by Engineering (EAP 15.2 and PP. 24)

No deficiencies were identified during this review.

7.3 Nonconformance and Design Change Control

Throughout the course of the inspection, various Nonconformance and Disposition reports (N&Ds), Engineering and Design Coordination Reports (E&DCRs), Engineering Change Notices (E&Cs) and Advance Change Notices (ACNs) were reviewed. The review was performed to ascertain: compliance with procedural controls (addressed in Section 7.2); proper review and approval; retrievability and clarity; the technical adequacy of the nonconformance dispositions and design changes; and the adequacy and completeness of the information included to ensure adequate implementation of the disposition or change.

The team determined that the E&DCRs, ACNs, ECNs and N&D dispositions reviewed were technically adequate, clearly written, in compliance with procedural controls, and adequately provided the information required to assure proper implementation of the disposition or change. The documents were controlled and readily retrievable.

The nonconformance and design change documents reviewed are found in Attachments 1.2 and 1.3 of this report.

No discrepancies were identified as a result of this review.

8.0 Follow-up on Outstanding Inspection Items

8.1 (Closed) IE Bulletin 79-14

The bulletin addressed the requirements for seismic analysis of as-built safety related piping systems. The criteria for performing the seismic analysis of safety related piping systems was addressed in the FSAR and was reviewed and found acceptable in the SER section 3.9.2. The licensee's program for Category I pipe stress and support final reconcilation was addressed in SWEC's project procedure PP-93. Detailed NRC review of the piping as-built and stress reconciliation programs was addressed in inspection reports 410/85-25 and 410/85-31 as they pertained to piping installed by Reactors Controls (RCI), ITT-Grinnel and SWEC. Verification of as-built piping and support installations was conducted during this team inspection for three piping systems as identified in section 3.2 of this report. Based on the results of these three inspections, the licensee's activities in this regard are considered sufficient to close this bulletin.

8.2 (Closed) Unresolved Item (50-410/85-06-04)

This item is related to the tolerance provided for thermal growth of scram discharge header piping inside seismic restraints. RCI drawing No. NMP-027-SH-A for scram header supports at 90° and 270° initially had specified a standard clearance of 1/16" ± 0" to 1/16" between piping and box type supports. However, scram header support No.

SH-16A had been found in 1985 to have been installed with zero clearance on all sides. The concern raised in 1985 was related to the restraint provided by the box support which would limit the radial and longitudinal expansion of the piping as the line temperature increased from 70°F to 450°F.

The licensee's and RCI's response to this concern included an evaluation of the piping for the overstress condition resulting from the zero clearance depicted above. The response also included a revision of the above drawing to provide for minimum acceptable vertical and lateral gap requirements for each individual scram header support, and a commitment for modification of any supports which did not conform to the minimum clearance requirements specified in the revised drawing.

A review of RCI's analysis identified several apparent deficiencies regarding the assumptions of support stiffness and the lack of evaluation for additional bearing stresses between the piping and the support wall. In addition, a walkdown performed by the team of scram header supports identified two other supports with zero clearances (section 3.2.6 of this report). SWEC QC subsequently performed an inspection for clearances in all 33 scram header supports and a found third support with zero clearance. An engineering evaluation was performed by SWEC for the three nonconforming supports using an alternate analytical approach from that used by RCI. Members of the as-built team reviewed SWEC's analysis on May 6, 1986. The analysis indicated the follwoing:

- The temperature condition (70°F-450°F) for which RCI had performed the piping analysis was beyond the ASME code requirements for class 2 piping systems. The 450°F temperature occurs in twenty (20) operating cycles which is classified by subsection NB of the ASME code as an emergency condition.

- Evaluation of the piping is required only for the normal operating condition (300 cycles from 70°F to 280°F).

- Evaluation of piping at the location of all nonconforming supports identified in SWEC's inspection (i.e., Nos. 1A, 11A and 18B) utilizing the emergency thermal condition of 450°, indicated that the stresses were within code limits.

Since conditions of zero clearance between hot piping and supports was not considered a desirable design practice, however, SWEC committed to the modification of the above nonconforming supports to the revised drawing requirements for minimum clearance.

The engineering evaluation performed by SWEC was considered sufficient to address the technical concerns associated with these findings. The quality aspects related to the findings, and the

implementation of SWEC's commitments in this regard will be tracked as part of violation (410/86-13-03) which addresses the nonconformance between the as-built scram header support drawings and the actual installations. Unresolved item 85-06-04 is, however, considered closed.

9.0 <u>Unresolved Items</u>

Unresolved items are matters about which more information is required to ascertain whether they are acceptable items, violations, or deviations. Unresolved items are discussed in Sections 3, 5 and 6.

10.0 <u>Management Meetings</u>

Discrepancies were discussed with licensee management as they were identified during the course of the inspection. A final exit meeting was held on April 25, 1986 at which time, the licensee management was apprised of the inspection scope, findings and observations. A supplemental phone conversation was conducted on May 8,1986 to discuss the RCI violation.

At no time during this inspection was written material provided to the licensee by the inspectors.

ATTACHMENT 1.0: Documents Reviewed and Detailed Inspections

- 1.1 RHR Piping and Supports
- 1.2 Service Water System
- 1.3 Scram Discharge Volume System
- 1.4 Control Building HVAC
- 1.5 HVAC Supports
- 1.6 Electrical Reference Documents
- 1.7 Instrumentation and Controls

SCOPE: RHR Piping & Supports

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
1	P.O. SPEC	22A373			RHR Heat Exchanger
2	P.O. Spec	21A1913			Pumps, Auxiliary for Boiling Water Reactors
3	P.O. Spec	21A1944			Electric Motors, General
4	DWG	12177-BZ-310B	1		Anchor Bolt Assy ECCS Pumps
5	DWG	12177-EV-159A	5		Support Plate & Restraint CSL & RHS Pumps
6	DWG	12177-BZ-310A	1		Anchor Bolt Assy ECCS Pumps
7	DWG	731E961AF.SH 1	9		G.E. RHR P&ID
8	DWG	12177-FSK-27-70	10		Residual Heat Removal - Fundamental
9	DWG	12177-FSK-27-7G	8		Residual Heat Removal - Flow Diagram
10	DWG	12177-FSK-27-7H	9		Residual Heat Removal - Flow Diagram
11	DWG	12177-FSK-27-7L	3		Residual Heat Removal - Flow Diagram
12	DWG	12177-FSK-27-7K	3		Residual Heat Removal - Flow Diagram
13	DWG	12177-FSK-27-7D	10		Residual Heat Removal - Flow Diagram
14	DWG	2RHS-066-023	Final		Stress As-Built Consolidated Control Drawing
15	DWG	2RHS-066-024	Final		Stress As-Built Consolidated Control Drawing
16	DWG	2RHS-066-029	Final		Stress As-Built Consolidated Control Drawing
17	DWG	2RHS-066-030	Final		Stress As-Built Consolidated Control Drawing
18	DWG	2RHS-066-032	13		Stress As-Built Consolidated Control Drawing

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LTR - LETTER
RPRT - REPORT
CRT - CRITERIA
CALC - CALCULATION

ATTACHMENT 1.1

SCOPE: RHR Piping & Supports

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
19	DWG	2RHS-066-054	Final		Stress As-Built Consolidated Control Drawing
**20	DWG	12177-BZ-715M	1		Pipe Support Detail, South Aux. Bay
**21	DWG	12177-BZ-71RS	4		Pipe Support Detail, South Aux. Bay
**22	DWG	12177-BZ-71AAP	1		Pipe Support Detail, South Aux. Bay
**23	DWG	12177-BZ-71AGY	1		Pipe Support Detail, Reactor Bldg.
**24	DWG	12177-BZ-71AGZ	3		Pipe Support Detail, Reactor Bldg.
**25	DWG	12177-BZ-71CW	2		Pipe Support Detail, Reactor Bldg.
**26	DWG	12177-BZ-71MZ	5		Pipe Support Detail, Reactor Bldg.
**27	DWG	12177-BZ-71AMN	2		Pipe Support Detail, Reactor Bldg.
**28	DWG	12177-BZ-71MW	4		Pipe Support Detail, Reactor Bldg.
29	DWG	12177-EP-71F	10		Residual Heat Removal Pipeing - Reactor Bldg.
30	DWG	12177-EP-71B	11		Residual Heat Removal Piping - Reactor Bldg.
31	SPEC	22A2817	3		Residual Heat Removal System - Design Spec.
32	SPEC	22A2817AB	9		Design Specification Data Sheet
33	DWG	12177-ES-53BC	3		Heat Exchanger Supports - Reactor Aux. Bays
34	DWG	12177-ES-53CQ	1		Heat Exchanger Supports - Reactor Aux. Bays
35	PRO	EAB3.1	2	9/24/84	Verification of Nuclear Power Plant Design
36	PRO	PP77	10	4/2/86	Advance Change Notices

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**Denotes pipe supports which received detailed inspections

SCOPE: RHR Piping & Supports

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
37	PRO	EAP6.5	0	7/27/84	Preparation, Review, Approval & Control of Engineering & Design Coordination Reports - Computerized Logging & Tracking System
38	PRO	PP16	15	4/2/86	Engineering Design & Coordination Rpts ED&CRs
39	PRO	EAP15.2	1		Handling of Non-Conformance & Disposition Reports by Engineering
40	PRO	PP24	11	4/2/86	Handling of Non-conformance & Disposition Reports (N&D)

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ATTACHMENT 1.2

SCOPE: Service, Water System

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
1	DWG	12177-FSK-9-10A	10	2/14/85	Service Water Flow Diagram
2	DWG	12177-FSK-9-10F	10	2/14/85	Service Water Flow Diagram
3	DWG	12177-FSK-9-10Y	8	2/14/85	Service Water Flow Diagram
4	DWG	12177-FSK-9-10AA	6	11/19/84	Service Water Flow Diagram
5	DWG	12177-FSK-9-10L	9	11/19/84	Service Water Flow Diagram
6	DWG	12177-FSK-9-10AC	7	11/19/84	Service Water Flow Diagram
7	DWG	2SWP-021-018	7	10/1/85	Stress As Built/Consolidated Control Drawing
8	DWG	2SWP-021-013	6	2/5/86	Stress As Built/Consolidated Control Drawing
9	DWG	2SWP-021-024	5	2/5/86	Stress As Built/Consolidated Control Drawing
10	DWG	2SWP-021-012	5	2/5/86	Stress As Built/Consolidated Control Drawing
11	DWG	2SWP-021-002	5	2/18/86	Stress As Built/Consolidated Control Drawing

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ATTACHMENT 1.2

SCOPE: Service Water System

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
12	DWG	2SWP-021-029	2	8/16/84	Stress As Built/Consolidated Control Drawing
13	DWG	2SWP-021-195	5	11/7/85	Stress As Built/Consolidated Control Drawing
14	DWG	2SWP-021-194	9	9/26/85	Stress As Built/Consolidated Control Drawing
15	DWG	2SWP-021-027	9	4/8/86	Stress As Built/Consolidated Control Drawing
16	DWG	2SWP-021-010	5	9/20/85	Stress As Built/Consolidated Control Drawing
17	DWG	2SWP-021-007	10	3/3/86	Stress As Built/Consolidated Control Drawing
18	DWG	2SWP-021-104	3	2/24/86	Stress As Built/Consolidated Control Drawing
19	DWG	2SWP-021-105	9	2/19/86	Stress As Built/Consolidated Control Drawing
20	DWG	2SWP-021-022	8	10/1/85	Stress As Built/Consolidated Control Drawing
21	DWG	2SWP-021-032	12	12/30/85	Stress As Built/Consolidated Control Drawing
22	DWG	2SWP-021-020	6	10/1/85	Stress As Built/Consolidated Control Drawing

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ATTACHMENT 1.2

SCOPE: Service Water System

DOCUMENTS EXAMINED

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
23	DWG	2SWP-021-014	7	2/1/86	Stress As Built/Consolidated Control Drawing
24	DWG	2SWP-021-025	6	2/21/86	Stress As Built/Consolidated Control Drawing
25	DWG	2SWP-021-011	7	2/5/86	Stress As Built/Consolidated Control Drawing
26	DWG	2SWP-021-023	8	4/8/86	Stress As Built/Consolidated Control Drawing
27	DWG	2SWP-021-028	8	4/8/86	Stress As Built/Consolidated Control Drawing
28	DWG	2SWP-021-199	8	11/7/85	Stress As Built/Consolidated Control Drawing
29	DWG	2SWP-021-198	7	11/7/85	Stress As Built/Consolidated Control Drawing
30	DWG	2SWP-021-197	6	7/16/85	Stress As Built/Consolidated Control Drawing
31	DWG	2SWP-021-196	8	11/7/85	Stress As Built/Consolidated Control Drawing
32	DWG	2SWP-021-193	8	11/7/85	Stress As Built/Consolidated Control Drawing
33	DWG	2SWP-021-192	6	9/26/85	Stress As Built/Consolidated Control Drawing

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ATTACHMENT 1.2

SCOPE: Service Water System

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
34	DWG	2SWP-021-190	8	11/7/85	Stress As Built/Consolidated Control Drawing
35	DWG	2SWP-021-026	6	2/26/86	Stress As Built/Consolidated Control Drawing
36	DWG	2SWP-021-008	7	7/7/85	Stress As Built/Consolidated Control Drawing
37	DWG	2SWP-021-006	8	3/3/86	Stress As Built/Consolidated Control Drawing
38	DWG	2SWP-021-106	3	2/24/86	Stress As Built/Consolidated Control Drawing
39	DWG	2SWP-021-107	11	2/22/86	Stress As Built/Consolidated Control Drawing
40**	DWG	12177-BZ-108JP-3	3	7/16/85	Pipe Support Detail - Tunnel Piping
41**	DWG	12177-BZ-108SG-2	2	7/16/85	Pipe Support Detail - Tunnel Piping
42**	DWG	12177-BZ-108BS-5	5	7/24/84	Pipe Support Detail - Tunnel Piping
43**	DWG	12177-BZ-108HW-2	2	4/6/85	Pipe Support Detail - Tunnel Piping
44**	DWG	12177-BZ-108CJ-5	5	4/2/85	Pipe Support Detail - Tunnel Piping

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SCOPE: Service Water System

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
45**	DWG	12177-BZ-19BB-6	6	10/3/84	Pipe Support Detail - Service Water Piping
46**	DWG	12177-BZ-19G124-54	4	2/25/86	ITT Grinnell Pipe Hanger Division
47	DWG	12177-BZ-108TP367-S4	4	6/21/85	ITT Grinnell Pipe Hanger Division
48	DWG	12177-BZ-19G173-S4	4	2/25/86	ITT Grinnell Pipe Hanger Division
49	DWG	I-770207-A	C	8/22/78	Service Water Strainers
50	DWG	12177-ESK-3B	18	6/10/85	Control Switch Contact Diagram
51	P.O. SPEC	NMP2-P275D	4	3/15/86	Mechanical Equipment Erection
52	P.O. SPEC	NMP2-P301C	4	6/28/86	Field Fabrication and Erection of Piping
53	P.O. SPEC	NMP2-P301J	6	1/21/86	Field Fabrication and Erection of Pipe Supports
54	P.O. SPEC	NMP2-P222X	1	11/8/85	Safety Related Horizontal Centrigual Pumps
55	P.O. SPEC	NMP2-P311A	1	4/9/85	Suppression Pool, Simplex & Self Cleaning Strainers
56	P.O. SPEC	NMP2-E031A	1	6/9/76	Standby Diesel Generator Systems

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**Denotes Pipe Supports which received detailed inspections.

SCOPE: Service Water System

DOCUMENTS EXAMINED

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
57	P.O. SPEC	21A9236	4	7/7/85	Engine-Generator for HP Core Spray System
58	CALC	Z108-0364	1	6/20/85	Tunnel Piping - BZ 108SG
59	CALC	Z108-0378	2	11/4/85	Tunnel Piping - BZ 108JP
60	PROC	QS-10.43-NM	A	5/2/84	Hanger and Anchor Bolt Installation Quality Standard
61	PROC	FQC-4.2-26-7	-	2/7/86	System Walkdown Prior to Turnover
62	PROC	FQC-4.1-4-8	-	8/23/85	Visual Examination of Welds/Base Material
63	PROC	FQC-4.2-14-1	-	4/17/85	Inspection of Installed Pipe Supports
64	PROC	PP93	3	3/13/86	Category I Pipe Stress & Supports Final Reconcilation
65	QAIR	E5A42126	-	3/21/85	Anaconda Metal Hose Installation
66	QAIR	X3001469	-	5/20/83	Motor Operated Carbon Steel Valves
67	QAIR	W4020346	-	2/1/84	Acceptance of CAT II & CAT III Pipe Hangers

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SCOPE: Service Water System

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
68	QAIR	W4020358	-	2/2/84	Acceptance of CAT II & CAT III Pipe Hangers
69	QAIR	W4020369	-	2/2/84	Acceptance of CAT II & CAT III Pipe Hangers
70	QAIR	W4020413	-	2/2/84	Acceptance of CAT II & CAT III Pipe Hangers
71	QAIR	W4020422	-	2/8/84	Acceptance of CAT II & CAT III Pipe Hangers
72	QAIR	W4020662	-	2/20/84	Acceptance of CAT II & CAT III Pipe Hangers
73	QAIR	W4020663	-	2/21/84	Acceptance of CAT II & CAT III Pipe Hangers
74	QAIR	W4020674	-	2/22/84	Acceptance of CAT II & CAT III Pipe Hangers
75	QAIR	W4020688	-	2/23/84	Acceptance of CAT II & CAT III Pipe Hangers
76	QAIR	W4020720	-	2/25/84	Acceptance of CAT II & CAT III Pipe Hangers
77	QAIR	W4020747	-	2/28/84	Acceptance of CAT II & CAT III Pipe Hangers
78	QAIR	W4020763	-	2/28/84	Acceptance of CAT II & CAT III Pipe Hangers

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SCOPE: Service Water System

DOCUMENTS EXAMINED

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
79	LDCN	2169	-	4/24/84	FSAR Figure 9.2 - 1J
80	LDCN	2152	-	4/18/86	FSAR Figure 9.2 -1A
81	E&DCR	C469940	-	4/8/86	Jacket Water HX Plate
82	E&DCR	Z13032	-	4/9/85	Addition of Two Anchors
83	E&DCR	F02451C	-	1/13/86	Purchasing Requirements for Valve Packing.
84	DR	17554	-	4/23/86	MOV 2SWP*67A
85	ECN	SWP-79	-	5/22/84	Service Water
86	ECN	SWP-606	-	1/31/86	Service Water
87	ECN	SWP-023	-	3/11/82	Service Water
88	ECN	SWP-603	-	11/20/84	Service Water
89	ECN	SWP-095	-	4/10/85	Service Water

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ATTACHMENT 1.2

SCOPE: Service Water System

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
90	ECN	SWP-026	-	5/24/82	Service Water
91	ECN	SWP-088	-	9/17/84	Service Water
92	N&D	G-103	-	5/13/83	Motor Operators
93	N&D	G-125	-	5/13/83	Motor Operators
94	N&D	11522	-	3/23/85	Grout Placement
95	N&D	11337	-	3/7/85	Grout Preplacement, Placement & Curing
96	ACN	045070	-	10/2/85	Area 2/Tunnels
97	FDDR	KG1-0705	-	4/15/86	E22-S001 HPCS D.G.
98	DWG	2SWP*35	3	2/9/84	Service Water Loop Diagram

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ATTACHMENT 1.3

SCOPE: Scram Discharge Volume System

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
1	DWG	12177-FSK-36-1F	4	7/16/85	Control Rod Drive Hydraulic System Flow Diagram
2	DWG	NMP-027-SH 1	5	10/31/85	Scram Header Piping
3	DWG	12177-DP-387AA-4	4	3/19/86	Control Rod Drive Hydraulic Sys Iso Drawing
4	DWG	NMP-020-SH 2	4	10/17/85	Scram Vol. Discharge Hanger Location 90° Side
5	DWG	NMP-027-SH 2	4	10/30/85	Scram Header Lines Hanger Locations
6	DWG	NMP-021-SH 2	5	10/2/85	Plan View of Scram Drainline - Support Locations
7	DWG	NMP-019-SH 2	5	12/10/85	CRD Scram Supply & Vent Lines - Hanger Locations
8	DWG	NMP-022-SH 4	1	10/30/85	Scram Vent Lin Hanger Locations
9	DWG	NMP-019-SH 4	5	12/12/85	Supply Line & Scram Vent Line Support Locations
**10	DWG	NMP-027-SH A	4	1/1/85	General Notes for Scram Header Hangers
**11	DWG	NMP-027-SH 1A	4	11/1/85	Scram Header Hanger Detail
**12	DWG	NMP-027-SH 11A	3	11/1/85	Scram Header Hanger Detail
**13	DWG	NMP-027-SH 14A	3	11/1/85	Scram Header Hanger Detail
**14	DWG	NMP-027-SH 18A	4	11/2/85	Scram Header Hanger Detail
**15	DWG	NMP-020-SH 5	4	10/21/85	Volume Tank Supports 90° & 270° Side
**16	DWG	NMP-020-SH 6	5	10/21/85	Volume Tank Discharge Piping Support
**17	DWG	NMP-019H-28-SH 1	2	11/26/85	CRD Scram Vent Line Hanger Details
18	DWG	12177-EE-34FD	3	5/27/82	Cable Tray Identification

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CALC - CALCULATION

**Denotes pipe supports which received detailed inspections.

ATTACHMENT 1.3

SCOPE: Scram Discharge Volume System DOCUMENTS EXAMINED

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
19	P.O. SPEC	GE22A7690	3		Design Requirements for CRD System
20	P.O. SPEC	NMP-2-P301V1	2	11/15/85	Design, Fabrication & Erection of CRD Hydraulic System
21	CALC	SA-1632-GAP	0	3/25/85	Scram Header Support - GAP
22	PROC	N2-IOP-30	2	9/13/85	Control Rod Drive
23	PROC	NMQAI-10-12	0	3/9/85	Instruction for QC Inspection (RCI)
24	QAIR	QP6S0073		2/21/86	RCI Design Verification
25	N&D	15594		2/20/86	SOV Modified Improperly
26	E&DCR	F13536		4/23/85	Insulation Requirements
27	E&DCR	Z99421		3/10/86	Isolation Valves Required for ILRT

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ATTACHMENT 1.4

SCOPE: Control Bldg. HVAC

DOCUMENTS EXAMINED

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
1	SPEC	NMP2-P301J	6	1/21/86	Spec. for Field Fabrication & Election of Pipe Supports
2	INST	QCI No. 10.07	C	5/7/85	ASME III, Code Classes 1,2,3 & ANSI B31.1 Preliminary & Final As-Built Verification of Large Bore Piping
3	INST	QCI No. 10.10	D	12/13/85	Geometry & Pipe Support Locations Final as Installed Verification of Small Bore Pipe Support Location
4	SPEC	NMP2-P301 P	2	8/27/85	Field Fabrication & Erection of Piping by SWEC, ASME III Class 1,2,3 & ANSI B31.1 Class 4
5	SPEC	NMP2-P413L	6	10/30/85	Specification for Ventilation & Air Conditioning System Ductwork
6	PROC	N2-IOP-78	1	3/86	Remote Shutdown System
7	PROC	N2-OSP-HVC-R001	Draft	3/86	Control Room Outside Air Special Filter Train Functional Test
8	PROC	N2-IOP-53A	1	3/24/86	Control Room Ventilation System
9	PROC	N2-POT-53-3	0	11/15/85	Control Building Pressure Test
10	PROC	N2-POT-53-1	1	3/15/86	Control Building HVAC
11	CALC	12177PR(C)Z1-V	3	1/31/86	Design Basis LOCA Doses in the Control Room at EAB & the LPZ from All Sources

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ATTACHMENT 1.4

SCOPE: Control Bldg. HVAC

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
12	SPEC	NMP2-S203G	5	1/31/86	Drilled-in type Concrete Anchors
13	PROC	FQC-4.2-14-14	-		Inspection of Installed Pipe Supports
14	PROC	FQC-4.2-26-7	-	4/15/85	Inspection of Installed Pipe Supports
15	PROC	FQC-4.1-4-8	-	7/26/85	Visual Examination of Welds/Base Material
16	QAM	QS-10.43-NM	A		Hanger & Anchor Bolt Installation
17	CALC	Z739-0326		8/24/84	Duct, Damper & Equipment Support Stiffness & Acceleration Values for the Control Building & Diesel Generator Building
18	DWG	12177-EA-43D	3		Master Access Plans El. 277'-6", El. 279'-0", El. 288'-6", El. 289'-0"
19	DWG	12177-EA-43E	2		Master Access Plans El. 280' 0", El. 289' 0" El. 306' 0"
20	DWG	12177-EB-39A	11		Air Conditioning & Ventilation Control Room Building El. 306' 0" SH1
21	DWG	12177-EB-39B	10		Air Conditioning & Ventilation Control Room Building El. 288' 6" SH.2
22	DWG	12177-EB-39F	11		Air Conditioning & Ventilation Control Room Building El. 288' 6" & El. 306' 0" SH 6

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ATTACHMENT 1.4

SCOPE: Control Bldg. HVAC

DOCUMENTS EXAMINED

Docket No. 50-410
Report No. 50-410/86-13

ITEM No.	TYPE OF DOCUMENT*	DOCUMENT NO.	Rev	DATE	DOCUMENT TITLE/SUBJECT
23	DWG	12177-EB-39J	9		Air Conditioning & Ventilation Control Room Building Sections SH.9
24	DWG	12177-EC-58DD	7		Outline Plan El. 288' 6" Control Building
25	DWG	12177-EC-58ET	4		EQPT PAD & ANC Bolt Sched Control Building
26	DWG	12177-EZ-7736	J		Fan Assembly
27	DWG	39-EA70-D374-1	D		Item No. ZHVC*ACVIA
28	DWG	DSK-1743-2862-102	1		Foundation Bolt Plan - Control Room Emergency Filter
29	DWG	12177-EC-58DD	7		Outline Plan El. 288'-6" Control Building
30	DWG	12177-EZ-739ZJ	9		Seismic Duct Support Location
31	DWG	12177-EZ-739ZF	15		Seismic Duct Support Location
32	DWG	12177-EZ-739ZA	11		Seismic Duct Support Location
33**	DWG	12177-BZ-739D	19		Seismic Duct Support Design Sheets 1,3,4,6,15, 27,38,94,106,107,143,254,255 & 316

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ATTACHMENT 1.5

CONTROL ROOM HVAC SYSTEM SUPPORTS INSPECTED

DSA-1494	DSA-731	DSR-625
DSA-1443	DSR-616	DSR-780
DSA-721	DSR-619	DSA-839
DSA-745	DSR-621	DSR-777
DSR-607	DSR-622	DSR-778
DSA-1483	DSR-1405	DSA-779
DSA-1401	DSR-623	DSR-783
DSR-614	DSA-624	

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ATTACHMENT 1.6

Electrical Reference Documents

The governing licensee electrical specifications, drawings standards and procedures for installation and acceptance in these areas are the following.

- Specification E061A Revision 11 dated March 21, 1986 Electrical Installation.
- Quality Assurance Inspection Plans N020E061A026, Revision D, March 15, 1986, Electrical Installation - cable jumper and Internal Terminations and Splices:
- Quality standard QS-10-52-NM, Revision 0 dated October 10, 1984 - Raceway and Cable Installation.
- SWEC Drawings 12177-EE-8C series external connecting diagrams 4.16KU SWGR 2ENS*SWG107 and 2ENS*SWG103.
- GE Drawings 0151D2475 and 0151D2475 series - Internal Switchgear Connection Diagrams - 4.16KU SWGR 2ENS*SWG101 and 2EN*SWG103.
- SWEC Voltage Profile Calculation EC-40-2.
- SWEC Drawing 12177-EE-1Q-10-4116OVAC One Line Diagram Emergency Bus 2ENS*SWGR101 and 103.
- SWEC Calculation EC-112, Rev-0 May 31, 1984 - EC-0 Cable Pulling Tensions.
- SWEC Calculation EC-101, Rev-0 September 15, 1983 - Bundle Cable Pulling.
- SWEC Calculation EC-133, Rev-0 January 31, 1986 - Class 1E 4160 volt switchgear Closing Coil DC Voltage Drop Verification.
- NMP2 Preoperational Test Procedure ES.0300.001 - Validation Test for Voltage Profile Calculations EC-40-2.
- SWEC External Connection Diagram 12177-EE-11BM-3 Series - 125 VPC SWGR 2BYS*SWG002B.
- SWEC Wiring Diagram 12177-EE-11BM-3 Series - 600 VAC Wiring Diagram DPNL 2NUS*PNL749 - PNL751 - PNL753 - PNL755 - PNL750.
- SWEC Wiring Diagram 12177-EE-9N Series 600 VAC Wiring Diagram 2ENS*MCC303 Control Room Building.
- SWEC Wiring Diagram 12177-EE-1AX-7 - 600 VAC One Line Diagram 2EHS*MCC303 Control Room Building.

- SWEC Wiring Diagram 12177-EE-12-9 Series 600 VAC One Line Diagram Emergency Bus 2EJS*US1 & US3 Control Building.
- SWEC Quality Standard QS 10.52-NM Rev A, June 10, 1985 - Raceway and Cable Installations.
- SWEC Quality Assurance Inspection Plan N2OE061AFA003 Rev G, February 18, 1986 - Electrical Installation, Conduit Installation.
- SWEC Quality Assurance Inspection Plan N2OE061AFA025 Rev G, February 12, 1986 - Electrical Installation, Cable Pulling Installation.
- SWEC Quality Assurance Inspection Plan N2OE061AFA112, Rev A, March 15, 1986 - Category 2 and 3 Electrical Support Surveillance Inspection.
- SWEC Quality Standard QS 10.53NM, Rev B, August 16, 1984 Cable Terminations and Connections.

ATTACHMENT 1.7

Instrumentation and Control

A. Licensing

Final Safety Analysis Report

Section 7 Instrumentation and Control

B. Safety Evaluation Report

Section 7 Instrumentation and Control

C. Draft Technical Specification

Table 2.2.1-1 Reactor Protection instrumentation Setpoints
Table 3.3.3-2 Emergency Core Cooling instrumentation Setpoints
Section 3.8.4.4 Electrical Equipment Protective Devices LCO
Section 4.8.4.4 Electrical Equipment Protective Devices Surveillance Requirements

D. Inspection and Enforcement Information Notices

86-03, January 14, 1986, Potential Deficiencies in Environmental Qualification of Limitorque Motor Valve Operator Wiring

84-20,March 21, 1984,Service Life of Relays in Safety Related Systems

84-13, February 28,1984, Potential Deficiency in Motor Operated Valve Circuits and Annunication

84-02 ,January 10, 1984, Operating A Nunclear Power Plant at Voltages Levels Lower than Analyzed

Letter NMP2L 0464, August 8,1985 to R. Starostecki NRC 55(e)84-21 Service Life of Relays

E. Procedures

NMP2-E061A.revision 11, Specification for Electrical Installation

NMP2-E062A,revision 2, Specification for Electrical Installation and Field Modification to the Power Control Complex(PGCC)

NMP2-C081A,revision 8, Specification for Instrument Installation

N2-EMP-V13,revision 0, Electrical Preventive Maintenance Replacement of Agastat Relays

N2-IOP-31,revision1,change 1, Interim Operating Procedure Residual Heat Removal System

[illegible]

F. Calculations

EC-402, revision , Voltage Profile

EC-125 ,revision 1,Scram Pilot Solenoid Cable Sizing

EC-134, revision 0, Minimum Voltage Level at Load Center ,2EJS*US3 During Degraded Voltage

G. Calibration

IL21SC-053 Loop Report Ractor Vessel Level 3 2ISC*LT7B

IL2ISC-072 Loop Report Drywell Pressure 2ISC*PT15B

IL2RDS-024 Loop Report CRD Scram Volume Water Level 2RDS*LTX12B

H. Quality Assurance

Inspection Plan Instrumentation by SWEC
N2OCO81AFA001,revision OC, Instrument Installation
N2OCO81AFA002,revision OB, Field Fab.& Erect Tubing
N2OCO81AFA003,revision OO, Instrument Hangers

H. Drawings

1. Logic Diagrams 12177-LSK

22-9.1A,revision 9, Air Conditioning Control Room Fan FN 2A&2B; and Valve MOV 1A&1B.

22-9.1B, revision 9,Air Conditioning Control Room Fan ACU 1A&1B; and Damper AOD 6A&6B.

22-9.1C, revision 9, Air Conditioning Control Room Damper AOD 61A&61B.

22-9.2A, revision 9, Air Conditioning Relay Room Fan ACU 2A&2B; and Damper AOD 12A&12B.

24-9.4A,revision 6, Standby Diesel Generator Load Sequence; 24-9,4B, revision 6; 24-9.4C, revision 6; and 24-9.4D, revision 6.

27-19A, revision 6, Containment Isolation ; 27-19B, revision 6; 27-19C, revision 6; 27-19D, revision 6; 27-19E, revision 6; and 27-19F, revision 6.

27-19G, revision 6, Balance of Plant ESF Actuation; 27-19H, revision 6.

27-19J, revision 6, Containment Isolation-Instrument Line Check Valves, Drywell Vacuum Breaker,Post Accident Sample

2. Flow Diagrams 12177 -FSK

   22-9A, revision 9,Control Building Air Conditioning;
   22-9B, revision 8;
   22-9C, revision 8; and
   22-9J, revision 4.

3. Flow Diagram GE 731E966,revision 6, RHR System

4. One Line Diagrams 12177-EE

   M01A-3, Normal Power 13.8KV-4.16KV-600V
   M01B-2. Emergency Power 4.16KV-600V
   M01C-3, Normal 600V-120V
   M01D-5
   M01E-3, Emergency Power 600V-120V
   M01F-4, Emergency 125VDC- Normal 48VDC-24VDC
   N01G-4, Normal 125VDC

5. Elementary Diagram 12177-ESK

   5RHS02-10 DC Diag.-4.16KV Pump 2RHS*P1B
   5RHS05-5 DC Diag.-4.16KV Pump 2RHS*P1B
   6RHS11-4 AC Diag.-600V Valve 2RHS*MOV24B
   7ISC02-11 AC Diag.-120V Hi.Rad. Isolation
   6HVC01-10 AC Diag.-600V Fan 2HVC*ACU1A&1B
   6HVC03-13 AC Diag.-600V Fan 2HVC*FN2A&2B
   6HVC04-7 AC Diag.-600V Valve 2HVC*MOV1A&1B
   7HVC01-11 AC Diag.-120V Dampers; 2HVC*AOD6A,12A,& 61A
   7HVC02-11 AC Diag.-120V Dampers; 2HVC*AOD6B,12B,&61B
   5SWP06-11 AC Diag.-4.16KV Pump 2SWP*P1F
   5SWP12-9 DC Diag.-125V Pump 2SWP*P1F
   5ENS22-12 DC Diag.4.16KV Bus 2ENS*SWG103UV & Load Sequence
   11RSS12-5 Remote Shutdown System 11RSS13-5;and 11RSS14-3.

6. Elementary Diagram GE RHR System 807E170TY

   SH 1, revision 25;
   SH 2, revision 19;
   SH 3, revision 19;
   SH 4, revision 19;
   SH 8, revision 24;
   SH 9. revision 24;
   SH 10,revision 18;
   SH 13, revision 19;
   SH 16, revision 18;
   SH 17,revision 19; and
   SH 21,revision 23.

7. Wiring Diagrams 12177-EE 4Q-1 Instruments Racks 2CES*RAK026 & 027

8ECQ-7 External Connection 2ENS*SWG103, ACB 5, 6, & 7
8CS-7 External Connection 2ENS*SWG103, ACB 11, 12, & 13
3CN-5 External Connection PGCC Term. 2CEC*PNL 704
3CP-6 External Connection PGCC Term. 2CEC*PNL 704
9NB-4 External Connection 2EHS*MCC303 Bus B
9NG-4 External Connection 2EHS*MCC303 Bus B
9NJ-3 External Connection 2EHS*MCC303 Bus D
9SE-4 Misc. 2EHS*MCC303
9SG-3 Misc. 2EHS*MCC303
10AA-2 125VDC Misc. Equipment
11GD-3 120VAC Misc. Equipment

Wiring Diagram GE 914E316 Reactor Vessel Level and Pressure Local Panel B H22-P027 ,2CES*RAK027

Schematic and Wiring Diagram for Size 1 & 2 Starters Gould WD 56593-C03-5

8. Isometric Diagram 12177-DK

301EQ-7 Prim. Cont. EL 305 2ISC*LT7B high
301EX-4 Prim. Cont. EL 305 2ISC*LT7B low
301FA-6 Prim. Cont. EL 305 2ISC*LT7B low
460A-1 Sec. Cont. EL 306 2ISC*LT7B low
450CY-1 Sec. Cont. EL 289 2ISC*LT7B low
450CZ-1 Sec. Cont. EL 289 2ISC*LT7B low
440BT-2 Sec. Cont. EL 261 2ISC*LT7B high & Low
440BU-2 Sec. Cont. EL 261 2ISC*LT7B high & Low
301A-9 Inst. Pent. Piping Details Sh 1
2ISC*LT7B low
2ISC*PT15B
301K-7 Inst. Pent. Piping Details Sh 5 2ISC*LT7B high
430CB-3 Sec. Cont. EL 240 2ISC*PT15B
301E-15 Inst. Pent. Piping Tabulation 2ISC*PT15B
301G-12 Inst. Pent. Piping Tabulation 2ISC*LT7B

Piping Diagram GE 914E317 Reactor Vessel Level and Pressure Local Panel H22-P027

Arrangement Reactor Trip Panel 2CEC*PNL611, GE 793E711

Sh 1, revision 15;
Sh 5, revision 12

Purchase Part Relay GE

164C5258 Sh 1-3,revision 12, FGP*C750 Agastat
169C9489 SH 1-3,revision 08, EGP IC2004002 Agastat
169C9481 Sh 1-3,revision 05, MDR 4134-1 Potter & Brumfield
DA188C7841 Sh 1,revision 3, CR 205D122AAXANUC General Electric
145C 3209 Contactor CR 205D122AAXANUC General Electric