

U. S. NUCLEAR REGULATORY COMMISSION
 OFFICE OF NUCLEAR REACTOR REGULATION
 DIVISION OF REACTOR INSPECTION AND LICENSEE PERFORMANCE

ORGANIZATION: BW/IP INTERNATIONAL, INC.
 VERNON, CALIFORNIA

REPORT NO.: 99900030/93-01

CORRESPONDENCE ADDRESS: BW/IP International, Inc.
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NUCLEAR INDUSTRY ACTIVITY: Manufacturer of valves and pumps used in nuclear safety-related applications

INSPECTION CONDUCTED: December 6-9, 1993

TEAM LEADER: Robert L. Pettis Jr. 2/24/94
 Robert L. Pettis, Jr., P.E. Date
 Reactive Inspection Section No. 1
 Vendor Inspection Branch (VIB)

OTHER INSPECTORS: R.P. McIntyre, Senior Reactor Engineer, VIB

APPROVED: for Robert L. Pettis Jr. 2/24/94
 Uldis Potapovs, Chief Date
 Reactive Inspection Section No. 1
 Vendor Inspection Branch

INSPECTION BASES: 10 CFR Part 21 and 10 CFR Part 50, Appendix B

INSPECTION SCOPE: Review selected 10 CFR Part 21 reports submitted to the NRC and corrective actions which resulted from the previous NRC inspection.

PLANT SITE APPLICABILITY: Numerous

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1 INSPECTION SUMMARY

1.1 Violations

No violations were identified during the inspection.

1.2 Nonconformances

1.2.1 Contrary to Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50 (Appendix B), and BW/IP International, Incorporated (BW/IP), Procedure L-A-16, "Product Defect Reporting In Compliance with 10 CFR Part 21 Requirements," dated March 9, 1990, BW/IP could not produce documentation to support notification to 5 of 15 licensees of the results of its 10 CFR Part 21 Evaluation Board for Deviation CFR 91-004. The Deviation related to cast components supplied by ACME Castings, Incorporated (ACME), who failed to pass down 10 CFR Part 21 requirements to its subvendors providing heat treatment services. Additionally, ACME's Appendix B quality assurance (QA) program was identified as unacceptable by BW/IP. BW/IP reported the defect to the NRC on October 2, 1989. (93-01-01)

1.2.2 Contrary to Criterion V, "Instructions, Procedures, and Drawings," of Appendix B, and BW/IP Procedure L-A-16, "Reporting of Defects and Failures to Comply in Nuclear Products and Services," dated July 29, 1992, (which supersedes L-A-16, dated March 9, 1990), BW/IP notified the NRC of known defects with check valves (CFRN-9301, dated February 12, 1993, and CFRN-9302, dated February 18, 1993), yet did not notify their customers of the defect until November 30, 1993, after the NRC contacted BW/IP concerning the scope of the December 6, 1993, inspection. Two separate examples of this nonconformance have been identified and are referred to as Part A and B. (93-01-02)

1.2.3 Contrary to Criterion VII of Appendix B, "Control of Purchased Material, Equipment and Services," and BW/IP Specification PS-1535, paragraph 3.3.3, which is referenced as a procurement document in Purchase Order (PO) V 407811, dated April 28, 1992, to Delta Centrifugal Corporation for American Society for Testing and Materials (ASTM) ASTM A-743 castings, BW/IP quality control accepted, on June 17, 1992, a Type 420 casting procured under this PO having a hardness of 262 Brinell hardness number (BHN) as indicated on the Certified Material Test Report (CMTR), which exceeded the specification limit of 255 BHN. (93-01-03)

1.2.4 Contrary to Criterion VII of Appendix B, "Control of Purchased Material, Equipment, and Services," and Paragraph B of BW/IP PO V 413444, dated January 11, 1993, to Nova Machine Products Corporation (NOVA) for eight ASME SA-193 Grade B6 studs, BW/IP accepted a material certification provided by NOVA which did not identify the supplying mill or identify the mill's quality system program or the approving organization. (93-01-04)

2 STATUS OF PREVIOUS INSPECTION FINDINGS

2.1 (Closed) Violation 89-01-01

Contrary to Section 21.21, "Notification of failure to comply or existence of a defect," of 10 CFR Part 21, BW/IP could not provide documentation to support their basis for informing TU Electric, in a letter dated June 22, 1989, that a previous deficiency related to the adjustment height of the swing arm did not constitute a reportable condition pursuant to the provisions of 10 CFR Part 21. This condition led to excessive backleakage through 13 safety-related swing check valves. In addition, BW/IP also failed to notify all of its nuclear customers of the deviation. A 10 CFR Part 21 report would have resulted if BW/IP had evaluated the deviation. Also, BW/IP had not initiated an evaluation of a broken cast swing arm which was metallurgically tested and determined to have material flaws (hot cracks).

With respect to the adjustment height issue, BW/IP notified all of its customers on September 22, 1989, of the deviation and the steps necessary to prevent improper valve operation pursuant to BW/IP Tech Alert No. 8909-77-001. With respect to the broken cast swing arm issue, BW/IP reported the deviation to the NRC on October 2, 1989. The NRC issued Information Notice 90-03 on the subject on January 23, 1990.

2.2 (Closed) Nonconformance 89-01-02

Contrary to Criterion III, "Design Control," of Appendix B, BW/IP failed to adequately review for suitability, eight replacement swing arms supplied to the Comanche Peak Steam Electric Station (CPSES). The swing arm, classified by BW/IP as a critical nonpressure boundary item, is essential to the operation of the swing check valve used in various safety-related applications at the CPSES and other nuclear facilities.

BW/IP stated that it fabricated the swing arms as safety-related in accordance with its Appendix B QA program, however, BW/IP acknowledges the NRC position concerning its dedication program. Since the inspection, BW/IP has participated in various industry sponsored meetings and seminars to improve its dedication practices. These included participating in a dedication seminar for commercial grade items, presented by General Electric on June 15, 1990; the Valve Manufacturers Association Quality Conference held in Houston, Texas, in 1991, which 16 other companies attended; Nuclear Procurement Issues Committee (NUPIC) Supplier Meetings in 1991, 1992 and 1993, in which the Electric Power Research Institute's (EPRI's) "Supplemental Guidance for EPRI Report NP-5652," dated June 4, 1993, was presented (1993 meeting); and several others. In July 1990, BW/IP developed Engineering Procedure B3-6, "Utilizing Commercial Items in Safety-Related Components," which references EPRI NP-5652 and NP-6405, in addition to other Los Angeles Operations (LAO) procedures. According to BW/IP, the procedure has had limited use since its inception. The NRC inspection team did not review the adequacy of the procedure during the inspection.

2.3 (Closed) Nonconformance 89-01-03

BW/IP failed to audit 17 suppliers of nuclear safety-related items due to their status as holders of an American Society of Mechanical Engineers (ASME) Quality System Certificate (QSC).

BW/IP acknowledged the NRC position on auditing ASME QSC holders, pursuant to NRC Information Notice 86-21, and on June 1, 1990, revised Section 7-3.3(7) of its Nuclear Program Quality Manual (NPQM) to require an implementation audit of QSC and Certificate of Authorization holders prior to use of the material. The procedure also states that a follow-up audit will be performed every three years thereafter for maintenance on BW/IP's approved vendor list (AVL). Since implementation of this policy, over 15 QSC holders currently on the AVL have been audited.

2.4 (Closed) Nonconformance 89-01-04

BW/IP failed to qualify ACME as a supplier of safety-related quality level (QL) QL-3 (safety-related) and QL-4 (military) items. ACME's quality program, based on Military Specification MIL-I-45208A, was disapproved by BW/IP on November 11, 1985. On June 8, 1987, ACME's vendor status was changed to that of a QL-3 and QL-4 supplier based solely on ACME's certification that they comply with the provisions of 10 CFR Part 21.

On September 28, 1989, BW/IP, together with TU Electric, audited ACME and identified several deficiencies within the implementation of ACME's quality program which included, for example, improper identification, segregation and control of nonconforming material, and inadequate documentation of inspection and testing personnel training and qualification records. The audit results were documented on Request for Corrective Action (RCA) 89-17. Based on these results, the NRC requested that BW/IP review POs placed with ACME to identify where potential nonconforming material may have been used, notify affected customers, and evaluate such deviations pursuant to the requirements of 10 CFR Part 21.

BW/IP evaluated all POs placed with ACME since 1978 and referred the issue to its 10 CFR Part 21 Evaluation Board for disposition. The Board concluded that for Deviation CFR 91-004 there was no impact, however notification of the Board's results was requested to be sent to all BW/IP pump and valve customers as noted in an October 2, 1991 letter. Notification was intended for 15 utilities and stated that implementation of the recommended inspections described in the letter is sufficient to assure the identified parts will perform their intended safety function. However, there was no documentation in the file to support notification to Commonwealth Edison, Tennessee Valley Authority (TVA), TU Electric, Southern California Edison and Carolina Power and Light. The corrective actions mainly addressed the potential for improper heat treatment by ACME since they had insufficient documentation to identify the provider of the heat treatment.

ACME furnished BW/IP with pump impellers, reactor coolant pump case wear rings, valve swing arms and gate guides, valve seats and clevises. After a follow-up audit of ACME by BW/IP on September 18, 1990, identified open and

unresolved deficiencies, previously identified in RCA 89-17 almost one year earlier, BW/IP issued Instruction Notice 90-19, dated September 20, 1990, to formally remove ACME from the AVL as a QL-3 supplier. Nonconformance 93-01-01 was identified during this part of the inspection.

2.5 (Closed) Nonconformance 89-01-05

BW/IP failed to survey initially and audit triennially 43 suppliers of safety-related QL-1, 3 and 4 items currently on the BW/IP AVL.

BW/IP revised its AVL to delete the 43 vendors. This was reviewed during the inspection.

2.6 (Closed) Nonconformance 89-01-06

Quality Survey/Audit Reports and Quality Audit Checklists for vendors/suppliers evaluated by BW/IP are incomplete and/or inadequate to determine that the supplier's quality program had been effectively implemented.

BW/IP deleted Eagle Pattern & Manufacturing Company from its AVL on September 29, 1989, and placed limitations on two other suppliers (GMC Precision Tool and Toolex) which are now limited to only providing machining services for LAO provided material. These limitations were documented in a BW/IP Vendor Status Memo (VSM) dated February 12, 1990. BW/IP also performed a computer search of POs placed with M&N Metals, Incorporated (M&N), to determine any impact on material purchased. Although the results of BW/IP's review were not documented, BW/IP stated that the material supplied to them on the five POs identified was not affected. However, BW/IP deleted M&N from its AVL per a VSM dated February 12, 1990.

2.7 (Closed) Nonconformance 89-01-07

Contrary to Criterion XVI of Appendix B and Section 16, "Corrective Action," of the BW/IP NPQM, RCAs are not issued for conditions detrimental to quality for nonpressure boundary, non-ASME Code, safety-related items.

BW/IP revised Section 16-1 of its NPQM to clarify that RCAs are applicable to document deficiencies in non-ASME Code, safety-related items. Revision 1, to Section 16-1.2, now states that conditions adverse to quality shall be documented and corrected using RCAs.

2.8 (Closed) Nonconformance 89-01-08

Contrary to Criterion XVII, "Quality Assurance Records," of Appendix B and Section 17, "Control and Maintenance of Quality Records," of the BW/IP NPQM, an adequate system for quality record retention and retrieval did not exist.

BW/IP stated that although design calculations exist for all ASME Code pressure boundary parts, design calculations for other than pressure boundary parts were not required to be retained by Section 17 of BW/IP's NPQM in effect at the time. These calculations would have been performed by BW/IP at its Van

Nuys, California, plant prior to the transfer in 1985 of the valve product lines to the Vernon, California, plant. BW/IP's interpretation of Criterion XVII of Appendix B is that retention of design calculations is not a mandatory requirement since they are not specifically mentioned in the list of the types of records to be retained.

2.9 (Closed) Nonconformance 89-01-09

Contrary to Criterion XVIII, "Quality Assurance Records," of Appendix B, Engineering Change Notices and supporting engineering analyses were unavailable to support field changes of bolt torque specifications implemented as a result of two deficiency reports submitted by the TVA to the NRC, for a 6-inch and 12-inch motor operated gate valve installed at the Bellefonte and Watts Bar nuclear power plants.

BW/IP provided documentation of corrective actions which included a systematic review of other drawings which were generated in the same manner as the nonconformance, and a meeting held with designers, checkers and project engineers. As a result of the inspection team's review of this issue, this item is considered closed.

2.10 (Closed) Unresolved Item 89-01-10

Section 21.51, "Maintenance of Records," of 10 CFR Part 21 requires that records be maintained to assure compliance with the regulation. However, BW/IP was unable to produce records that documented evaluations for three occurrences that were reported to the NRC by licensees in 1981 and 1984. BW/IP stated that these records may be in storage.

BW/IP could not locate such records. Corrective action included revisions to its record keeping and retrieval system to prevent this problem from occurring in the future.

2.11 (Closed) Unresolved Item 89-01-11

BW/IP could not produce the Acceptance Test Procedure (ATP) results for the 3-inch and 4-inch check valves supplied to the CPSES which failed during hot functional testing. BW/IP stated that these records may be in storage.

BW/IP stated that records containing the relevant ATP results were available for review during the inspection. However, time did not permit the NRC inspection team to review such test results. Based on the statement from BW/IP that the documentation exists, this issue is considered closed.

2.12 (Closed) Unresolved Item 89-01-12

Documentation was not available during the 1989 inspection to support the procurement, qualification of suppliers, and the overall nuclear QA program in place at the Van Nuys plant, prior to 1986 for the swing check valve product line. BW/IP stated that these records may be in storage.

BW/IP could not produce the documentation and stated that based upon a number of pre-1986 NRC inspections of the Van Nuys plant records for its valve product line, it concluded that the Van Nuys plant was in compliance with NRC regulations in effect at the time.

3 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 Entrance and Exit Meetings

During the entrance meeting in Vernon, California, on December 6, 1993, the NRC inspection team met with members of the BW/IP staff and discussed the scope of the inspection, and established working interfaces. The inspection team observed activities, held discussions with BW/IP's staff, and reviewed records and procedures. The specific areas, documentation reviewed, and the team's findings are described in this report. The persons who participated in and who were contacted during the inspection are listed in Section 4 of this report. During the exit meeting on December 9, 1993, the inspection team summarized the inspection findings with BW/IP's management and staff.

3.2 Review of 10 CFR Part 21 Reports

To facilitate the review of actions performed by BW/IP in support of 10 CFR Part 21 notifications reported to the NRC, the NRC inspection team reviewed BW/IP Procedures L-A-16, "Product Defect Reporting In Compliance with 10 CFR Part 21 Requirements," dated March 9, 1990, and Policy and Procedure L-A-16, "Reporting of Defects and Failures to Comply in Nuclear Products and Services," dated July 29, 1992, (supersedes L-A-16, dated March 9, 1990), which implements 10 CFR Part 21. The procedures appeared adequate and if properly implemented should provide an effective means of complying with the regulation.

The following notifications, submitted to the NRC pursuant to 10 CFR Part 21, were reviewed during the inspection. The NRC inspection team's review consisted of a review of documentation contained in BW/IP's 10 CFR Part 21 Evaluation Board's files for each item, interviews with personnel, and an examination of representative records and procedures.

3.2.1 (Closed) NRC 92-008 and 92-096

On June 30, 1992, BW/IP notified the NRC of a reportable defect concerning the interchangeability of a swing arm (BW/IP Part Number 72543) for a 3-inch, 900 pound, swing check valve (BW/IP Model 75510). The incident was initially reported to BW/IP by TU Electric on January 16, 1992. The report stated that the swing arm was not completely interchangeable with the original part. An inspection of the part by BW/IP identified critical dimensions to be the same as the original part, except for the elongated stud hole provided for improved seating. BW/IP's evaluation also identified that under the most adverse tolerance stack-up conditions, the part demonstrated no interference with other valve internals. BW/IP concluded that the part was considered equivalent in form, fit, and function to the original part, and that no corrective action is necessary. The report stated that BW/IP would inform its

customers of the potential interference by issuing a Technical Service Bulletin. In July 1992, BW/IP Tech Alert No. 9304-77-003 was issued to eight nuclear utilities potentially affected by this issue.

The Tech Alert stated that no immediate corrective actions are necessary based on the results of an interference study and on field experience of swing check valves of similar design. However, valves in systems subject to rapid flow reversal transients should be identified and evaluated on a case-by-case basis.

3.2.2 (Closed) NRC 92-112

On July 7, 1992, TU Electric submitted an interim report regarding backleakage discovered through auxiliary feedwater (AFW) system check valves at Unit 1 of the CPSES which was previously reported to the NRC on May 19, 1989. On December 21, 1989, TU Electric submitted Final Report (TXX-89849, SDAR CP-89-015) to the NRC for CPSES Unit 1. NRC 92-112 is an interim report which provides corrective action for commitments identified in TXX-89849 concerning Unit 2. Based on the actions taken in response to Unit 1 issues in 1989, including a 10 CFR Part 21 report and the issuance of a BW/IP Technical Service Alert, this issue is considered closed.

3.2.3 (Closed) NRC 93-025

On October 13, 1993, TU Electric notified the NRC of a reportable defect in an Interim Report pursuant to 10 CFR 50.55(e), concerning two manually operated 3-inch gate valves supplied by BW/IP in which the stems had separated from the disks and the disks remained tightly wedged in the seats. It was stated by TU Electric that the cause of the condition appeared to be a design error (oversized handwheels) combined with excessive force being applied during valve operation.

BW/IP stated that they were never notified by TU Electric of this potential design error. On December 11, 1993, TU Electric submitted a Final Report on the defect stating that it was determined that additional administrative controls will be implemented to prevent inadvertent damage during valve operation and additional operator awareness training would be conducted. No further mention was made of a design error by BW/IP.

3.2.4 (Closed) NRC 93-055 and 93-057

On February 12, 1993, BW/IP submitted a 10 CFR Part 21 Notification (CFRN-9301) to the NRC identifying a defect in a basic component which led to the failure of a BW/IP 4-inch, 150 pound, bolted bonnet swing check valve to fully close during pre-operational testing at the CPSES. The top of the disk was found to be lodged under the seat lip, thus preventing full closure. Another valve also located in the component cooling water return line subsequently failed testing in a similar manner. The root cause of the failures to close was due to the configuration of the attachment weld between the disk and the stud. Prior to 1977, this weld was placed on the back surface of the stud and extended into the bushing. In disks manufactured after 1977, the weld was

recessed into the back surface of the disk and a final machine cut was made to assure a flush surface.

BW/IP stated that the notification applied to all BW/IP 4-inch, 150 pound, bolted bonnet swing check valves which have a raised disk-stud retention weld on the back surface of the disk and affected valves would require a new disk component or refurbishment of the existing disk.

BW/IP Policy and Procedure L-A-16, "Reporting of Defects and Failures to Comply in Nuclear Products and Services," effective date July 29, 1992, requires that BW/IP advise purchasers and licensees with like equipment which may be subject to the defect. Contrary to the above, BW/IP did not notify its other customers of this defect until November 30, 1993, almost 10 months after notifying the NRC. As a result, Part A of Nonconformance 93-01-02 was identified during this part of the inspection.

3.2.5 (Closed) NRC 93-071

On February 18, 1993, BW/IP submitted a 10 CFR Part 21 Notification (CFRN-9302) to the NRC identifying a defect in a basic component which led to the failure of a BW/IP 4-inch, 150 pound, bolted bonnet swing check valve to fully close during pre-operational testing at the CPSES. The valve was radiographed and the disk was found to be lodged in the full open position. Subsequent disassembly revealed four points of contact between the disk-swing arm assembly and the body. Failure to close is attributable to the internal body wall protrusions which result from the contact of the two machined bores perpendicular to the flow direction. BW/IP stated that the notification applied to all BW/IP 4, 6, 8, and 10-inch, 150 and 300 pound, bolted bonnet swing check valves which have a two piece forged body construction.

BW/IP further stated that installed valves should be inspected for evidence of disk-body contact at the protrusions and if contact is observed, protrusions should be removed and blended to the internal body contour. Design modifications will be implemented to assure proper operating clearances between the disk and the valve body for new valve applications.

As identified previously in NRC 93-055 and 93-057, BW/IP did not notify their other customers of this defect until November 30, 1993, almost 10 months after notifying the NRC. As a result, Part B of Nonconformance 93-01-02 was identified during this part of the inspection.

3.2.6 (Closed) NRC 93-111

On May 21, 1991, TU Electric submitted to the NRC a voluntary report (the event did not meet the reporting criteria of 10 CFR 50.73) due to interest resulting from previous experience with check valves in the AFW system at the CPSES. The report identified the failure of one of eight 4-inch, 900 pound pressure seal check valves in the AFW to meet acceptance criteria during reverse flow testing on April 18, 1991. TU Electric identified the root cause of the failure as a manufacturing error in the machining process of the valve body casting that allowed excess casting material to remain on the inside surface of the valve body. The affected check valve stuck open due to

interference between the disk counterweight and a lip of the excess casting material on the valve body, allowing reverse flow in one branch of the AFW.

However, the counterweight was added in April 1990 as a design modification to the eight check valves. The TU report also stated under root cause that in an unmodified condition the valve would not have stuck open, and thus, the condition described should not be considered a generic problem for this model check valve in other applications. This is not considered a generic issue.

3.3 Raw Water Pump Impeller Liner Issue

During receiving inspection in June 1993 at the Fort Calhoun Station, Omaha Public Power District (OPPD) identified that the carbon content of impeller liners (castings) purchased from BW/IP were outside of the allowable range permitted by the material specification for ASTM A-487 Grade CA6NM Class A material. BW/IP Deviation Evaluation Summary Sheet CFR 93-009 documented that the impeller liners were supplied to BW/IP by Atlas Foundry (ATLAS) with a material certification that showed all four liners were from the same material heats and to be within specification for carbon content. Both an OPPD material analysis performed by an independent laboratory and an analysis performed by ATLAS confirmed an out-of-specification condition for the carbon content.

ATLAS' review of the situation determined that the out-of-specification condition was an isolated case and was caused by errors by both the furnace operator, who added five pounds of carbon to the melt instead of one-half pound, and the chemistry laboratory operator who misread the 0.29 carbon content as 0.029, as would be expected for CA6NM material.

In order to provide additional assurance that the above condition does not occur again, BW/IP revised the Procurement Specification for Safety Related CA6NM and WCB Castings, PS-1585, Revision A, on December 8, 1993, to include the requirement that hardness shall be reported on the CMTR for all castings. As a result, this issue is considered closed.

3.4 Undersized Fillet Weld Issue

On February 5, 1992, TU Electric informed the NRC that, while disassembling BW/IP check valves on Unit 2 of the CPSES, the clevis on each of two valves was inadvertently broken. The TU Electric engineering review conducted as part of the repair work package identified that the fillet weld holding the clevis to the valve bonnet was approximately one eighth-inch in width, in accordance with BW/IP fabrication drawings.

However, the BW/IP seismic qualification report (Stress Report NSR 454KA1-1), which is generic for all BW/IP swing check valves, analyzed a one quarter-inch clevis-to-bonnet fillet weld attachment, with no credit taken for the capscrew connection. BW/IP stated that the clevis is attached to the bonnet by the capscrew, which is the main load path. In addition, a one eighth-inch fillet weld is placed around the clevis base. BW/IP fabrication drawings and shop practice is to use a one eighth-inch attachment weld. In January 1993, BW/IP reanalyzed the seismic analysis with a one eighth-inch weld as part of

Deviation Evaluation CFR 92-002, which was opened to evaluate the problem for customer notification and potential 10 CFR Part 21 reportability. The new analysis determined that the stresses for a one eighth-inch weld were within the allowable design stress limits without taking credit for the capscrew. The analysis also determined that, without the weld, the bolted connection alone was fully capable of supporting the entire load.

BW/IP valve engineering identified approximately 145 similar check valve installations that still exist that were analyzed with the one quarter-inch fillet weld and no credit for the bolt. Following the inspection, BW/IP provided to the NRC a Deviation Evaluation Summary Sheet (DESS), dated January 6, 1994, which closed the issue. The DESS stated that the weld is classified as a non-structural, non-pressure boundary attachment weld. The calculations show that the bolt (which was not considered in the original seismic analysis) is the primary load carrying component. Further calculations were performed of the bolt stresses under seismic loads ignoring the clevis to bonnet weld for different valve and bolt sizes. All results were well within the allowable stress limits by a significant margin. BW/IP corrective actions included notification to all customers by January 31, 1994. As a result, this issue is considered closed.

3.5 Material Procurement

BW/IP's AVL was reviewed and recent procurement documents from selected vendors on this list were examined to assess the effectiveness of quality assurance implementation in this area. As a result of this review, two nonconformances were identified.

1. On April 28, 1992, BW/IP issued PO V 407811 to Delta Centrifugal (DELTA) for a QL 3 ASTM A-743, CA 40F, TP 420 casting, 6.625-inch outside diameter, 2.250-inch inside diameter, 102-inch long for stock. The material was to be supplied in accordance with the BW/IP approved quality program description dated March 8, 1989. The PO also invoked BW/IP Specification PS 1535, Revision B, paragraphs 2.0, 3.3.3, and 3.3.4. BW/IP Quality Control accepted this material as meeting the PO requirements on June 17, 1992.

The NRC inspection team's review of DELTA's CMTR indicated measured hardness level of 262 BHN. This value exceeds the maximum hardness limit of 255 BHN specified in paragraph 3.3.3 of the referenced BW/IP material specification. The acceptance of nonconforming material without adequate justification was identified as Nonconformance 93-01-03. Before the completion of this inspection, BW/IP executed a Nonconformance Report which provided an acceptable technical basis for acceptance of the nonconforming material.

2. On January 11, 1993, BW/IP issued PO V 413444 to Nova Machine Products Corporation (NOVA) for eight 0.750 inch-10 UNC studs meeting the requirements of ASME SA-193 Grade B6 and BW/IP Specification IT-5461, paragraphs 3.3, 4.4, and 5. Paragraph 3.3 of this specification states that a certification of material is required for this part. It also states that this certification is normally a mill certificate reporting

the actual test values of chemical analysis and mechanical properties and certificate of heat treatment per the material specification.

Paragraph B of the PO requires that, if subtier suppliers not holding ASME QSCs are used, their quality system program revision and date and the name of the approving organization to whom the material is being supplied must appear on the subtier CMTR. Paragraph K of the PO requires the identification of the mill supplying the material.

A review of BW/IP's files for this material contained a certification from NOVA stating that the material was purchased from a qualified source and manufactured in accordance with NOVA's QSC. Although the NOVA certificate reported the material heat number and provided chemical analysis of the material, it did not identify the producing mill or provide information concerning the producing mill's quality system as required by the purchase documents. Acceptance of this material without adequate verification of conformance to the PO requirements was identified as Nonconformance 93-01-04.

Before the completion of this inspection, BW/IP contacted NOVA by telephone and obtained information showing that the material was obtained from H&D Steel Service Center (H&D) as SA-479, Type 410 steel. H&D, in turn, purchased the material from Slater Steel. Although this information indicated that H&D had been qualified by NOVA, there was no statement on the Slater Steel certification that their quality system program had been reviewed by H&D or by NOVA.

4 PERSONNEL CONTACTED

4.1 BW/IP, International, Inc.

- *+ F. Costanzo, Manager of Engineering, Nuclear Products Operations (NPO)
- *+ D. Gibson, Manager, NPO
- * D. Koo, Manager, Valve Engineering
- *+ D. McCourt, Manager, Manufacturing, NPO
- *+ L. Fettis, Manager, Valve Operations
- *+ D. Ham, Manager of Quality
- *+ K. Probst, Supervisor, Quality Assurance Audits
- J. Mieding, Manager of Engineering, Commercial Products Operations
- *+ D. Lattimore, Supervisor, Quality Engineering
- *+ K. Huber, Section Head, Special Projects
- W. Klenner, Nuclear Valve Product Manager

U.S. Nuclear Regulatory Commission

- * U. Potapovs, Chief, Reactive Inspection Section No. 1, Vendor Inspection Branch
- + Attended the entrance meeting
- * Attended the exit meeting