U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-388/83-19

Docket No. 50-388

License No. CPPR-102 Priority -- Category B

Licensee: Pennsylvania Power and Light Company

2 North Ninth Street

Allentown, Pennsylvania

Facility Name: Susquehanna Unit 2

Inspection At: Berwick, Pennsylvania

Inspection Conducted: October 17 - 28, 1983

Inspectors: L. H. Bettenhausen, Chief, Test and Programs Section (Team Leader) — 2/17/84 date signed

R. M. Campbell, NDE Technician — 2/14/84 date signed

R. H. Harris, NDE Technician — 2/15/84 date signed

H. W. Kerch, NDE Engineer — 2/14/84 date signed

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Inspection Summary:

Unit 2 Inspection on October 17 - 28, 1983 (Report No. 50-388/83-19)

Areas Inspected: Announced team inspection by nine region-based inspectors of (1) as-built configuration of portions of three safety related systems; (2) preservice inspection program and data obtained; (3) independent ultrasonic examination of nine selected welds and other independent examinations; and, (4) review of welder qualifications, weld histories and materials certification. The inspection involved 561 hours on site and 70 hours in-office.

Results: Three violations were identified: (1) inadequate preparation of a weld for ultrasonic inspection; (2) a small bore piping flex leg was not installed in accordance with the engineering design calculation; (3) eighteen temperature elements had incorrect nameplate identification. The team also assessed two strengths and three weaknesses in the design, construction and engineering programs and controls.

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1. SUMMARY OF INSPECTION

A special announced team inspection was conducted at Susquehanna Steam Electric Station, Unit 2, October 17 to 28, 1983. Nine region-based inspectors examined the as-built and installed configurations of portions of three safety related systems; the preservice ultrasonic inspection program for welds, its implementation and data obtained; welder qualification and materials certifications; and independent ultrasonic examination by NRC of nine selected welds.

Safety related systems selected for examination were the Standby Liquid Control (SLC) System in its entirety, the B loop of the Residual Heat Removal (RHR) system, and the scram and scram discharge portions of the Control Rod Drive (CRD) System. For each of these systems, inspectors examined the as-built configuration and compared this configuration to Piping and Instrumentation Diagram (P&ID), Final Safety Analysis Report (FSAR) descriptions, codes, standards, and specifications. For selected portions of the systems, visual and dimensional comparisons were made to detailed structural and piping isometric drawings. For specific components and welds, materials certifications, weld histories, non-destructive examination records and other documentation was reviewed in detail. This summary briefly recounts the scope and findings of the inspection.

For the SLC, the P&ID and seventeen piping isometrics were verified. Fifty-six pipe supports were examined in detail; Instrumentation and Control components, piping and wiring were inspected. Section 4.2 describes the items inspected, the criteria used and the findings. One dimensional discrepancy on a pipe support was identified; drawing correction was initiated prior to completion of the inspection. One violation was identified while in the Reactor Building (RB): as a result of failure to translate design calculations into construction information, one flexible leg of small bore piping did not have adequate flexibility to accomodate seismic movement between containment structure and RB. All other aspects of the SLC inspection were satisfactory.

The CRD review concentrated upon the Scram Discharge Volume (SDV), the instrumented SDV (SDIV) and control rod insert/withdraw (I/W) lines and supporting structural, vent, drain and instrument components. The details of the physical and dimensional comparisons with drawings and specifications are found in Section 4.3. It was found that the physical installations checked satisfied the requirements of NRC Inspection and Enforcement Bulletin 80-17. The piping weld quality was uniformly high. Several problems with loose, missing or broken minor components led to an assessment of weakness in control of the current plant equipment configuration; licensee efforts to upgrade control of the present configuration had been put in place shortly before this inspection so there was no opportunity to assess effectiveness.

Inspection was concentrated on the B loop of RHR. The piping and components serving the Low Pressure Coolant Injection function were inspected, along with twelve large bore and seven small bore piping isometrics and detail of eight support drawings and instrumentation and control. The details and results are found in Section 4.4. The findings can be summarized as a violation for inadequate preparation of a flued-head-to-valve weld for ultrasonic Inservice Inspection, a violation for misidentification on the nameplates of eighteen temperature elements, an assessment of weakness in attaining plant cleanliness and additional examples of weak configuration control.

The Pre-service Inspection program and data were reviewed in detail, particularly as they applied to RHR and Reactor Recirculation piping. Nine welds from this review were selected for independent ultrasonic examination by NRC inspectors Details and results of the reviews and examinations are found in Section 5. One result of the NRC review is an assessment of weakness in the degree of licensee involvement in his contractor's PSI program design, program implementation, data review and evaluation.

Welder qualification, weld history data, material certifications and heat treatment information was inspected. Details are given in Section 6. The licensee's use of Induction Heating Stress Improvement for austenitic stainless steel weldments is considered a strength.

The special team inspection involved 631 hours (561 on site, 70 in-office). As summarized above, three violations, two assessments of strength and three assessments of weakness resulted. To place this in perspective, the report details examination of dozens of engineering drawings and dimensional comparisons with installed components with no discrepancies. There were relatively few unidentified maintenance items of a minor nature such as missing valve handwheels, damaged air regulator sight glasses and loose switch covers. The inspected portions of the as-built plant conformed to drawings and FSAR.

DETAILS

2. PERSONS CONTACTED

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* Present at exit meeting conducted October 28, 1983.

3. SCOPE OF INSPECTION

The principal objective of this inspection was to confirm completion of construction of Susquehanna Unit 2 in accordance with applicable codes standards, regulations and licensee commitments. This was accomplished by examining portions of several safety-related systems in detail, reviewing the pre-service inspection program and data and independently performing confirmatory ultrasonic measurements. The detailed examination of systems involved comparison of physical layout with drawings, schematics and Final Safety Analysis Report (FSAR) description, including piping, supports and restraints, instrument tubing, instruments and controls. The systems examined and the results of the inspection are described in the body of this report. The review of the preservice inspection program and the independent NRC examinations are discussed. Welder qualification, review of selected weld histories and the Induction Heating Stress Improvement (IHSI) program were also inspected.

Susquehanna Units 1 and 2 constitute two phases of a total construction project involving field fabrication and erection accomplished by using essentially the same personnel and fabrication procedures. The quality assurance and quality control procedures and personnel were also largely the same. The primary responsibility for field fabrication was delegated to the Bechtel Power Corporation. Inspections conducted by the NRC on Unit 1 in many cases represented review of fabrication activities for both units. A key aspect of this inspection was to examine the selected systems for recurrence of problems noted in Unit 1; none were found.

4. AS-BUILT CONDITION OF SELECTED SAFETY-RELATED SYSTEMS

4.1 Introduction

Portions of three safety-related systems were examined. The Standby Liquid Control (SLC) system was examined in its entirety, except for an inaccessible portion between the biological shield wall and the reactor vessel. The B Loop of the Residual Heat Removal (RHR) system was examined from its penetration of the recirculation piping to the RHR pumps. Selected sections of the control rod drive system were also examined. Piping was compared to flow diagrams, selected dimensioned isometric drawings and FSAR descriptions. Selected supports were compared with their detailed drawings. Small bore piping and instrumentation tubing were compared to selected isometrics. Electrical instrumentation and control wiring was checked against drawings, schematics and FSAR description. The sections which follow discuss the inspection details and findings.

4.2 Standby Liquid Control (SLC) System

4.2.1 Piping

The inspectors performed a walkdown inspection of the piping on the SLC system. The walkdown involved a visual and physical inspection of piping, valves, pumps, and accumulators. The walkdown covered piping extending from the Reactor Pressure Vessel (RPV) to the standby liquid control tank (2T-204).

A segment of the piping located between the containment isolation valve and the reactor vessel could not be inspected since it was inaccessible.

These drawings were utilized for performing the walkdown:

P&ID M-2148; Unit 2 Standby Liquid Control
DCA-206-1 thru DCA-206-5; piping isometrics
DCB-201-1 thru DCB-201-8; piping isometrics
HCB-205-1 thru HCB-205-4; piping isometrics

The inspection included the following aspects:

- Piping run geometry, dimensions, angles and orientations.
- Pipe support locations.
- Pipe-to-pipe and pipe-to-equipment welds.
- Mark numbers (tags) on mechanical equipments which are integral part of the piping system (valves & pumps).

The criteria utilized for the evaluation of the installed configuration of the piping system included the following documents:

- SSES FSAR, Section 9.3.5 "Standby Liquid Control System."
- Specification 8858-M-204 (Rev. 12) for field fabrication and installation of nuclear service piping for SSES Unit 1 and 2.
- ASME Boiler and Pressure Vessel (B&PV) Code, Section II and III.
- Specification 8856-M-391 (Rev. 5) for piping as-built program for the SSES Unit 1 & 2.

No violations were identified as a result of the inspection of standby liquid control piping system.

4.2.2 Pipe Supports and Restraints

Pipe supports and restraints on the SLC system were inspected during the walkdown. The inspection involved a visual and physical examination of selected pipe supports provided for the piping identified in Section 4 1.1. A total of 56 pipe supports were inspected as installed in the following piping systems:

DCA-206-1 thru DCA-206-5: 19 supports
DCB-201-1 thru DCB-201-8: 24 supports
HCB-205-1 thru HCB-205-4: 13 supports

The verification of the SLC system pipe support installations was performed to the following requirements:

- checking actual configuration against support as-built drawing, including dimensions;
- checking directions in which hangers restrain piping and clearances between pipe and hanger or pipe and wall or floor penetrations;
- checking connections to the proper structure;
- checking sizes of welds on hangers, including welds to pipe;
- checking baseplate dimensions and location of structural attachment on the baseplate;
- checking baseplate bolts for tightness, edge distance and minimum bolt embedment for representative sample of anchor bolts;
- checking restraint bleed holes open and free from foreign material;
- checking that spring hangers are provided with indicators showing the cold position specified;
- checking for deleted supports;
- checking proper grouting of floor mounted supports; and
- checking that movement of piping due to vibration, thermal expansion, etc., would not likely contact other pipes, supports, equipment or components.

The actual installed configurations checked and the criteria utilized for their evaluation are listed below:

- Support drawings for piping runs DCA-206, DCB-201, and HCB-205;
- Specification 8856-M-213 (Rev. 14) for installation, inspection and documentation of pipe supports, hangers and restraints for the SSES Unit 1 and 2;
- Specification (8856-C-72) for furnishing and installation of expansion-type anchors for the SSES Unit 1 and 2;
- ASME B&PV, Section III, 1971 issue with all addenda issued through winter 1972;
- Specification (8856-M-204) for field fabrication and installation of nuclear service piping for SSES Unit 1 & 2;
- Specification (8856-M-209) for pipe hangers, supports, and restraints for SSES Unit 1 and 2;
- AWS specification D1.1-72.

No violations were observed.

As a result of the inspection of pipe supports for the SLC system, a discrepancy was identified in the installation of structural attachment to the base plate for support no. DCB-201-H51. The attachment was shown to be concentric with the base plate in the as-built drawing. It was found eccentric by 0'-3 5/16"; this exceeded the installation tolerance of the specifications. The licensee performed an engineering evaluation of the support, determined that it was acceptable and revised the as-built drawing prior to the conclusion of this inspection.

4.2.3 Instrumentation and Control

The inspector reviewed FSAR requirements, licensee commitments, design control procedures/instructions and applicable drawings to determine whether instrumentation and associated controls for the Standby Liquid Control System (SLC) referenced in the FSAR Section 9.3.5 were installed in accordance with these requirements.

Instrumentation/Control Items and documents examined for this determination include:

- Pressure Transmitter No. PT-C41-2N004;
- Pressure Indicator No. PI-C41-2R003;
- Temperature Element No. TE-C41-2N006;
- Temperature Control Switch No. TSHL-C41-2N003;
- Pressure Relief Valves Nos. 2F029A and B;
- Excess Flow Check Valve No. ZS-24808;
- 1 inch Hand Valve Nos. 2F010, 2F012, 2F014, 2F015, 2F018 2F024, 2F025 and 2F027;
- Miscellaneous Drain Valve Nos. 2-48-004, 2-48-005 and 248-006;
- Explosive Valve Nos. 2F004A and B;
- Key Lock Switch Nos. 24804 and 24806;
- Panel Nos. 2C011, 2C601 and 2C617;
- Test Switch Nos. 24808A and B;
- Electric Heater Nos. 2E219 and 2E220;
- Standby Liquid Control Injection Pump Nos. 2P-208A and B;
- Heat Tracing per Drawing No. E-52-FACE-102 (V/P-CMU-781-12);
- Explosive Valve electrical continuity relay Nos. XY-2M600A and B with alarm No. XA-24804;
- SLC Flow Control Diagram G.E. No. 851E886;
- SLC Process Instrument Piping/Tubing per G.E. Specification No. 22A4019A8;
- SLC Design Specification G.E. No. 82A14B2 and 22A14B2AM;
- Piping and Instrument Drawing No. M-2148, System No. 253A;
- Instrument Tubing Run Drawing No. JD-33-5-5B, Revision 4 for PT-C41-2N004;
- Instrument Tubing Support Drawing No. JD-33-5-5, Revision 2 for instruments PT-C41-2N004/PI-C41-2R003;

- Instrument Mounting Location Drawing No. ID-33-5-5, Revision 2 for instruments PT-C41-2N004/PI-C41-2N003;
- Discharge line drawing Nos. SP-HCB-205-2, Revision 7 and SP-DCB-201-6, Revision 11 for pump 2P-208B;
- Discharge line drawing Nos. SP-HCB-205-3, Revision 7 and SP-DCB-2017, Revision 13 for pump 2P-208A.

Verification that these portions of the SLC system were fabricated and installed in accordance with the approved design criteria was accomplished through visual inspection and walkdown of the system.

The inspector observed that the metal flex tubing used to prevent damage to the capillary tube of TE-E41-2N006 was held in place with electrician's plastic tape. The licensee took immediate action by issuing work authorization No. WA-V-36017 to correct the deficiency.

During the inspection and verification of the SLC as-built configuration, the inspector observed that the installation of small bore pipe routed along the exterior wall of the containment and then to instrument racks in the reactor building did not appear to have sufficient flexibility to accommodate movement between the two buildings resulting from a seismic event or thermal expansion of materials.

The inspector reviewed the engineering calculation and analysis No. 2335-F revision B, dated September 26, 1983, for small bore pipe (SP-DCB-212-5/SP-DCB-212-6) flex-leg installation noting that the analysis and calculation was based on free end movement of the flex-leg (pipe). The installation is per drawing SP-DCB-212-5 and SP-DCB-212-6 which shows the design flex-leg supported by bracket nos. DCB-212-H-5024 and DCB-212-H-5059 and the free end clamped to instrument rack nos. 2C004 and 2C005 respectively. These racks have been analyzed as rigid structures (ref: FSAR section 3.10a.3.1.1) and were not considered in the engineering analysis/calculation.

The inspector informed the licensee of the discrepancy with the engineering analysis and calculation which resulted in a nonconforming installation. This is a violation of 10 CFR 50, Appendix B, Criterion III which states, in part, that: "measures shall be established that applicable... design basis... for structures, components... are correctly translated into specifications, drawings...." (388/83-19-09)

The inspector also verified routing of the SLC control cable, cable terminations, and quality control inspection records for the following:

- Cable Nos. ED200200E from 2TC615-A to TB-0517; EK200200F from TB-0517 to SVC412004A, EK200201E from 2TC613-E to TB-0518 and ED200201F from TB-0518 to SVC412F004B;
- Cable Scheme Drawing No. E-166;
- Crimp Tool Nos. CT-1386, CT2453 and CT-1752;
- Specification Nos. E-59, E-49;
- Quality Control Instruction (QCI) Nos. E-4.0 and E-5.0;
- Cable Pull cards for cables noted above.

No violations were identified.

Inspection of the piping, pipe supports and restraints, and instrumentation and controls for SLC showed that, with one minor dimensional discrepancy, the SLC system was built in conformance with designs and requirements. A violation for failing to correctly translate design information into construction in one instance was also identified.

4.3 Control Rod Drive (CRD) Scram System

4.3.1 Scram Discharge Volume (SDV), Instrumented Volume (SDIV), Drain and Vent Piping

IE Bulletin 80-17 and the PP&L response to it of May 26, 1981, outlined action to be taken and the results needed to assure full operability of the scram system. The physical installation aspects of the bulletin response for Susquehanna Unit 2 were verified by this inspection.

The condition of CRD system piping including welding, external pipe condition, pipe scope, valve position, pipe cap type and position, pipe diameter and material types were inspected.

The scope of the CRD piping inspection included:

Description	Drawing Reference
CRD Vent Line System	VP-CRB-1096-2
CRD Drain Line System	VP-CRB-1097-2
South Volume Level 2N013A + B	VP-CRB-113-2
North/South Volume Level E, F, G & H	VP-CRB-115-2
South Volume Level 2N016C + D	VP-CRB-116-3
CRD Discharge Instrument Volume	-----
CRD Discharge Headers	-----

This inspection confirmed that the requirements of IE Bulletin 80-17 had been met with respect to vent line slope and non-sharing of function, vent line termination in sump above normal sump level, drain line slope and non-sharing of function, drain line termination in sump, 8" discharge header slope, hydraulic

coupling of headers to instrumented volume, instrumented volume discharge component position and level sensor position. The confirmation was done by independently measuring slopes and dimensions and visually examining piping and welds. The system attributes corresponded with the applicable drawings for those portions inspected, with the following exception:

Drawing CRB-1096-2 requires the vent line by FW #30 to be sloped 1/8" per foot. Approximately 2' of the vent line in this area was sloped less than 1/8" per foot. This slope condition is not in conflict with the requirements of IEB 80-17 in that it will not allow vent line water pockets, but it does not meet the condition specified on the drawing. Non-conformance Report (NCR) number 9741, as dispositioned on 1/12/83, identifies other non-relevant deviations between the as-built condition of CRD lines and the applicable drawings. The inspector noted the disposition of NCR 9741 to be consistent with the requirements of the IE Bulletin 80-17. The basis of the disposition for deviation from line slopes generally is the short distance (1-2 feet) and proximity to the high point vent; this disposition had GE concurrence. The inspector had no further questions following discussions with licensee representatives on this non-conformance.

Inspection of portions of the CRD piping including discharge headers, instrumented volume headers, valves, drain and vent lines resulted in the conclusion that actions to meet IEB 80-17 requirements for physical installation of SDV, SDIV, vent and drain lines documented in the PP&L letter of May 26, 1981, and the FSAR had been completed. The quality of welds visually inspected was uniformly high. No violations were identified.

4.3.2 CRD Pipe Supports and Restraints

Selected portions of CRD system pipe support installations were inspected. The inspection involved a visual and physical examination of selected seismic pipe supports provided for the CRD Scram Headers, vent, drain, and insert/withdraw lines. The CRD North Side supports were selected for this examination.

A walkdown of selected pipe supports for the above system was conducted to verify the compliance with piping and support as-built drawings. The inspected supports were selected from the following drawings:

VP-CRH-1084 - Piece identification and weld map, scram header supports (North Side)
VP-CRH-1094-2 - SHT 1 thru VP-CRH-1094-2 SHT 4: piece identification and weld map HCU - CRD piping support (North Side)

VP-CRH-1095-2 SHT-1 thru VP-CRH-1095-2 SHT-6: piece identification and weld map HCU - CRD piping support (North Side)
VP-CRH-1096-2: CRD scram header vent line isometric Drawing
VP-CRH-123-2: S.V. Ventline support location map details
VP-CRH-2N41-2 thru VP-CRH-2N48-2: S.V. Vent line supports (North)
VP-CRH-2N51-2 thru VP-CRH-2N58-2: S.V. Vent line supports (North)
VP-CRH-2N59-2 thru VP-CRH-2N67-2: S.V. Vent line supports (North)
VP-CRB-1097-2: CRD Scram header drain line isometric
VP-CRH-124-2: Scram volume drainline support location map
VP-CRH-124-2-H2 thru VP-CRH-124-2-H31: S.V. Drainline support details for North and South Side, Unit 2.

Some of the pipe supports on the vent and drain lines could be inspected visually only. Several could not be inspected either visually or physically because of interferences and inaccessibility.

The Scram Headers are restrained at specified locations by one multiple space frame. The majority of insert/withdraw (I/W) line gang supports outside containment are supported by this same space frame. Additionally, some of the vent line restraints are supported by the same frame. Due to the large number of restraints supported by this large space frame, it was not possible to inspect each restraint independently without considering the entire space structure.

The verification of the CRD scram system pipe support installations outside containment was viewed with regard to the requirements outlined previously in Section 4.2.2.

No violations were observed.

As a result of the inspection of pipe supports for the CRD scram system, a lack of configuration control by the licensee was identified where three pipe clamps on the I/W gang frames were found loose or twisted. These had not been previously identified by the licensee. This finding forms part of the basis for an assessment of weakness in control of as-built plant configuration. (50-388/83-19-02)

4.3.3 Scram Discharge Volume - Instrumentation and Control

The instrumentation and associated controls for the Control Rod Drive Scram Discharge Volume described in FSAR section 4.6.1.1.2.4.2.5 were inspected. Instrumentation and Control Items and documents examined include:

- R&IP M-2146, revision 11, Part A, and M-2147, revision 12, Part B.
- CRD Scram Discharge Volume Level Switch Assembly Drawing Nos. VP-CRB-113-2, revision 10, VP-CRB-114-2, revision 10 and VP-CRB-115-2, revision 12.
- CRD Scram Volume Discharge Tank and Level Switch Assembly Support Drawing Nos. VP-CRH-113-2, revision 10 and VP-CRH-114-2.
- CRD Scram Volume Level Transmitter Assembly Drawing Nos. VP-CRB-116-2, revision 5 and VP-CRB-117-2, revision 9.
- CRD Scram Header Drain Line Drawing No. VP-CRB-1097-2, revision 9.
- Level transmitter Nos. LT-2N016A&B and LT-2N016C&D. Level Switch Assembly Nos. LSH-2N013A&B, LSH-2N013C&D, LSH-2N013E&F and LSH-2N013G&H.
- Design Drawing No. M-164-200(1) & (2).
- Field Change Request (FCR) No. M-2233.

No violations were identified.

On October 26, 1983, while performing a visual inspection of the Scram Discharge Volume Level Switch Assembly (VP-CRB-115-2), the inspector observed the following deficiencies:

-- Hand wheel missing from Valve No. 2F141A.
-- Loose cover and base for Switch Assembly Nos. LSH-2N013A, B, C, D, F and H.
-- Break in flex-conduit/connector to Switch Assembly No. LSH-2N013G.
-- Missing drain cap from Valve No. 2-47008A drain line.
-- Free swinging four inch water line (SP-KBF-20211) hanging from a single support with an unsupported free end in excess of 20 feet.
-- Missing identification nameplates and lock springs from CRD directional control valves.
-- Water leaks from CRD inlet and exhaust valve packing seals. (An increase in the amount of leakage was noted during the structural integrity test in progress on October 20, 1983).

Discussions with the licensee regarding these deficiencies resulted in the conclusion that these items would have been identified in systems turnover inspections by the Integrated Startup Group (ISG). Instruction No. OI-TY-208, revision 0, dated September 1, 1983, delineates the system turnover inspection requirements. The inspector verified that the Scram Discharge Volume Level Switch Assembly had not been turned over to the station staff at the time of this inspection. The Systems Turnover inspection instructions adequately address identification of the deficiencies noted above.

The licensee took the following action prior to completion of this inspection:

-- Nonconformance Report No. PL-NCR-83-1200 was issued to rework the four inch water line and provide proper support.
-- Work Authorization No. 4-37298 was issued by ISG to inspect and tighten the switch assembly covers and base.
-- Work Authorization No. 5-34352 was issued by ISG to repla the hand wheel for Valve No. 2F141A.
-- Work Authorization No. 4-34348 was issued for corrective action to control and/or prevent packing leaks of the CRD inlet and exhaust valves.

These work authorizations are in accordance with Administrative Procedure No. AD-QA-502, revision 5, dated May 16, 1983, instituted for Unit 2 on October 15, 1983, and utilized as a means of controlling corrective maintenance and implementation of selected modifications on plant structures, systems or components. These observations by the inspector, prior to identification by licensee inspections, are further basis for assessment of weaknesses in configuration control. The inspector had no further questions in this area.

4.4 Residual Heat Removal (RHR) System

4.4.1 Large Bore Piping

The inspector conducted a general walkdown inspection of the installed Residual Heat Removal (RHR) piping, primarily on "B" Loop from the suppression pool to the reactor pressure vessel connections.

Walkdown inspection was also conducted on the Recirculation System "B" Loop consisting of twenty-eight inch piping with twenty-two inch headers and twelve inch risers.

Inspection consisted of visual examination with random dimensional checks concentrated on the following B-loop lines:

24" DCA-210	20" GBB-205
24" DBB-207	20" GBB-206
24" GBB-206	20" GBB-216
24" GBB-204	20" GBB-204
24" GBB-209	18" GBB-209
24" GBB-205	18" HBD-285

Visual inspections, walkdowns and observations of these portions of the RHR "B" loop large bore pipe system were conducted to determine the conformance of the as-built condition to the following criteria:

- Specification 8856-M-204, Revision 12, Field Fabrication and Installation of Nuclear Piping;
- ASME B&PV Code, Section III;
- Drawings P&ID M-2151,
  DCA-210-2,
  DBB-207-2,
  P&ID M-2143; and
- FSAR Section 5.4.7 (RHR System).

The inspector noted the positions of valves, flanges, pipe bends, pipe elbows, pipe tees, pipe reducers, pumps, heat exchangers and weld joint identifications for comparison to the applicable as-built drawings. No violations or deviations were observed.

Although a majority of the pipe and welds in Loop "B" was covered with insulation as required for service, some welds were exposed to permit visual inspection. Those welds that did not have insulation in place and other welds that had insulation removed at NRC request were examined and found to meet drawing and code requirements.

Welds marked FW#2, DCA-210-1 and DCA 210-2 at the containment sides of the RHR isolation valve HV2F015-B were examined in detail. Visual inspection of these two welds presented the impression that the weld was incomplete. Review of the flued head and valve weld joint details showed a base metal minimum wall thickness requirement of at least ¼ inch greater than the minimum weld metal thickness. The actual weld thickness was determined to have been ultrasonically measured as part of the Pre-service Inspection (PSI) program and was verified by NRC measurement using ultrasonic thickness equipment during this inspection. The base metal on both sides of the weld met the ASME Section III requirement of a taper no greater than 3 to 1. The inspector concluded that the DCA-210 welds marked FW #2 were in conformance to the ASME Code Section III and design drawing requirements.

However, specification 8856-M-204 requires that welds identified by Inservice Inspection Isometric Drawings be prepared for in-service inspection per Section XI of the ASME Code. Drawing ISI-ISO-DCA-210-2 identifies this weld for Inservice Inspection. The physical condition of the weld precluded use of ultrasonic probes on the weld area itself. This was identified on the June 14, 1983 contractor report of inspection. The inadequate preparation of this weld for inservice inspection was verified by independent visual and ultrasonic NRC inspection. This is a violation (50-388/83-19-03).

During walkdown inspection of the RHR Piping System, inspectors observed maintenance repairs underway on a Limitorque power actuator removed from Valve HV 2F017B. Further investigation

showed repairs were under the proper work authorization with applicable procedures, instructions, and quality control checkpoints, according to licensee's new maintenance procedure effective October 15, 1983.

With formal construction essentially complete, it was noted that excessive debris was present in the form of trash, cigarettes, and dirt in many areas of the containment and reactor building. The prevalence of dirt and debris observed by all inspectors of the team leads to an observation of weakness in the maintenance of plant cleanliness (50-388/83-19-04).

The inspector observed seven pieces of E7018 manual weld electrode inside component support structural steel members near valve HV2F017B. One electrode was color-coded for electrician craft, the remaining were color-coded as issued to pipefitter construction craft workers. No other examples of uncontrolled weld materials were noted during this inspection. With the plant construction complete and finding only this single occurrence of uncontrolled weld electrode, the inspector concluded that this was an isolated instance. The inspector reviewed the current weld electrode control system under the present maintenance program and concluded that weld rod and electrode required for post-construction activities are under adequate control. (See Section 6.3 also)

In summary, the inspector performed an as-built walkdown inspection of twelve large bore RHR pipe segments. Specific system components such as pumps, flanges, elbows, tees, bends, heat exchangers, welds and valves were examined for conformance to ASME Section III requirements and applicable as-built drawings. No violations or discrepancies were noted.

4.4.2 Small Bore Piping

The inspector selected portions of the small bore piping in the "B" Loop (unless noted as "A" Loops) of the RHR system for walkdown inspection. Those portions of small bore RHR piping examined were drain, vent or instrument attachments, nominally of 1" diameter, connected to the large bore piping. Included in this inspection were lines identified by the following valves or instrument taps.

2F045D	2-51-026
2F072D	2-51-095
2F128B	
LT2N008*	2-51-012
2F124B	2-51-808
H5006	2-51-093
2N022A (Loop "A")	

* On LT-2N008, the instrument tap and attached piping was removed and returned to the supplier for repairs. The inspector reviewed the non-conformance report (NCR) and field material requisition controlling removal and repair of this component and found it satisfactory.

Observations and visual inspection were made of welds, flanges, gages, drains, and valves in the above portions of small bore piping in the RHR system.

The actual condition, location and dimensions of selected components were compared to the following criteria:

- Specification M204, Revision 12 (Piping)
- ASME B&PV Code Section III
- Drawings P&ID M-2151, including
  SP-DCA-210-2
  SP-GBB-206-3

- FSAR Section 5.4.7 (RHR System)

Of those items and attributes inspected, all components were installed in accordance with the applicable drawings and specifications. No violations were identified.

During this walkdown inspection of safety-related small bore RHR piping, the inspector observed several installed valves requiring maintenance and repairs for such items as missing handwheels, damaged or missing sight glasses on air regulators and excessively dirty threaded shafts. The inspector followed up on this by inspecting the maintenance and corrective action tracking on those and similar items.

Due to the recent changeover from construction to Integrated Startup Group (ISG), further inspection was conducted into the licensee's program for tracking and control of items requiring maintenance. The inspector noted fifteen problems on nine components requiring repairs. Documentation reviews and discussions with licensee representatives resulted in inspector determination that work authorizations (WA) or non-conformance reports (NCR) were issued to cover most of the inspector-identified problems. The few remaining items would be identified during scheduled turnover walkdown inspections as described in Section 4.3.4. These observations by the inspector are further basis for assessment of weakness in configuration control.

The review of the turnover process and the application of ISG instruction OI-TY-208 and Administrative Procedure AD-QA-502 to Unit 2 showed that these procedures were fully implemented on October 15, 1983, and were being used to control maintenance activities. This review of equipment and maintenance control

during turnover and the associated administrative procedures now in effect satisfactorily resolves a previous concern for lack of procedures (UNR 388/83-05-01)(Closed).

No violations were identified.

4.4.3 RHR Support and Restraints

An inspection was conducted on pipe hangers and supports of the RHR piping system. A physical inspection was concentrated on the "B" loop side for large bore piping supports. Some small bore piping restraints on the "A" side of the RHR system were also examined.

Several pipe supports and restraints were selected for a detailed as-built review and comparison with the detailed drawings obtained from the licensee's work package files. The following hangers, supports and restraints were selected for this detailed review:

RHR Large Bore Restraints ("B" Loop)

DCA-210 H-2, H-3, H-17, H-18
DCA-210 H-19

RHR Small Bore Restraints ("A" Loop)

SP-GBB-206 H5001
SP-GBB-206 H5002
SP-GBB-206 H5003

Detailed inspection of the subject hangers and pipe supports included those attributes identified in Section 4.2.7.

Inspection was conducted to determine the conformance of the as-built condition of the hangers and restraints to the following criteria:

- ASME B&PV Code, Section III (1971 issue, with all addenda issued through Winter 1972).
- Hanger specification M213.
- Hanger detail drawings DCA-210 and SP-GBB-206.
- Isometric drawings DCA-210-2 and SP-GBB-206-3.

In summary, the inspection consisted of a detailed inspection on 5 twenty-four inch pipe supports and restraints on the "B" Loop, and 3 restraints for one-inch piping on the "A" Loop of the RHR system. Pipe hangers and restraints inspected were found to meet drawing and code requirements. No violations were identified.

Additionally, an inspection of approximately twenty restraints in the RHR system utilizing ITT-Grinnell snubbers was performed as part of the NRC verification of the licensee's corrective action regarding the deficiency reported in non-conformance report No. 10519. The inspection was intended to insure that the PSA shock suppressors and ITT-Grinnell rear brackets did conform to the ±5° movement criteria specified in the design drawing. All inspected snubber restraints were found to rotate freely, with the exception of two snubbers No. GBB-209-H4, and GBB-209-H13. This finding was discussed with representatives, corrected and inspected satisfactorily in a subsequent NRC inspection. This verification of the licensee's corrective action closes items previously identified as Construction Deficiency Reports (CDR 82-00-14 and CDR 83-00-04).

While performing a walkdown inspection of the RHR room at elevation 645' - 0", the inspector observed a building column fabricated from 6" diameter pipe. The column was welded to a baseplate which was overhanging from a large building column concrete pedestal.

The baseplate was stiffened in one direction by a vertical gusset plate welded to the side of the pedestal. The inspector discussed the finding with the licensee since the column was essentially unstable in the direction perpendicular to the gusset plate. At the time, the licensee could not confirm whether the column was permanent or temporary. However, the licensee later identified the column as permanent and stated it was required to support an overstressed platform beam at elevation 670' - 0". The inspector requested the backup design calculation of this column for review.

This is an unresolved item (388/83-19-01).

4.4.4 Instrumentation and Controls

The inspector selected instrument components and controls associated with the RHR B Loop as follows:

- Level Indicating Switch Nos. LIS-2N031A, LIS-2N031B, LIS-2N031C and LIS-2N031D.
- Nuclear Boiler Vessel Instrumentation Drawing Nos. E-105942, revision 12, dated June 24, 1983, and E-105951-2, revision 12, dated August 29, 1983.
- Pressure Switch No. PS-2N021A&C.
- Pressure Indicating Switch No. PIS-2N021B&D.
- Design Specification Data Sheet Nos. 22A2925 and 22A2925AD.
- Instrument Tubing Run Drawing for Pressure Indicator PI-E11-2R002B No. JD-33-1-3A, revision 6, dated June 3, 1983.
- Instrument Support Drawing for Panel 2C-021 Connection A3, A4 and A6 No. JD-33-3-4, revision 4, dated October 14, 1982.

- Instrument Tubing Run Drawing for Panel 2C-021 connection A6 No. JD-33-3-4G, revision 6, dated June 3, 1983.
- Instrument Tubing Support Drawing for Pressure Indicator PI-E11-2R002B&D No. JD-33-1-3, revision 5, dated September 19, 1983.
- Instrument Tubing Run Drawing for Panel 2C-021 connection A4, No. JD-33-3-4E, revision 6, dated June 3, 1983.
- Instrument Mounting Location Drawing for Pressure Indicators PI-E11-2R002B&D No. ID-33-1-3, revision 2, dated August 30, 1982.
- Field Change Request Nos. M-2902, M-2861 and M-10777.
- Piping and Instrumentation Drawing No. M-2142, revision 7, dated December 30, 1982.
- Residual Heat Removal System Drawing No. E-105951-2, revision 12, dated August 29, 1983.
- Cable Nos. FD2Q3078E from HVE112F129B to TB0557, FK2Q3034E from 2C601-21C to FSE112N021B, FK2Q3078D from SVE112F105B to TB0557, FM2Q3067C from 2TC623-A to TB2C021-A3 and FK2Q3059 from FSE112N033B to TB0557.

These components were examined for fabrication and installation in accordance with previously referenced requirements.

No violations were identified.

The inspector performed a visual walkdown inspection of the RHR B Loop Heat Exchanger No. 2E-205B. The inspection conisted of verification of line size (2 inch or less) and slope, Material, Type, Valve or Instrument type and location, and routing of pipe. Hanger type, support configuration and location were also included. Final as-built drawing used for this inspection include:

- RHR Heat Exchanger Air Supply and Vent, drawing No. SP-GBB-205-2, revision 12, dated September 24, 1983.
- RHR Heat Exchanger Drain Pot to High Pressure Condensor, drawing No. SP-GBD-246-1, revision 5, dated October 4, 1983.
- Shell Side Drain from RHR Heat Exchanger to drain, drawing no. SP-GBB-223-2, revision 4, dated August 23, 1983.
- High and Low Level Indicator piping from RHR Heat Exchanger, drawing No. SP-GBB-222-6, revision 10, dated August 24, 1983.
- RHR Heat Exchanger Drain Pot to High Pressure Condensor, drawing No. SP-GBB-205-3, revision 9, dated August 17, 1983.
- Local Sample line for RHR Heat Exchanger, drawing No. SP-DCB-223-2, revision 11, dated October 17, 1983.
- RHR Heat Exchanger Shell Side Process Vent and Relief, drawing No. SP-HBB-220-5, revision 5, dated August 24, 1983.

No violations were identified. The inspector observed that changes made after the final as-built revision date were being documented and approved by the code data engineer.

In an inspection of the Cleanup Leak Detection System, elevation 749' Reactor Building, the inspector observed that dual element temperature units were incorrectly identified on the equipment nameplate as single element units. Instruments affected are TE-G33-2N016A through F, TE-G33-2N022A through F and TE-G33-2N023A through F. Systems drawing M-2144, revision 15, dated August 29, 1983 identifies these units as dual element units. Paragraph 6.1.f of Field Procedure No. J-2, revision 7, dated April 4, 1983, requires verification of nameplate data. The licensee was informed that this was a violation of 10 CFR 50, Appendix B, Criterion VIII which states, in part, that, "measures shall be established for the identification and control of materials, parts and components... These identification and control measures shall be designed to prevent the use of incorrect... components." (50-388/83-19-05)

This finding by the inspector, prior to identification by licensee quality control inspections is further basis for assessment of weakness in configuration control.

In an inspection of cables under the reactor vessel, elevation 704, Area 31, the inspector observed several cable connectors which appear to use teflon insulation. These connectors are in an area in which the integrated radiological dose can be in excess of 10^4 Rads. Cables affected are in system 278B (Intermediate Range Monitor) and identified as follows: UM2Q1195C, UM2Q1199C, VM2Q1197C, VM2Q1201C, XM2Q1196C, XM2Q1200C, YM2Q1198C and YM2Q1202C. The licensee has noted the potential connector deficiency in NCR No. 11130, Block 22 dated June 8, 1983. The licensee is in the process of verifying adequacy of material for use in a high radiation area. The licensee stated the connectors would be replaced if it was determined that teflon was inappropriately used as the insulating material.

In an inspection of RHR pump motor nos. 1B-202D and 1B-202B, Drawing No. UP-M1-E11-30(1)-1, the inspector observed that the motor terminal box containing motor space heaters and thermocouple terminals was inadequately secured to the motor housing. The licensee performed a review, letter of October 26, 1983, of the seismic adequacy of the terminal box. The review concluded that both the space heaters and thermocouples are not safety related and are not necessary for operation of the pumps. The licensee agreed to rework the motor terminal boxes to provide a secure mounting. The inspector had no further questions.

4.4.5 Review of RHR Heat Exchanger (HX) Documentation

The inspector reviewed the complete vendor turnover package for the Montreal Locomotive Works (Worthington) RHR heat exchangers to verify conformance to purchase order and ASME B&PV Code Section III requirements. The heat exchangers are removable bun le

"U" tube shell and tube design. The materials of construction are carbon steel shell, tube sheet and heads with copper alloy 715 (70-30 Cu-Ni) tubes welded to a compatible weld clad tubesheet. The material certifications, filler metal certifications, weld history map, and fabrication nondestructive testing results were reviewed. The shell side of the unit is designed and fabricated to ASME Section III (1971, Winter 1972) Class 2 requirements and the tube side to Class 3. Review of the N-1 Code Data Reports indicated that line 10 ("Tubes:") did not indicate the actual copper alloy identification but only the basic specification, i.e., ASME: B395. Review of the documentation package indicated the design called for Alloy 715 drawn and stress relieved temper (DSR) tubes. The Phelps Dodge certified test reports indicated these tubes were supplied. The licensee clarified the information on the test report by issuing a letter for inclusion with the Data Reports stating the correct tube material composition and temper as confirmed by GE letter EAG-4698 dated October 27, 1983. Review of the HX documentation indicated compliance to applicable Codes and Standards.

No violations were identified.

5. Preservice Inspection (PSI)

5.1 PSI Program

5.1.1 Applicable Edition - ASME Code, Section XI

The licensee has elected to comply with Section XI, 1974 Edition including the Summer 1975 Addenda to govern the performance of PSI at Unit 2. This selection will be modified by requests for relief from specific code requirements which the licensee determines are impractical. All such requests with technical justification for the relief must be submitted to the NRC for review and approval. Seven relief requests have been submitted to the NRC at this time, and were noted by the inspector to be similar to requests which were approved by the NRC for Susquehanna, Unit 1. The licensee stated that additional relief requests are anticipated based on collected examination data.

5.1.2 Section XI Requirements

The Residual Heat Removal (RHR) System and the Reactor Recirculation System were selected for review to ascertain that the facility PSI Program meets the ASME Section XI requirements regarding examination items.

The inspector's review included the following:

- Document 80A-4745, "PSI Program Plan - RHR System"
- Document 80A-4751, "PSI Program Plan - Reactor Recirculation System"
- System Isometric Weld Identification Drawings for the aforementioned systems

The inspector found that the program established for the reviewed systems met the Section XI requirements found in Tables IWB-2500 and IWB-2600 for Class 1 items and in Tables IWC-2520 and IWC-2600 for Class 2 items.

No violations were identified. However, licensee staff were unable to answer questions regarding the program without frequent consultations with the PSI contractor. This, together with data review problems discussed below, leads to an assessment of weakness in the degree of licensee involvement in the PSI program. (50-388/83-19-06)

5.2 PSI Data Review

Selected ultrasonic examination data associated with 167 ASME Class 1 and 2 welds in the following systems were reviewed:

- Core Spray
- RHR
- Main Steam
- Reactor Water Clean-up

The review was done to ascertain that the examinations were done in compliance with the governing procedure and that applicable ASME Code and Regulatory requirements were met. The review was done, additionally, to ascertain the consistency of evaluations and dispositions with the recorded results. Specific welds reviewed are identified in Table A. Nine of these welds were selected for independent NRC ultrasonic inspection as described in Section 5.4.

The review disclosed the following:

- Various data sheets contain sketches depicting angle beam paths in the examination material, ("S" curves for example), which do not follow the conventional 45° angle beam metal path. No explanation for this is provided.

- In several instances, the cause of indications is not identified.

- Indications are attributed to grain boundaries or "dendritics" (to use the report language), but no documentation was available to show that the suspected cause was verified.

In response to the inspector's questions, the licensee representative stated that no independent verification of NDE results was done by licensee personnel.

The inspector found that the examinations were done in accordance with applicable requirements, but the data indicated areas where more complete evaluation of results is needed. No violations were identified.

The inspector considered the lack of independent verification and evaluation as further examples of weakness in the licensee's involvement in PSI activities.

5.3 PSI Procedure Review

The inspector selected procedure number 80A-2771 for review. This document is the governing ultrasonic examination procedure for piping welds in the plant.

The inspector questioned the use of a 35° beam angle (paragraph 4.3.1) for the examination of certain piping welds for the detection of transverse reflectors. Procedure 80A-2771 based the use on calibration blocks that have "excessive ID/OD ratios." The inspector stated that the criteria for using the 35° angle should be specific and not based on "excessive ID/OD ratios." Field Change No. 001, dated 10/27/83 was prepared and made part of procedure 80A-2771. The change established a thickness/diameter ratio of 0.15 as the maximum ratio permitting the use of a 45° beam angle. Documentation associated with the calibration blocks which precluded the use of a 45° beam verified that 45° was not adequate for the required examination. The data regarding welds which were examined with 35° indicated that the weld thickness/diameter ratio precluded the use of 45°.

At the inspector's request and in his presence, confirmatory thickness measurements were made by the licensee on weld DBB-222-1-3-B, a Tee to Flange weld in the Reactor Water Clean-up System which had been examined using a 35° beam angle. The results confirmed the need for using 35°. The inspector had no further questions regarding this matter.

No violations were identified.

5.4 Independent NRC PSI Inspection:

An independent NRC inspection was performed. The inspection consisted of a volumetric ultrasonic examination of nine weldments selected by NRC personnel. These weldments had previously been examined by the licensee with the results reviewed and discussed in Section 5.2 above.

The ultrasonic inspection was performed in accordance with ASME Section XI, 74 through summer 75 addenda and licensee's procedures as applicable.

Table 1 is a brief summary of those weldments inspected and results obtained. Results are based on verification of licensee's inspection and documentation and NRC's independent measurements.

Table 1

LINE/SYSTEM	WELD ID	COMMENTS	RESULTS
DCA-210-2 RHR	FW 2 S/S	45° scan flued head side only, 100% axial and circ. scan was performed with a single vee path with a noise level 20% of screen height.	See Note 1
DCA-210-2 RHR	FW 3 S/S	45° scan flued head to pipe 100% axial both sides, could not damp out indications.	See Note 2
DCA-211-2 RHR	FW 1 S/S	45° scan 100% axial both sides elbow to elbow.	Acceptable
DCA-208-1 RHR	FW 11 S/S	45° scan elbow side only single vee path 95% axial pressure connection adjacent to weld area.	Acceptable
GBB-204-3 RHR	FW 3 C/S	45° scan pipe side only 90% axial, weldolet located in scanning area.	Acceptable
HBB-211-2 RHR	FW 14 C/S	45° scan elbow side only 100% axial.	Acceptable
GBB-204-3 RHR	FW 15 C/S	45° scan pipe side only 100% axial.	Acceptable
DBB-222-1 RWCU	FW 7 C/S	45° scan tee to valve tee side only. 50% axial limited scanning area caused by tee.	Acceptable
DBB-222-1 RWCU	3 B C/S	45° scan tee to flange tee side only 100% axial and circ.	Acceptable

NOTES FOR TABLE 1

Note 1: Weld DCA-210-2-FW-2 could not be inspected 100% due to the contour of the weld. There was not sufficient filler metal across the face of the weldment to allow movement by the transducer to perform the examination using a 1/2 vee path and a full vee path could not be used due to interference in the second leg of the vee path that could mask indications. This inspection verifies licensee's contractor's findings.

Note 2: DCA-210-2-FW-3. Contractor's documentation was not drawn to scale and therefore, the metal path may not be as shown. U.T. inspection performed by NRC had essentially the same indications as the contractor. It could not be determined if the indication was at the surface of the material as indicated by licensee documents. Disposition of these indications is an unresolved item (50-388/83-19-07).

In addition to the ultrasonic inspection of pipe weldments, forty Hilti bolts were inspected ultrasonically for length only per NRC procedure NDE 18, Revision 0. Bolts were of various sizes and lengths and located in the Standby Liquid Control areas. All bolts were found acceptable per criteria and drawings.

5.5 Radiographic Film Review

During the preservice ultrasonic data review, weld DCA-210-2-FW-2, required further evaluation. The radiographic film was reviewed by an NRC inspector; an elongated indication of several inches was apparent at radiographic film area 12 thru 18. This indication was not identified nor dispositioned by the licensee. The licensee committed to reperform radiography. This is considered an unresolved item (50-388/83-19-10), pending further investigation and disposition by the licensee.

5.6 Summary

This portion of the inspection involved a review of the PSI program, examination data, procedures and the performance of confirmatory ultrasonic examinations of nine selected welds.

Data associated with 167 welds were reviewed. The RHR and Recirculation systems were examined systematically to ascertain compliance with ASME Section XI requirements.

As a result of this inspection, a minimum of licensee involvement in PSI activities, both in determination of the program and review and disposition of data obtained, leads to an assessment of weakness.

6. Welder and Material Qualifications

6.1 Welder Qualification

The inspector reviewed the Bechtel Welder Performance Qualification activities for conformance to ASME Section IX, AWS D1.1 and Bechtel FP-W-1 requirements. The inspection consisted of an indepth review of the program, inspection of the facilities, observation of welder qualification activities, review of methods used to mitigate falsification, inspection of equipment and interviews with personnel including welders. No indication of falsification of qualification records or other improprieties were noted. The activities meet applicable Codes and Standards requirements. Although the system lacks overview by independent organizations, there is QC surveillance of the activities and random Authorized Nuclear Inspector (ANI) checks of these activities. The accept/reject rates for welder qualification are tabulated on a cumulative basis on the Bechtel WR-9 weekly report form and are not atypical. No violations were identified.

6.2 Weld Quality Records

The inspector reviewed completed Quality Control Inspection Reports (QCIR's) for conformance to Specification 8856-M-204 and ASME B&PV Code, Section III, requirements. The records reviewed were selected from welds identified in RHR system walkdown inspections, a sample from the main steamline, and random welds selected from the Bechtel WR-9 weekly report system. Included in the review were original and repair welds on large pipe and small pipe systems. Carbon steel and stainless steel weld records were reviewed. Minor clerical errors were noted which were errors of transcribing rather than errors in recording welding data and parameters. In most cases, these errors were identified and had been corrected by FWE review of the quality packages. The minor clerical errors, if uncorrected, have no safety significance. Minor confusion was caused by records of filler metal issued for tack welding (or weld joint preparation purposes) prior to QC signoff of the QCIR for initiation of joint welding; however, the inclusion of filler metal issue slips as an integral part of the quality records is verification in the weld joint preparation period. In most cases, these issue slips state that the filler metal is "to be used for tack welding only." Lack of the tack welding rate does not constitute a significant Quality Assurance problem.

Review of the records included review of applicable NDE examinations conducted and results of these examinations. Complete welder qualification record files for welders identified in the specific weld joint quality records were checked in both the Document Control Record System and the Weld Test Shop files. These records covered the complete range of qualifications, not just the records applicable to specific joint records. The welder performance qualification records met ASME Section IX requirements. A review of the Bechtel WR-9 records from 1/13/83 to 8/19/83 indicated that the defect

percentage on a linear inch basis did not radically change during the period reviewed and is not inconsistent with other construction sites. The ratio of Field Welding Engineers (FWE) to the number of pipefitter welders increased from 1982 to 1983. The ratio of FWE's to craft workers is typical for other Bechtel sites and is considered to provide adequate FWE coverage of welding activities.

In summary, the review of weld quality records of welds examined in walkdown system inspections and random selections met Bechtel and ASME Code requirements.

No violations were identified.

6.3 Control of Welding in the Plant Modification Organization (PMO)

The licensee and Bechtel established an interim organization to control activities upon completion of field fabrication and erection and until such time as the licensee assumes full supervision of all activities. The inspector reviewed the activities associated with welding, whose scope includes the following:

1. Permanent plant welding to ASME, ANSI B31.1 and AWS Codes,
2. Filler metal control,
3. Welder performance qualifications, and
4. Nondestructive testing of welds.

The control of welding was reviewed for conformance to PMO (Bechtel) FP-W-4 (Rev. 0) and applicable ASME, AWS and ANSI Codes and Standards. The PMO organization utilizes the Bechtel Project Superintendent and Lead Field Welding Engineer who have the responsibility for insuring that welding is accomplished in accordance with FP-W-4 requirements. The PMO organization utilizes Bechtel qualified PQR documents for qualification and justification of Bechtel WPS documents. The Bechtel BQAM ASME Section III document is utilized to provide QA control of the PMO Welding Activities.

FP-W-4 (Rev. 0) establishes controls for welder performance qualification expiration and ASME Section XI repair welding procedures. The document is limited in process applicability to the gas tungsten arc (GTA) and shielded metal arc (SMA) welding processes.

The inspector observed retraining and welder performance qualification of a previously qualified Ironworker welder whose qualifications lapsed during his tenure as a Welding Foreman.

The PMO control of welding procedures meet applicable ASME, ANSI and AWS Codes and Standards requirements and also provide for systematic control of "Non-Q" welding. The PMO program as constituted represents a system for controlling welding that is familiar to the licensee personnel as being essentially a continuation of the Bechtel construction program. The inspector had no further questions.

No violations were identified.

6.4 Valve Material Certifications

The inspector reviewed material certification and QA documentation for selected valves in the RHR process system being examined by the inspection team. The certification and documentation packages were reviewed for conformance to specification 8856-M-204 and ASME Section III material requirements. The valves reviewed were made by Pacific Valves utilizing Pacific Southern Foundry castings and Anchor Darling valves using Dodge Steel Castings. The following valves were reviewed: HV 2F015, HV 2F050B, HV 2F003B, HV 2F028B, HV 2F024B, HV 2F034B, and HV 047B. The purchase orders (P.O.) were obtained by using the valve index. The P.O. file then yielded the item number and QCIR numbers. As many of the P.O.'s ordered multiple valves with additional QCIR numbers, therefore more QCIR files were reviewed than are represented by the above valve list. All of the valves reviewed had cast carbon steel bodies and bonnets.

The Pacific Valves reviewed, e.g., P12R41074-1 (HV 2F003B), indicated that the castings were repair welded in the as-cast condition, using E7018 filler metal and the shielded metal-arc welding (SMAW) process and E70T-1 filler metal and the self-shielded flux cored arc welding (FCAW) process. The filler metal for repair welding was purchased with material certifications utilizing a subcritical (1125 ± 25F) simulated post weld heat treatment (PWHT). Following repair welding, the castings were subjected to the casting material heat treatment, i.e., a supercritical (1650F) normalizing heat treatment which is not consistent with standard practice.

The Anchor Darling valves reviewed, (e.g., P12R34696-1 (HU 2F034B)) showed that the valve castings were repair welded with the casting in the heat treated condition, then subjected to a subcritical PWHT which is consistent with normal accepted metallurgical practice.

The Pacific Valves were repair welded in accordance with Pacific Southern Foundries WPS 1-1-WP-2N. The original WPS required a 200F preheat and subcritical 1150 ± 50F - 2 hour PWHT. The revised WPS requires a 200F preheat and 1650F - 2 hour supercritical PWHT (which is also the casting material heat treatment). Although procedure qualification record (PQR) documents are available for qualification and justification of the welding procedure specification (WPS) in both heat treated conditions, the supercritical PWHT is a heat treatment which is not normally considered compatible with low carbon weld metal which owes its tensile properties to fast cooled acicular ferrite microstructures. The supercritical PWHT invalidates the filler metal material certifications which were tested in a subcritical simulated PWHT.

The supercritical heat treatment of the Pacific Valve welding repairs utilizing Pacific Southern Foundry castings is considered an unresolved item pending review of licensee justification that the repaired castings with slow cooled normalized structures meet minimum engineering requirements in the (repair) weld metal areas. (388/83-19-08)

No violations were identified.

6.5 Induction Heating Stress Improvement (IHSI)

The inspector reviewed the data package for heat treatment of austenitic stainless steel weldments to mitigate intergranular stress corrosion cracking (IGSCC). The licensee subcontracted Ishikawajimama-Harima Heavy Industries Nuclear Power Division (IHI) to conduct an IHSI treatment on a total of 105 welds. The inspector reviewed the treatment which was conducted to meet the NRR Staff Position on IHSI stated in NUREG 0313 and technical procedures iterated in EPRI NP-81-4-LD and EPRI NP-2527-LD. The licensee conducted IHSI heat treatments on welds in the core spray, RHP, and recirculation loops (including some welds in the reactor water cleanup system). The data indicated that the cooling water temperatures, maximum OD temperatures, minimum weld joint ΔT, and coil width parameters met the engineering heat treatment requirements which should mitigate ID IGSCC. Included in the welds receiving IHSI treatment were the flued head-to-valve welds, e.g., DCA-21[illegible]2 FW-2 discussed in other sections of this report.

Prompt action to negate the potential for IGSCC by utilization of the IHSI treatment is considered a strength in the licensee's program.

No violations were identified.

7. Management Meetings

Team members met with licensee and construction representatives at the corporate offices in Allentown, Pennsylvania, on October 12, 1983, to participate in the licensee presentation of the Engineering Design Control Program, System Turnover Process and tie-in to Unit 1. The scope of the team inspection was presented at this meeting.

Subsequent meetings were held at the construction site on October 17, 21, and 28, 1983, to appraise the licensee of the scope of the inspection and inspection findings. Periodic meetings, as required, were held by team members with the licensee on an individual or group basis to inform the licensee of inspection findings and discussions of possible resolutions and corrective action. The inspection was summarized at the final exit meeting on October 28. At no time during this inspection was written material provided to the licensee or its representatives.

TABLE A

WELDS REVIEWED FOR PSI DATA

ISOMETRIC	WELD NUMBER, TYPE	ISOMETRIC	WELD NUMBER, TYPE
DCA-202-2	1-A, Tee-Reducer	HBB-211-2	FW-14, Valve-Elbow
CA-207-1	FW-3, Valve-Valve	GBB-204-3	FW-15, Pipe-Flange
A-207-2	FW-3, Valve-Valve	DBA-216-1	C-14, Elbow - 2" Branch Connection
A-208-1	FW-11, Elbow-Valve	DBA-216-1	C-14, Elbow - 2" Branch Connection
1-2	FW-1, Elbow-Elbow	DBB-205-2	5-B, Pipe-Elbow
-210-2	FW-2, Pipe-Flued Head	DBB-205-2	5-C, Pipe-Elbow
210-2	FW-3, Pipe-Flued Head	DBB-205-2	5-C, Pipe-Elbow
210-2	FW-5, Pipe-Pipe	DBB-205-2	5-D, Pipe-Elbow
A-212-1	1B, Pipe-Tee	DBB-205-2	4-C, Pipe-Tee
A-212-1	FW-2, Pipe-Flange	DCA-210-2	FW-9, Pipe-Valve
211-3	FW-12, Elbow-Flange	DCA-210-2	FW-8, Pipe-Valve
DBB-222-1	FW-7, Tee-Valve	DCA-210-2	1-B, Pipe-Elbow
DBB-222-1	FW-4, Elbow-Valve	GBB-215-1	5-A, Pipe-Elbow
DBB-222-1	3-B, Tee-Flange	GBB-206-2	2-BC, Pipe-Elbow
GBB-204-3	FW-3, Pipe-Weldolet	GBB-206-2	2-BD, Pipe-Elbow
GBB-205-1	FW-5, Elbow-Nozzle	GBB-206-2	2-BD, Pipe-Elbow

ISOMETRIC	WELD NUMBER, TYPE	ISOMETRIC	WELD NUMBER, TYPE
GBB-205-1	2-F, Pipe-Elbow	*HBB-201-3	2-C, Pipe-Elbow
GBB-205-1	2-F, Pipe-Elbow	HBB-211-2	FW-14, Pipe-Elbow
GBB-205-1	2-B, Pipe-Elbow	GBB-209-2	1-D, Pipe to Tee
GBB-205-1	2-A, Pipe-Elbow	GBB-209-2	1-C, Reducer to Pipe
GBB-205-1	FW-4, Pipe-Tee	GBB-209-2	FW-6, Elbow to Valve
GBB-205-1	1-F, Pipe-Tee	GBB-209-2	1-E, Pipe to sweep o let
GBB-205-1	1-H, Pipe-Tee	GBB-209-2	3-A, Pipe to Tee
GBB-205-1	1-L, Pipe-Pipe Cap	GBB-209-2	4-D, Pipe to Tee
GBB-205-1	1-G, Tee-Tee	GBB-209-2	4-AE, Pipe to Elbow
GBB-205-1	FW-3, Pipe-Valve	GBB-209-2	FW-9, Pipe to Tee
GBB-206-2	4-A, Pipe-Elbow	GBB-209-2	5-F6, Pipe to Elbow
DBB-213-1	FW-3, Pipe-Pipe	GBB-209-2	2-B, Pipe to Elbow
DBA-214-1	A-14, Elbow - 2" Branch Connection	GBB-209-2	4-B, Pipe to Elbow
GBB-204-1	FW-9, Pipe to Valve	GBB-209-2	4-C, Pipe to Sweep o let
GBB-204-1	5-A, Pipe to Elbow	GBB-209-2	FW-3, Elbow to Tee
GBB-204-1	5-B, Pipe to Reducer	GBB-209-2	FW-1, Pipe to Tee
GBB-204-1	4-A, Pipe to Reducer	GBB-209-2	4-H, Pipe to Tee

ISOMETRIC	WELD NUMBER, TYPE	ISOMETRIC	WELD NUMBER, TYPE
GBB-204-1	FW-5, Pipe to Elbow	GBB-209-2	FW-6, Elbow to Valve
GBB-204-1	3B-B, Pipe to Elbow	GBB-209-2	1-E, Pipe to sweep o let
GBB-204-1	3A-A, Pipe to Elbow	GBB-209-2	3-A, Pipe to Tee
GBB-204-1	FW-3, Pipe to Valve	GBB-209-2	FW-1, Pipe to Tee
GBB-204-1	FW-6, Reducer to Tee	GBB-209-1	2-A, Pipe to Elbow
GBB-204-1	5-C, Reducer to Tee	GBB-209-1	2-B, Pipe to Elbow
GBB-204-1	7-B, Pipe to Elbow	GBB-209-1	2-C, Pipe to Tee
GBB-204-1	5-D, Pipe to Tee	GBB-209-1	FW-3, Pipe to Valve
GBB-204-1	FW-8, Pipe to Valve	*GBB-209-1	3F-G, Pipe to Elbow
GBB-204-1	FW-13, Pipe to Flange	GBB-209-1	3A-B, Pipe to Elbow
GBB-204-1	FW-14, Pipe to Flange	GBB-209-1	FW-3, Pipe to Valve
GBB-209-2	1-B, Reducer to Tee	GBB-209-1	FW-18, Pipe to Tee
GBB-209-2	FW-4, Pipe to Valve	GBB-209-1	FW-8, Pipe to Tee
GBB-209-2	2-C, Pipe to Valve	GBB-209-1	4-B, Pipe to Elbow
GBB-209-2	2-A, Pipe to Elbow	GBB-209-1	4-C, Elbow to Pipe
*GBB-209-2	FW-2, Pipe to Tee	DBB-207-1	1-B, Pipe to Elbow
24" DBB-207-2	1-A, Elbow to Pipe	*DBB-207-1	1-B, Elbow to Pipe

24" DBB-207-2	1-A, Pipe to Elbow	*DBB-207-1	FW-2, Pipe to Elbow
24" DBB-207-2	FW-3, Pipe to Elbow	24" DBB-207-1	1-A, Pipe to Elbow
24" GBB-206-1	5-C, Pipe to Elbow	24" DBB-207-1	FW-3, Pipe to Elbow
24" GBB-206-1	5-B, Pipe to Elbow	24" GBB-206-1	5-A, Pipe to Tee
24" GBB-206-1	FW-10, Pipe to Elbow	24" GBB-206-1	4-A, Pipe to Elbow
24" GBB-206-1	FW-9, Pipe to Flange	24" GBB-206-1	FW-8, Pipe to Flange
GBB-206-1	FW-8, Pipe to Elbow	*GBB-206-1	3-A, Pipe to Elbow
GBB-206-1	FW-7, Pipe to Elbow	GBB-206-1	2-D, Pipe to Elbow
GBB-206-1	2-C, Pipe to Elbow	GBB-206-1	2-B, Tee to Pipe
GBB-206-1	2-A, Tee to Pipe	GBB-206-1	FW-6, Tee to Pipe
GBB-206-1	FW-5, Tee to Flange	GBB-206-1	1-B, Tee to Flange
GBB-206-1	1-A, Pipe to Tee	GBB-206-1	1-C, Tee to Flange
GBB-206-1	FW-1, Pipe to Valve	GBB-206-1	FW-3, Weldolet to Elbow
24" GBB-204-1	FW-1, Pipe to Valve	24" GBB-204-1	FW-2, Elbow to Pipe
24" GBB-204-1	7-A, Elbow to Flange	24" GBB-204-1	1-B, Elbow to Flange
24" GBB-204-1	FW-10, Elbow to Valve	24" GBB-204-1	4-B, Elbow to Reducer
24" GBB-204-1	FW-4, Elbow to Valve		

* Examination results evaluations do not identify cause of indications.