ORGANIZATION: HAYWARD TYLER PUMP COMPANY
BURLINGTON, VERMONT

REPORT NO.: 99900345/82-02	INSPECTION DATE(S) 1/25-29/82	INSPECTION ON-SITE HOURS: 90

CORRESPONDENCE ADDRESS: Hayward Tyler Pump Company
ATTN: Mr. B. P. Lyons
Manager, Process Industry Products
P. O. Box 492
Burlington, VT 05401

ORGANIZATIONAL CONTACT: Mr. R. C. Groeschel, QA Manager
TELEPHONE NUMBER: (802) 863-2351

PRINCIPAL PRODUCT: Pumps.

NUCLEAR INDUSTRY ACTIVITY: Eight contracts for ASME Section III Code pumps applicable to one foreign and six domestic sites.

ASSIGNED INSPECTOR: L. E. Ellershaw 2-16-82
L. E. Ellershaw, Reactive & Components Section (RCS) Date

OTHER INSPECTOR(S): I. Barnes, Chief, RCS
U. Potapovs, Chief, Vendor Program Branch

APPROVED BY: I. Barnes 2-16-82
I. Barnes, Chief, RCS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of the receipt by the Nuclear Regulatory Commission of allegations pertaining to implementation and enforcement of the Hayward Tyler Quality Assurance (QA) program. Specific pertinent subject areas included in the inspection were indoctrination and training, design control, nonconformance and corrective action, manufacturing process control, assembly and test, and control of special processes.

PLANT SITE APPLICABILITY:

Components/records identified with the following nuclear facilities were examined during this inspection: Docket Nos. 50-498/499, 50-566/567, and 50-354/355.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 20 of the QA Manual and Engineering Std. 9.0.5/1-1 dated January 4, 1977, review of current and historical training and indoctrination schedules and records showed the following:

   a. The current (1982) training schedule and the schedules for the past three years were not consistent with the training requirements identified in Exhibit I of Engineering Std. 9.0.5/1-1.

   b. Only about one-half of the training specified in the 1981 schedule was actually completed, with none of the scheduled training for manufacturing personnel being performed.

   c. Performance of training in Process Control and Nonconformities for Methods Technicians, although indicated by the 1980 training schedule as having been completed, could not be verified from review of course attendance records.

   d. Training records were retained only for QA/QC personnel and not for other employees with quality assurance program responsibilities.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 6 of the QA Manual, the following was observed with respect to processing of Engineering Change Requests (ECRs):

   a. ECR 260 was dispositioned by the Project Engineer without his obtaining the required input from the Manufacturing Engineering Supervisor.

   b. ECR 254 was signed off by the Project Engineer without his indicating an appropriate disposition (e.g. acceptance, requirement for design review, referral to customer, etc.).

   c. ECR 261 did not identify Quality Level, contract number or disposition.

   d. ECR 274 (Quality Level I) was closed out by the Project Engineer without his obtaining the required sign off by the QA Systems Engineer.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 16 of the QA Manual, corrective actions were not implemented by appropriate management with responsibility for shop compliance with QA program manufacturing process control provisions, as evidenced by manufacturing process control implementation being identified as discrepant in each of the seven QA manager's biannual reports, for the time period from December 2, 1977, to June 30, 1981.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 10 of the QA Manual, mandatory sequences of operations were not completed in the order indicated on the Route Sheet, and QC/QA operations were performed out of numerical sequence.

   Examples:

   a. Machining operations on Route Sheet 3-0173-8223, B/M Item 1102 and 1110, Top-Bottom Casing, Yellow Creek, were signed off as complete prior to performance of the initial operation on the Route Sheet, a QC inspection point for verification of casing material identity.

   b. An operation for installation of studs and nuts on the Route Sheet referenced in a. above was signed off as complete prior to an earlier operation for QC verification of stud and nut material identity. It was additionally noted that the Route Sheet sign offs indicated that the stud holes had not been drilled and tapped until after the studs had been installed, and that assignment of studs and nuts had been deferred to a later Route Sheet.

   c. Pump assembly and tack welding of the impeller retaining screw head to the impeller on Revision B of Route Sheet 3-0173-8049, Pump Serial No. 804901, Hope Creek, were made without performing earlier designated QC inspection operations for verification of cleanliness and welding controls.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 3 of the QA Manual, each operation listed on Route Sheets was not signed off on completion, as evidenced by:

   a. Operation Nos. 100, 102, 104 and 106 on Route Sheet 3-0173-8127, B/M Item 0202, Base Plate, South Texas, were unsigned for the completed and shipped item.

b. Operation Nos. 130 and 140 on the Route Sheet for Casing Assembly D910-001 and 002, Pump Serial No. 804002, South Texas, were unsigned for the completed and shipped item.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 10 of the QA Manual, Route Sheets did not control and document all operations, as evidenced by:

a. Manufacture of O-rings by Hayward Tyler was not controlled by Route Sheets.

b. A dimensional change was instructed to be made on December 15, 1981, from that specified by the applicable drawing listed by Route Sheet 3-0173-8232, B/M Item 1602, Batch No. 664U-001. The change was not permitted or documented by the Route Sheet and was made without the required prior submittal and approval of an Engineering Change Request for a drawing revision.

c. A gland dimension was instructed to be changed on August 21, 1981, from the specified part drawing requirements, as a result of clearance problems during pump assembly on Route Sheet 3-0173-8223, B/M Item 1101, Yellow Creek. This change was not documented by the Route Sheet and was made without either issue of a Non Conformity Report by QC for the assembly operation, or making the required prior submittal and approval of an Engineering Change Request for a drawing revision.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 10 of the QA Manual, inspection operations on certain Route Sheets (applicable to shipped items) had not been signed off to denote satisfactory completion of the operations.

Examples:

a. Operation No. 110 on Route Sheet 3-0173-8127, B/M Item 0202, Base Plate, had not been signed off to denote a QA review had been performed of the Route Sheet for completeness. Operation No. 050, an Authorized Nuclear Inspector hold point, was not signed on this Route Sheet.

b. Operation Nos. 120 (Inspect Visual), 150 (Final Inspect Visual) and 160 (QA Review Route Sheet) were unsigned on the Route Sheet for Casing Assembly D 910-001 and 002, Pump Serial No. 804002.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph NCA-4134.12 in Section III of the ASME Code, measures were not established in regard to a pump assembly torque wrench (Serial No. HTS 51-029) to assure necessary accuracy and to allow determination of required corrective actions if the tool was found discrepant at calibration; i.e. Purchase Order 21831 (February 26, 1981) to a calibration service vendor required the vendor to calibrate and adjust as required. Neither specific accuracy limits were provided to the vendor, nor was any statement included in regard to the error value on initial calibration check at which the customer must be informed.

9. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 9.0, the allocation of a batch number to certain welding material and subsequent recording of that batch number when the welding material was issued and used, did not assure its traceability, in that the welding material used was not the same material that the batch number had been allocated to.

   Batch number Y622 had been assigned to a container of 1/8" type E316L-16 electrodes, for which the Certified Material Test Report and the container identified the electrodes as being from Lot Number 3099003. However, observation of the electrodes in the container revealed that they were identified (stenciled) with Lot Number 2999003.

   The records show that this batch number was recorded as being used on Emergency Service Water Pumps for Carolina Power and Lignt Company's Shearon Harris Nuclear Power Plant.

10. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 12.0, a violation of an ASME Code essential variable (preheat temperature) was allowed by a welding procedure specification (WPS); i.e., a decrease of more than 100°F from the qualified preheat temperature was permitted. WPS 6.3.3/3-1.1, Revision 0, dated July 20, 1981, states, "Preheat 60°F min. (200°F actual)," while the Procedure Qualification Record (PQR) 6.3.3/3-1.1A dated July 20, 1981, states in regard to preheat, "200°F actual."

11. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 12.0, WPS 6.3.3/3-1.1 permitted the use of welding positions for which HTPC welders had not been qualified.

12. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 12.0, welding was not performed in accordance with the welding procedure specification (WPS) and the QC Inspector stamped off the operation on the Route Sheet to show that he had verified the acceptability of the welding.

    The Route Sheet used for Bill of Material Item No. 1402, Diffuser, Contract 0173-8232, specified the following operations and requirements and included welding material, batch number 731U, as a permissible material:

    Operation 050 - Verify filler material identity.

    Operation 070 - Weld repair per WPS 6.3.3/3-5.1 or 6.3.3/3-6.1, both Revision 01.

    Operation 080 - Verify compliance during performance of operation 070.

    The QC inspector verified that welding material batch number 731U and WPS 6.3.3/3-5.1, Revision 01, had been used. However, the WPS specifies the use of 3/32" diameter filler metal, while the filler metal actually used was 1/8" diameter.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. This inspection was performed concurrently with an investigation by members of the Region IV Investigation and Enforcement Staff. Investigative findings are contained in Report No. 99900345/82-01.

2. Indoctrination and Training - Applicable QA Manual (QAM) requirements as well as training and indoctrination schedules and training course attendance records for 1979 through 1982 were reviewed. In addition to the nonconformance identified in paragraph B.1. it appears that not all employees received the applicable training specified in the training schedule before being assigned to code work. At least one welder received no training in the QAM requirements for welding until after 9 months on the job. None of the welders received any training in Process Control during 1981, although this training was designated as applicable in the training schedule.

3. Design Control - The applicable QA Manual requirements for processing Engineering Change Requests (ECRs) were reviewed and approximately 20 recent (1981) ECRs examined for conformance with the QAM requirements.

   Nonconformance B.2 was identified.

4. Nonconformance and Corrective Action - The applicable QA Manual requirements were reviewed and an inspection performed of current practices used to resolve nonconforming conditions. A review was performed of nonconformance trend information generated by the QA Manager for the time period from 1977 through mid-1981 (last available report) and an inspection made in regard to QA program compliance in the resolution of six Non Conformity Reports (NCRs) pertaining to out of tolerance dimensions. In addition to the nonconformance identified in paragraph B.3, two items requiring additional inspection were identified. During review of NCR A0593 (which pertaining to an impeller undersized diameter dimension on South Texas Route Sheet 3-0173-8040/1, B/M Item 2102) it was noted that a repair build-up disposition had been lined out. The remaining words indicated that manufacture of a special wear ring and drawing revision were the final disposition. No information was available to indicate that this disposition had, in fact, been accomplished. The NCR had, however, been signed off by a QC inspector which programmatically indicates completion and acceptance of the required actions. Examination of the NCR log maintained by QC showed closeout of the item, with no entry made to show voiding of the item and replacement by a NCR with a different disposition. During the inspection a further NCR was produced which indicated that the original repair build-up had been performed. Insufficient time was available, however, to fully evaluate this NCR and determine whether the NCR had been appropriately identified in the manufacturing Route Sheets.

   During review of current work, an NCR (B2047) was examined which pertained to traceability, excess material and casting defects in five received suction bowls. The initial Route Sheets had been closed out and work was proceeding on machining Route Sheets. Part of the disposition, removal of excess material and defects in the excess material, required the use of the machining Route Sheet to accomplish the action. NCR B2047 was not entered, however, on the machining Route Sheet as being applicable, and was listed only by the NCR log as an open item. The QA Manual, as presently written, would preclude this practice, in that Route Sheet sign off by QA for completeness is only supposed to occur after resolution of all nonconformities.

5. Manufacturing Process Control - The applicable QA Manual requirements were reviewed and examinations made for QA program compliance of Route Sheets completed during 1977, 1979, and 1981. In addition to the nonconformances identified in paragraphs B.4, B.5, B.6, and B.7, one item requiring additional inspection was identified. Examination of the sign off dates on Route Sheet 3-0173-8223, B/M Item 1102 and 1110, Top-Bottom Casing, Yellow Creek, showed the following: (a) Studs and nuts were installed on August 13, 1981; (b) Stud holes were not drilled and tapped until August 17, 1981; and (c) Studs and nuts were indicated by QC on August 20, 1981, to have not been assigned to the Route Sheet. NRC personnel were informed, that the probable explanation of the question on stud issue, was manufacturing personnel used temporary studs in order to avoid damage to the studs used in final pump assembly. In regard to insertion of studs prior to drilling and tapping of the stud holes, a possible explanation of the date inconsistencies is that manufacturing personnel were not following the operational sequence specified by an individual Route Sheet, but rather were combining operations from different Route Sheets. This subject will be examined in detail during a future inspection.

6. Assembly and Test - A review was made of the applicable QA Manual requirements and an inspection performed of the assembly and test of Pump Serial No. 804901, Route Sheet 1-0173-8049, Hope Creek. Documents examined included final assembly and performance test procedures, performance test data, the procedure and requirements for bolt torquing in assembly, Certified Material Test Reports for compliance with Bill of Materials requirements, and calibration practices in regard to the torque wrench used in pump assembly. One nonconformance was identified which is described in paragraph B.8.

7. Control of Special Processes - The applicable QA Manual requirements and implementing procedures were reviewed for QA Program compliance. The areas inspected to verify implementation included: Nondestructive Examination (NDE) personnel qualifications; welding procedure qualifications; welding process control, and weld material control. In process NDE and welding could not be reviewed, in that these activities were not performed on ASME Code pumps/components during this inspection.

During inspection of weld material control which consisted of observing weld material holding ovens, electrode identification and review of certified test reports, nonconformance B.9 was identified.

Welding procedure specifications (WPS), identified as having been used on certain nuclear contracts, and their qualifications were reviewed in conjunction with the qualifications of the identified welders. Identification was made by review of Route Sheets associated with South Texas Project and Hope Creek. Nonconformances B.10, B.11, and B.12 were identified.

The NRC inspector expressed concern over the adequacy of the monitoring/inspection of welding. In addition to nonconformance B.12, it was observed on certain Route Sheets that amperages and voltages had been recorded by the QC inspectors during the welding operations. However, the values were incorrect in that they were reversed.

Records pertaining to the qualifications of NDE personnel were reviewed which included written examinations, eye examinations, and training. The two NDE disciplines performed at Hayward Tyler Pump Company are liquid penetrant examination, and visual examination. An area of concern was identified pertaining to visual examinations performed on ASME Code pumps and component supports manufactured prior to December 1979. The personnel qualification records indicated that the earliest certification date for a visual examiner was December 17, 1979.

Company HAYWARD TYLER PUMP COMPANY(HTPC) Dates JANUARY 25-29, 1982

Docket/Report No. 99900345/82-02 Inspector ELLERSHAW, BARNES & POTAPOVS

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
B. P. LYONS	MANAGER, PROCESS INDUSTRY PRODUCTS	HTPC
T. S. GRAHAM	VICE PRESIDENT OF MANUFACTURING	HTPC
O. KRISTENSEN	VICE PRESIDENT OF ENGINEERING	HTPC
R. C. GROESCHEL	MANAGER, QUALITY ASSURANCE	HTPC
R. L. PARRIN	GENERAL MANAGER	HTPC
P. D. ROW	MANAGER, QUALITY ASSURANCE	HTPC (LUTON)
W. H GAINES, JR	SECRETARY AND ASSISTANT GENERAL COUNSEL	PARENT COMPANY OF HTPC
J. T. BOESE	ATTORNEY	FRIED, FRANK, HARRIS, SHRIVER & KAMPELMAN — HTPC/OUTSIDE COUNSEL
S E. BUSHEY	SUPERVISOR, QUALITY CONTROL	HTPC
S. GARNSEY	INVENTORY CONTROL SPECIALIST	HTPC
G. BONK	SUPERVISOR, DOCUMENT CONTROL	HTPC
R. McMILLAN	QUALITY ASSURANCE ENGINEER	HTPC
D. CLARE	MANAGER, SPECIAL PRODUCTS	HTPC
A. PERRIN	PROJECT ENGINEER	HTPC
R. WEISKEL	QUALITY ASSURANCE ENGINEER	HTPC

Scope/Module 92704B

Report No. 22-0
Page 2 of 4

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
1	4	Hayward Tyler Pump Co. QA Manual		
2	8	Certified Material Test Reports for 12 batches of welding electrodes		
3	3	Engineering Std. 9.0.4/1-2, "Training Requirements For LP Examination Personnel"	10 Nov 79	1
4	3	Engineering Std. 9.0.4/4-2, "Training Requirements For Visual Examination Personnel"	26 Nov 79	00
5	8	NDE Qualification Records of 5 NDE examiners		
6	2	WPS 6.3.3/3-2.2 & PQR 6.3.3/3-2.2	10 May 78 & 10 Apr 78	0
7	8	Route Sheets for Pumps on Contract 8049		
8	2	South Texas Project Specification 3R209NS011-D	12 Jan 77	
9	2	WPS 6.3.3/3-1.1 & PQR 6.3.3/3-1.1 M	20 July 81	
10	5	Brown & Root PO No. 35-1197-4040/8040 for Seismic Supports including Specification 3R289NS042		D
11		NDE Reports for repair welds on Pump, S/N 3, Contract 8049	April and May, 1980	

Document Types:
1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchase Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

Columns:
1. Sequential Item Number
2. Type of Document
3. Date of Document
4. Revision (If applicable

cope/Module 927048

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
1	4	Quality Assurance Manual, Sections 10, 20, 6	1-25-82	1
2	3	Engineering STD. 9.0.5/1-1 (General Training/Indoctr. procedure)	1-4-77	0
3	NA	Employee Training schedules for 1979, 1980, 1981, 1982	NA	NA
4	NA	Employee Indoctrination and Training records	NA	NA
5	NA	Qualification files for all QA/QC personnel	NA	NA
6	NA	Engineering Change Requests Nos. 260, 254, 261, 274, 275	NA	NA

Document Types:
1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchas Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

Columns:
1. Sequential Item Number
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3. Date of Document
4. Revision (If applicable)

cope/Module 92704B

DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
1	4	QA MANUAL SECTIONS 3, 6, 9, 10, 11, 12, 15, 16, 17, 18	6-26-81	—
2	8	NCR LOG	1977 THRU 1981	—
3	8	10 NCRs	—	—
4	8	12 ROUTE SHEETS	—	—
5	2	WPS 6.3.3/3-5.1 & PQR 6.3.3/3-5.1	—	01 (WPS)
6	2	WPS 6.3.3/3-6.1 & PQR 6.3 3/3-6.1	—	01 (WPS)
7	8	CMTR ERCUAL-A2 BATCH NO. 7310	—	—
8	2	BECHTEL TECHNICAL SPECIFICATION 10855-M-082(Q)	4/7/80	4
9	6	QA MANAGER QUALITY TREND REPORTS	1977 THRU 1981	—
10	1	01-300-034	—	C
11	3	PERFORMANCE TEST PROCEDURE 2.3.7/3-3	—	04
12	3	ASSEMBLY PROCEDURE 01-400-514	—	A
13	3	ASSEMBLY PROCEDURE 6.0.4/2-1	—	02
14	8	CMTRs FOR PUMP SERIAL NO. 804901	—	—
15	1	BILL OF MATERIALS 01-100-045	—	E
16	3	TORQUING PROCEDURES (a) 6.0.4/2-1 & (b) 01-009-445	—	(a) 02 (b) 0
17	8	PURCHASE ORDER 21831 AND CALIBRATION RECORDS FOR CALIBRATION OF ASSEMBLY TORQUE WRENCH	—	—
18	2	TVA DESIGN SPECIFICATION YCNP-DS-1925-4023-R1		

Document Types:
1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchas Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

Columns:
1. Sequential Item Number
2. Type of Document
3. Date of Document
4. Revision (If applicable)

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APPENDIX

U. S. NUCLEAR REGULATORY COMMISSION

Region IV

Investigation Report No. 99900345/82-01

Docket No. 99900345

Vendor: Hayward Tyler Pump Company

Facility: Burlington, Vermont

Investigation at: Burlington, Vermont

Investigation Conducted: January 4-29, 1982

Investigator: _____ _____
R. K. Herr, Senior Investigator — Date
Investigation and Enforcement Staff

Investigator: _____ _____
D. D. Driskill, Investigator — Date
Investigation and Enforcement Staff

Inspector: _____ _____
L. E. Ellershaw, Mechanical Engineer — Date
(Components)
Vendor Programs Branch

Approved by: _____ _____
Karl V. Seyfrit, Acting Director — Date
Investigation and Enforcement Staff

Summary

Investigation on January 4-29, 1982 (Report No. 99900345/82-01)

Area Investigated

Allegations were presented to NRC that upper management of Hayward Tyler Pump Company failed to support and/or enforce the QA program and personnel removed files and/or documents from the main office to preclude NRC from inspecting

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them. This investigation involved 212 investigative manhours by two NRC investigators and one NRC inspector.

Results

Investigation and a technical inspection (Report No. 99900345/82-02) disclosed that Hayward Tyler Pump Company from 1978 through 1981 experienced a significant breakdown in the effective implementation of the QA program due to a lack of support by upper management. The above identified technical inspection report provides technical information which further supports the allegations.

Summary

Investigation disclosed that the allegations that Hayward Tyler Pump Company failed to effectively enforce the QA program in 1978, 1979, and 1980, were confirmed. Interviews of 32 former and present employees, both at the main office and at various locations outside the main office, substantiated the allegation that upper management personnel of the Hayward Tyler Pump Company did not fully support the total QA program in the manufacturing of nuclear grade pumps. Investigation revealed numerous incidents of flagrant violations of QA/QC procedures that appeared to have the support of upper management. Our investigation further disclosed that repeated efforts to correct these deficiencies when identified to upper management by QA/QC personnel met with negative results. Further investigation confirmed that boxes of duplicate records related to nuclear pumps were transferred from the Hayward Tyler Pump Company's main office to a warehouse in the local area, however, NRC inspectors were never denied access to those records or any other records.

Background

On October 30, 1981, Region IV received a telephone call from Mr. James Sniezek, NRC HQ, who stated that the NRC HQ just received an allegation from a newspaper journalist claiming that the Hayward Tyler Pump Company located in Burlington, Vermont, has manufactured some defective safety-related pumps and shipped them to various nuclear plants throughout the U.S. and overseas. On November 2, 1981, the Chief of the Vendor Branch telephonically contacted the newspaper journalist in Burlington, Vermont. The journalist indicated that four individuals had made allegations concerning the Hayward Tyler Pump Company and that he would attempt to encourage the allegers to provide specific information to Region IV. On November 10, 1981, a Mr. Hoffman, a staff member of Congressman Edward Markey's staff, telephoned the Chief of the Vendor Branch, Region IV and stated that a Mr. Warshaw, another journalist, reported to him that affidavits had been provided by four former employees of the Hayward Tyler Pump Company. Mr. Hoffman remarked that upon receipt he would forward the affidavits to Region IV. On November 16, 1981, Mr. Hoffman was contacted. He stated that the affidavits had not been received to date. Mr. Hoffman stated that he felt that the NRC should not start an investigation until the affidavits were received by the Region IV office.

On December 15, 1981, Mr. Hoffman notified Region IV that the affidavits had been forwarded to Chairman Palladino of the NRC. The affidavits were subsequently transmitted to Region IV.

Details

1. Persons Contacted

Principal Vendor Employees

B. F. Lyons, Manager, Process Industry Products
R. L. Parrin, General Manager

Other Individuals

J. T. Boese, Attorney, outside counsel
W. H. Gaines, Secretary and Assistant General Counsel of parent company
P. D. Row, QA Manager, Hayward Tyler Pump Company, Luton

Individuals A-1 through A-32

2. Investigation of Allegations

Allegation No. 1

Individuals A-1 through A-4 alleged that the Hayward Tyler Pump Company's upper management, identified as Individuals A-31 through A-33, failed to support and/or enforce the QA program.

Investigative Findings

Individuals A-1 through A-6 executed signed sworn statements (Attachment 1 through 6) and Individuals A-14 and A-17 executed signed sworn statements (Attachments 7 and 8) wherein they stated that Individuals A-31 through A-33, Hayward Tyler Pump Company's upper management personnel, failed to support or enforce the QA program. Additional interviews of Individuals A-8, A-9, A-10, A-12, A-13, A-15, A-16, A-18, A-19, A-20, A-21, and A-25 resulted in each stating that upper management, identified as Individuals A-31 through A-33, did not support the QA program at the Hayward Tyler Pump Company. Each of the individuals remarked that they have signed off routing sheet operations that they did not personally perform or conduct welding or machining operations with no paperwork. Each commented that they perceived that they were violating procedures of the QA/QC program; however, they maintained they were just following the orders of Individual A-32, who was supported by Individuals A-31 and A-33. The following are some of the specific examples of Individual A-32's failure to implement the requirements of the QA manual and/or procedures.

a. Individuals A-5, A-10, A-13, A-14, A-17, and A-18 all admitted flame and/or mechanically straightening shafts between 1978 and 1981, with no routing sheet instruction and no written QA/QC procedures. The above six individuals estimated that they straightened approximately 24 shafts during this period. Each indicated they were following Individual A-32's instructions. Individual A-19 stated that in 1980 observed one nuclear related shaft being flame straightened;

however, could not recall the contract number. These individuals explained that flame straightening shafts consisted of applying a torch to a small area about the size of a quarter bringing the temperature up to about 1200°F or "cherry red" and then applying snow to the torched area to cool the shaft. Most explained that if no snow was available then cold water was applied. A review of Hayward Tyler Pump Company QA/QC procedures and manufacturing process instructions disclosed no written material covering this activity.

b. Individuals A-10 and A-25 both provided documentation (Attachments 9 and 10, respectively) of changes to designated engineering requirements initiated by Individual A-32. Both stated that outside of these memoranda ordered and signed by Individual A-32, there was no routing sheet, no rework sheet, no design engineering change sheet, or NCR paperwork initiated. Both stated that these changes were issued by Individual A-32 after final QC inspection sign off occurred. Both explained that during assembly, the pumps in question did not fit properly and Individual A-32 ordered remachining of various component parts, in order that the pumps would fit correctly and pass testing. Both admitted that they realized that this type of activity was in conflict with the QA/QC manual. Individuals A-5, A-6, A-7, A-8, and A-9 each admitted to machining components without the proper paperwork, and Individual A-9 admitted to machining a component with a QC Red Sticker (hold tag), stuck to the component. All of the above individuals stated they were just following orders of A-32.

(Investigator's Note: A review of Hayward Tyler Pump Company pertinent records concerning these violations is discussed in more detail in NRC Inspection Report 82-02, nonconformance 6.)

c. Individuals A-4, A-15, A-16, A-17, and A-18 stated that Individual A-32, between 1979 and 1981, had requested them to perform welds on components with no paperwork available. Individual A-15 admitted to welding components with no routing sheet, but only under pressure from Individual A-32. Individual A-16 stated that occasionally when a welder would forget to sign and stamp his weld, Individual A-32 would later ask him (Individual A-16) to sign the paperwork and stamp a weld number on the weld. Individual A-16 admitted that this activity happened occasionally and when he was asked by Individual A-32 he would in fact sign another welder's signature on a routing sheet and also placed that other welder's stamp on the component. Individual A-16 explained that he would do this after he had inspected the weld to ensure that it was done correctly. Individual A-18 also admitted that on occasions he would place his own signature and own stamp to a welded component that someone else had welded, after he was requested to do so by Individual A-32. Individual A-17 stated that Individual A-32 would ask him to weld without paperwork, however, he always refused. Individuals A-4, A-15, A-17, and A-18 all stated that Individual A-32 would try to pressure them to violate QA procedures, and Individuals A-4, A-17 and A-18 stated that harrassment and threats of being laid off from work by Individual A-32 were

common during the 1979 and 1980 timeframe. Both Individuals A-17 and A-18 stated that they were never actually laid off, however, Individual A-4 stated he was laid off work for 1-2 days by Individual A-32, after he refused to weld on components without the proper paperwork.

d. During interview of Individuals A-19, A-20, and A-21 involved in the QA/QC program, each maintained that upper management did not support an effective QA program, particularly between 1978 and 1981. Individual A-19 stated that numerous pleas to upper management (identified as Individuals A-31, A-32, and A-33) to acquire more QC equipment such as micrometers, depth mikes, and other tools were ignored. Individual A-19 advised that at least once a week for the past 2 years, various personnel from the shop area (production) would confidentially tip him off to rework or other problems with components that did not either have the proper paperwork, or the paperwork did not list some of the machining operations. Individual A-19 stated that about 90 percent of the shop personnel have tipped him off to various problems with components and all claimed that Individual A-32 had ordered the departure from the normal QA/QC procedure. Individuals A-19 and A-21 both stated that they have discovered through inspection, by-pass of mandatory QC checks and/or sequence checkpoints, and at each time it was a result of the instructions received from Individual A-32. Individual A-21 also commented that numerous pleas to upper management (Individuals A-31, A-32, and A-33) for support of the QC program met with negative results. Individuals A-19, A-20, and A-21 each emphasized that repeated efforts to gain support from Individuals A-31 and A-33 through the NCR and/or audit program had little or no effect. Each concurred that resolution to their audits usually resulted in promises to improve, or some cosmetic approach that only solved problems on a temporary basis. Individual A-20 stated that he did not wish to relate specific details regarding violations of QC practices, for fear that the incidents could be traced back to him and he would lose his job. Individuals A-19, A-20, and A-21 all concurred that a significant breakdown in effective implementation of the QA program had occurred, due to the lack of support from the Hayward Tyler Pump Company's upper management.

(Investigator's Note: A statement from Individuals A-19 and A-21, was not obtained due to the length of the interview and previous investigative commitments. Results of interview are appended as Attachement 11 and 12, respectively. Supporting documentation of a technical nature can be found in Inspection Report 82-02, nonconformance 4.)

Individual A-32 was interviewed and the Results of Interview is appended hereto as Attachment 14. The interview of Individual A-32 covered his knowledge of Allegation No. 1. Individual A-32 was questioned concerning allegations that he had ordered shop personnel to do work on parts without having the required documentation (routing sheets, drawings, engineering change, etc.). Individual A-32 admitted he has asked shop personnel to do

work without paperwork, however, quickly pointed out that he always assured these personnel that the paperwork was being prepared and would catch up with the work. Individual A-32 further admitted that in reference to rework of pump components there had been occasions when he instructed individuals to do rework for which no documentation was ever prepared, and as an example he had ordered remachining of pump lantern rings and glands (to adjust tolerances in order that assembly could be effected), which had previously received final QC inspection. (Attachment 9 and 10 refers) Individual A-32 also admitted having been the subject of a recent audit report for personally performing rework of a base plate without paperwork during the Christmas 1981 holidays. (Attachment 15) Individual A-32 also acknowledged, that although he had occasionally disregarded paperwork requests for some components, he had never compromised the quality or integrity of a pump. Individual A-32 stated the alterations made to parts were in good faith to improve the quality of pumps.

Individual A-32 stated he could only recall one occasion that a misunderstanding occurred with Individual A-4, wherein he mentioned to Individual A-4 that if he refused to work on components as ordered (without paperwork), he would be required to be laid off a few days with no pay.

Individual A-32 remarked that he has instructed personnel to work on parts that had an NCR hold tag (red sticker) on them, however, pointed out that the work never involved the area in which the nonconformance was written. Individual A-32 added that he never instructed an employee to disregard a QC or ANI hold point. Individual A-32 explained that pumps shipped to WPPSS No. 2 and 3 projects were pumps that received a large amount of attention, in that many NCRs had been written. A-32 emphasized that a great deal of rework was accomplished on those pumps, however, he believed that all the rework was documented.

Subsequently, during questioning, Individual A-32 stated that some rework on some pumps may possibly not have been appropriately documented although he could not recall a specific instance.

(Investigator's Note: A statement was not obtained due to the length of interview and lateness of the hour, Results of Interview - Attachment 14.)

Allegation No. 2

Individual A-1 alleged that Individual A-32 supported the use of Eastman 910 adhesive (Crazy glue) when assembling pumps.

Investigative Findings

Individual A-1 stated that upon orders of his supervisor during the 1978-1979 timeframe he purchased nine tubes of crazy glue that were subsequently provided to Individual A-28 for use in assembling pumps. Interview of Individual A-28 resulted in his executing a signed sworn statement (Attachment 13) wherein he admitted using Eastman 910 and Duro Super Glue to secure the ends of rounded pieces of rubber together in order to form a rubber gasket (O-ring). Individual A-28 stated he knew of no written procedures for this assembly practice and stated that this practice was not listed on any of the routing sheets. Individual A-28 remarked that this procedure was a common practice utilized by all assembly personnel and he is not aware of any violations utilizing this procedure. Interview of Individuals A-27 and A-31 disclosed that the practice of using Eastman 910 and/or Duro Super Glue adhesive, to glue O-rings together is a manufacturer's suggested procedure. Individual A-27 stated that this practice is not listed on the bill of material. Individual A-31 provided the reporting investigator a tube of Duro Super Glue, and indicated that he was not aware of any improper practices on the part of Hayward Tyler Pump Company when using this glue.

(Investigator's Note: Supporting technical information for this allegation is recorded in NRC Inspection Report 82-02, nonconformance 6.)

Allegation No. 3

Individual A-2 alleged that Individual A-23 removed records/documents from the Hayward Tyler Pump Company's main office just prior to the Feburary 1980 NRC inspection in order to prevent NRC inspectors from inspecting the records.

Investigative Findings

Individual A-2 executed a signed sworn statement wherein he stated that in February 1980, the week before NRC inspectors arrived, Individual A-23 asked him for assistance in moving some boxes containing records/documents of nuclear related pumps from the Hayward Tyler main office to the trunk of his (Individual A-23) car. Individual A-2 stated that he knew that the documents contained nuclear related information, because during the move he looked inside one or two of the boxes and read some of the paperwork. Individual A-2 remarked that during the moving of these boxes Individual A-23 commented to him, that these boxes where being removed because "out of sight out of mind." Individual A-2 stated he interpreted this comment to mean that Hayward Tyler Pump Company was removing these boxes to prevent the NRC from inspecting them. Individual A-23 was interviewed and denied personally removing any boxes of records and/or documents in February 1980 from the Hayward Tyler Pump Company's main office to his car. Individual A-23 stated that to the best of his knowledge the boxes in question were stored in his office for about 3 months prior to February 1980, and they were removed by person or persons unknown. Individual A-23 stated that he shared a room with Individual A-22 during this timeframe, and remarked that it was his belief that the boxes were removed because he

and Individual A-22 needed more working space and because the NRC was arriving shortly and upper management wanted to clean up the areas for a better "cosmetic" appearance. Individual A-23 stated he subsequently learned that the four or five boxes were relocated to a Hayward Tyler Warehouse a few miles from the main office. Individual A-23 remarked that the boxes contained copies of data packages of pumps. Individual A-22 denied any knowledge as to who moved the boxes, when the boxes were removed, why the boxes were removed, or who ordered the boxes removed. Individual A-22 stated that Individual A-33 had the authority to relocate the boxes.

Interview of NRC inspectors who inspected Hayward Tyler Pump Company in August 1978, February 1980, October 1980, and August 1981, stated they were not prevented or denied access to any records that they requested.

Allegation No. 4

Individual A-4 alleged that Hayward Tyler Pump Company had no qualified QC welding inspectors on the second shift between December 1978 and Feburary 1980.

Investigative Findings

Files of QC inspectors were reviewed, assessed and reported in detail in NRC Inspection Report 82-02. This evaluation by NRC inspectors of the qualifications of Hayward Tyler QC welding inspectors disclosed that Hayward Tyler Pump Company did have a QC welding inspector, certified as being qualified, employed during this timeframe; however, he was not assigned to the second shift. Interview of QA/QC personnel, A-19, A-20, and A-21, resulted in their stating that they were called in to the shop during the second shift when required to perform inspection.

(Investigator's Note: Further technical information concerning this allegation is discussed in NRC Inspection Report 82-02, Item 7 page 9.)

Allegation No. 5

Individual A-3 alleged that in November 1979, approximately 200 route sheets were typed from handwritten route sheets, and that signatures on the typed route sheets were either left unsigned or signatures were falsified by Individual A-31 or A-32.

Investigative Findings

Individual A-31 stated that in November 1979, a large number of hand-written original route sheets were typewritten because of legibility problems encountered with various personnel's handwriting. Individual A-31 remarked that this transfer of information from handwritten to typewritten was ordered by Individual A-33, and that Individual A-26 was the individual who was in charge of this activity. Individual A-31 emphasized that he acted only as a manager who passed information to employees as per Individual A-33's instructions. Interview of Individual

A-26 resulted in his explaining that he was in charge of the transferring of information from handwritten route sheets to typewritten route sheets. Individual A-26 remarked that he followed revision procedures in this transfer of information, and subsequently stapled all original handwritten route sheets to the typewritten route sheets upon the completion of the transfer. Individual A-26 stated that he only transferred information on route sheets that were currently on the "floor" at the time.

A review of records identified the Level I (nuclear) documents that were currently being worked on during the November 1979 timeframe, and these records were examined. The route sheets, some of which were dated as early as 1978, (awaiting parts) were all stapled to handwritten, original route sheets. Further review disclosed that documents (route sheets) on components completed before November 1979, were not typed and contained the original handwritten route sheets. Investigation disclosed no evidence of falsification, however, did reflect no written procedure for transferring the information and/or stapling the old originals with the new originals.

Documents

The written statements and copies of all documents identified herein relating to these allegations are being maintained at the NRC Region IV office. The following is a list of documents utilized in this report.

Document 1 - Statement of Individual A-1, dated 1-13-82
Document 2 - Statement of Individual A-2, dated 1-14-82
Document 3 - Statement of Individual A-3, dated 1-14-82
Document 4 - Statement of Individual A-4, dated 1-13-82
Document 5 - Statement of Individual A-5, dated 1-26-82
Document 6 - Statement of Individual A-6, dated 1-25-82
Document 7 - Statement of Individual A-14, dated 1-25-82
Document 8 - Statement of Individual A-17, dated 1-26-82
Document 9 - Memo signed by Individual A-32, dated 12-15-81
Document 10 - Memo signed by Individual A-32, dated 8-21-81
Document 11 - Results of Interview with Individual A-19, dated 1-27-82
Document 12 - Results of Interview with Individual A-21, dated 1-28-82
Document 13 - Statement of Individual A-28, dated 1-25-82
Document 14 - Results of Interview with Individual A-32, dated 1-28-82
Document 15 - Internal Audit, dated 1-6-82

611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76011

Docket No. 99900345/82-02

Hayward Tyler Pump Company
ATTN: Mr. B. P. Lyons
Manager, Process Industry Products
P. O. Box 492
Burlington, VT 05401

Gentlemen:

This refers to the inspection conducted by Mr. L. E. Ellershaw of this office on January 25-29, 1982, of your facility at Burlington, Vermont, associated with the manufacture of nuclear pumps and to the discussions of our findings with you and members of your staff at the conclusion of the inspection.

This inspection was conducted as a result of the receipt by the Nuclear Regulatory Commission of allegations pertaining to implementation and enforcement of the Hayward Tyler quality assurance program. The main purposes of the inspection were to evaluate the identified concerns and to establish whether past and present manufacturing practices relative to manufacture of nuclear pumps were consistent with applicable codes, contractual and regulatory requirements. To make this determination, the primary areas selected for inspection were indoctrination and training, design control, nonconformance and corrective action, manufacturing process control, assembly and test, and control of special processes.

During the inspection, several instances were identified and documented in the enclosed inspection report where you failed to comply with NRC requirements. The specific findings complete with reference to the applicable requirements are summarized in the enclosed Notice of Nonconformance.

It is apparent from the results of this inspection, that significant deficiencies existed in the implementation of your quality assurance program, particularly in the areas of manufacturing process control and training. What concerns us greatly is that it appears highly improbable that findings, such as uncontrolled dimensional changes, could have occurred without the direct knowledge and awareness of responsible officers of your company.

Date of
8206150029

Please provide us within 30 days from the date of this letter a written statement containing: (1) a description of steps that have been or will be taken to correct these items; (2) a description of steps that have been or will be taken to prevent recurrence; and (3) the date your corrective actions and preventive measures were or will be completed. Consideration may be given to extending your response time for a good cause shown.

The response requested by this Notice is not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

The NRC staff is currently evaluating the significance of the identified nonconformances with respect to performance reliability of pumps which have been furnished to various nuclear sites and the effects of postulated failures on the specific systems in which the pumps are installed. Should the results of these evaluations indicate any concerns in regard to specific applications of your equipment, appropriate actions will be taken with affected NRC licensees.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room. If this report contains any information that you believe to be exempt from disclosure under 10 CFR 9.5(a)(4), it is necessary that you (a) notify this office by telephone within 10 days from the date of this letter of your intention to file a request for withholding; and (b) submit within 25 days from the date of this letter a written application to this office to withhold such information. If your receipt of this letter has been delayed such that less than 7 days are available for your review, please notify this office promptly so that a new due date may be established. Consistent with section 2.790(b)(1), any such application must be accompanied by an affidavit executed by the owner of the information which identifies the document or part sought to be withheld, and which contains a full statement of the reasons on the basis which it is claimed that the information should be withheld from public disclosure. This section further requires the statement to address with specificity the considerations listed in 10 CFR 2.790(b)(4). The information sought to be withheld shall be incorporated as far as possible into a separate part of the affidavit. If we do not hear from you in this regard within the specified periods noted above, the report will be placed in the Public Document Room.

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

John T. Collins
Regional Administrator

Enclosures:
1. Appendix A - Notice of Nonconformance
2. Appendix B - Inspection Report No. 99900345/82-02
3. Appendix C - Inspection Data Sheets (4 pages)

APPENDIX A

Hayward Tyler Pump Company
Docket No. 99900345/82-02

NOTICE OF NONCONFORMANCE

Based on the results of an NRC inspection conducted on January 25-29, 1982, it appears that certain of your activities were not conducted in accordance with NRC requirements as indicated below:

Criterion V of Appendix B to 10 CFR Part 50 states: "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."

Nonconformances with these requirements are as follows:

A. Section 20 of the Hayward Tyler Pump Company (HTPC) QA Manual states that the QA manager is responsible for administration of the training program, including developing of training schedules and maintaining attendance records together with records of education and experience of training course attendees.

Engineering STD 9.0.5/1-1, January 4, 1977, General Training and Indoctrination Procedure for Personnel Performing ASME Code and HTPC QA Manual Activities states that personnel who have had no previous code experience shall participate as a minimum in applicable training as outlined in attached schedule (identified as Exhibit I) before being assigned to code work. It also requires that the attendance at a training course be noted on each individual's training report (identified as Exhibit IV).

Contrary to the above, review of current and historical training and indoctrination schedules and records identified numerous deviations from these requirements. Specific examples are as follows:

1. Neither the current (1982) training schedule nor training schedules for the past 3 years are consistent with the training requirements identified in Exhibit I of Eng. St'd. 9.0.5/1-1. There are significant differences in identification of specific Job Classifications designated for indoctrination and training as well as in the type of training applicable to these Job Classifications.

2. Only about one-half of the training specified in the 1981 training schedule was actually completed. Although required by the schedule, no training was given to manufacturing personnel.

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3. The training schedule for 1980 identifies training in Process Control and Nonconformities as applicable training for Methods Technicians, and shows this training as completed. However, examination of training course attendance records showed no evidence of Methods Technicians having received this training.

4. Training records (Exhibit IV of Engineering St'd 9.0.5/1-1) are retained only for QA/QC personnel. No such records are retained for other employees engaged in quality activities. Similarly, there are no education and experience records retained for training course attendees other than QA/QC personnel.

B. Section 6.12 of the HTPC QA Manual requires that changes to design drawings be documented on an Engineering Change Request (ECR). The ECR is to be routed to the Manufacturing Engineering Supervisor who logs it in, enters his recommendation, determines if current shop work is affected and if route sheet change is required and passes it on to the Project Engineer for the applicable contract. The Project Engineer is responsible for approving/disapproving the recommendation and indicating whether the customer specification is violated, or if a design review is required. QA Systems Engineer approval is required for all Quality Level 1 through 4 items.

Contrary to the above, review of records identified numerous instances where processing of ECRs did not comply with these requirements. Specific examples are as follows:

1. ECR 260 was dispositioned by the Project Engineer without the required input from the Manufacturing Engineering Supervisor.

2. ECR 254 was signed off by the Project Engineer without indicating appropriate disposition (acceptance, requirement for design review, referral to customer, etc.).

3. ECR 261 did not have blanks for Quality Level or contract number filled in, and no disposition was indicated.

4. ECR 274 (Quality Level I) was closed out by the Project Engineer but did not have the required sign-off by the QA Systems Engineer.

C. Section 16.0 of the HTPC QA Manual requires the QA Manager to review Non Conformity Reports at least every six months for conditions adverse to quality and trends that show that these conditions exist. The documented results of this review including findings are required to be reported to the General Manager and the responsible manager for response and action. The supervisor having responsibility for the area requiring corrective action is stated to be responsible for implementing corrective action.

Contrary to the above, corrective actions were not implemented by appropriate management with responsibility for shop compliance with QA program manufacturing process control provisions, as evidenced by manufacturing process control implementation being identified as discrepant in each six month QA manager report for the time period from December 2, 1977, to June 30, 1981.

D. Paragraph 10.1.3 in Section 10 of the HTPC QA Manual states in part, "Operations which must be completed in sequence shall be indicated by numbers in the column marked 'Oper. No.' When the sequence of operations is not mandatory, the operations shall be indicated by letters following the sequence number, e.g., 4A, 4B, 4C . . .The following operations shall not be performed out of numerical sequence.

a) Q.C. and Q.A. operations and examinations identified by Work Station 7XX on the Route Sheet.

b) Hold Points, including A.I., Q.A./Q.C., Engineering, Manufacturing Engineering, and the customer. Welding and welding-related operations . . . ."

Contrary to the above, the following examples were identified where mandatory sequences of operations were not completed in the order indicated on the Route Sheet, and QC/QA operations were performed out of numerical sequence:

1. Route Sheet 3-0173-8223, B/M Item 1102 & 1110, Top-Bottom Casing, Yellow Creek

a. The initial operation on the Route Sheet, Oper. No. 010, a QC 7XX Work Station operation for verification of casing material identity, was signed off as being performed on August 17, 1981. Machining Operations Nos. 050, 060, and 070 were signed off, however, as having been completed on August 13, 1981.

b. Operation No. 030, A QC 7XX Work Station operation for verification of stud and nut material identity, was signed off on August 20, 1981, deferrring assignment of the items until assembly on the assembly Route Sheet. Operation No. 050 was signed off, however, on August 13, 1981, indicating studs and nuts had been installed. It was additionally noted that Operation No. 020 which

provided for drilling and tapping the holes for the studs, was not signed off as being performed until August 17, 1981.

2. Route Sheet 3-0173-8049, Final Assembly, Hydro & Perf. Test, Pump Serial No. 804901, Hope Creek

Using Revision B of the Route Sheet, the final pump assembly was made at Operation No. 150 on December 21, 1979. A tack weld was made of the impeller retaining screw head to the impeller at Operation No. 180 and not signed off. The following QC operations were not signed off to indicate performance in the required numerical sequence: (1) Operation No. 140-Inspection for cleanliness prior to assembly; (2) Operation No. 160-Allocation of weld rod; (3) Operation No. 170A- Verification of welder's identity; and (4) Verification of welder's compliance with the welding procedure specification.

E. Paragraph 3.10 in Section 3.0 of the HTPC QA Manual states in part, "The Shop Superintendent reports to the Manufacturing Manager, and is responsible through the Manufacturing Foreman, for carrying out all manufacturing operations listed on the Route Sheet and signing off each operation as it is completed (10.2) . . . ."

Contrary to the above, each operation listed on Route Sheets was not signed off on completion, as evidenced by the following examples:

1. Operation Nos. 100, 102, 104, and 106 on Route Sheet 3-0173-8127, B/M Item 0202 (Base Plate, South Texas) were unsigned for the completed and shipped item.

2. Operation Nos. 130 and 140 on the Route Sheet for Casing Assembly D910-001 and 002, Pump Serial No. 804002, South Texas, were unsigned for the completed and shipped item.

F. Paragraph 10.1 in Section 10.0 of the HTPC QA Manual states in part, "The Route Sheet . . . is the controlling document for all operations, including manufacturing and inspection operations such as examinations,

tests, and Code processes. It specifies the drawing and revision approved for the part or assembly . . . It provides space for sign off to signify satisfactory completion of each operation . . . When completed it documents the history of manufacturing . . . ."

Contrary to the above, the following examples were identified of where the Route Sheet did not control and document the history of all operations:

1. Manufacture of O-rings by Hayward Tyler is not controlled by a Route Sheet.

2. A dimension was instructed to be changed on December 15, 1981, from that specified on the applicable drawing listed by the Route Sheet for Part No. 01-300-865 (Suction Bowl), Contract No. 3-0173-8232, B/M Item 1602, Batch No. 664U-001. This change was not permitted or documented by the Route Sheet, and was made without the required prior submittal and approval of an Engineering Change Request for a drawing revision.

3. A gland dimension was instructed to be changed on August 21, 1981, from the specified part drawing requirements, as a result of clearance problems during pump assembly on Route Sheet 3-0173-8223, B/M Item 1101. This change was not documented by the Route Sheet and was made without either issue of a Non Conformity Report by QC for the assembly operation, or making the required prior submittal and approval of an Engineering Change Request for a drawing revision.

G. Paragraph 10.2 in Section 10.0 of the HTPC QA Manual states in part, " . . . The operator or inspector performing the operation shall stamp or initial and date the appropriate column when the operation is completed satisfactorily."

Contrary to the above, the following examples were identified on Route Sheets for shipped items where inspection operations had not been signed off to denote satisfactory completion of the operations:

1. Operation No. 110 on Route Sheet 3-0173-8127, B/M Item 0202, Base Plate, had not been signed off to denote QA review had been performed of the Route Sheet for completeness. Operation No. 050, an Authorized Nuclear Inspector hold point, was not signed on this Route Sheet.

2. Operation Nos. 120 (Inspect Visual), 150 (Final Inspect Visual) and 160 (QA Review Route Sheet) were unsigned on the Route Sheet for Casing Assembly D910-001 and 002, Pump Serial No. 804002.

H. Paragraph NCA-4134.12 in Section III of the ASME Code states in part, "(a) Measures shall be established and documented to assure that tools,

gages, instruments, and other measuring and testing equipment and devices used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements. A procedure shall be in effect to assure that they are calibrated and properly adjusted at specified periods or use intervals to maintain accuracy within necessary limits . . .(c) When discrepancies in measuring or testing equipment are found at calibration, the Certificate Holder shall determine what corrective action is required. Materials and items previously checked (since the previous valid calibration) with equipment which is out of calibration shall be considered unacceptable until the Certificate Holder can determine that all applicable requirements have been met . . . ."

Contrary to the above, measures were not established in regard to a pump assembly torque wrench (Serial No. HTS51-029) to assure necessary accuracy and to allow determination of required corrective actions if the tool was found discrepant at calibration; i.e., Purchase Order 21831 (February 26, 1981) to a calibration service vendor required the vendor to calibrate and adjust as required. Neither specific accuracy limits were provided to the vendor, nor was any statement included in regard to the error value on initial calibration check at which the customer must be informed.

I. HTPC QA Manual Section 9.0, paragraph 9.1 states in part, "All incoming material and parts shall be delivered to the Store Room and checked by the Receiver . . . The Receiver shall allocate a batch number and serial number for each piece or item . . . The Batch number which is the means of assuring material traceability is a four digit alphanumeric number allocated sequentially from a log by the Receiver."

HTPC QA Manual Section 12.0, paragraph 12.7 states in part, "The Inventory Control Clerk shall check welding materials which are released to him, to ensure that the containers are properly identified and shall be responsible for storing them by batch and serial no. in the Material Store Room . . . Each welder shall use the Route Sheet covering the welding to obtain the necessary welding material. This Route Sheet shall specify the batch numbers released for the contract by the Q.A. Systems Engineer, who shall have verified that these batch numbers meet the contract requirements. He shall take the Route Sheet package to the Inventory Control Clerk, who, shall issue sufficient welding materials from the Batch released for the contract to the welder with the Q.C. Inspectors verification. The Inventory Control Clerk shall enter the batch and serial number of welding material issued on the Route Sheet. . . . "

Paragraph 12.8 states in part, "The Q.C. Inspector has the responsibility for inspection of the welding in accordance with the requirements specified on the applicable Route Sheet. . . The Q.C. Inspector shall also list on the Route Sheet the welders identification by joint, and batch and serial number of welding materials used."

Contrary to the above, the allocation of a batch number to certain welding material with subsequent recording of that batch number when welding material was issued and used, did not assure its traceability, in that the welding material used was not the same material that the batch number had been allocated to.

Batch number Y622 had been assigned to a container of 1/8" type E316L-16 electrodes, for which the Certified Material Test Report and the container identified the electrodes as being from Lot Number 3099003. However, observation of the electrodes in the container revealed that they were identified (stenciled) with Lot Number 2999003. The records show that this batch number was recorded as being used on Emergency Service Water Pumps for Carolina Power and Light Company's Shearon Harris Nuclear Power Plant.

J. HTPC QA Manual Section 12.0, paragraph 12.1 states in part, "All Welding Procedure Specifications (WPS) shall be written and qualified in accordance with ASME Code Section IX and the applicable requirements of the Code . . . ."

ASME Code Section IX, paragraph QW-201.2 states in part, " . . . A change in any essential variable shall require requalifications, to be recorded in another PQR . . . ."

QW-406.1 (an essential variable) states, "A decrease for more than 100°F (56°C) in the preheat temperature qualified. The minimum temperature for welding shall be specified in the WPS."

Contrary to the above, Procedure Qualification Record (PQR) dated July 20, 1981, states in regard to preheat, "200°F actual", while Shielded Metal Arc Welding WPS 6.3.3/3-1.1, Revision 0, dated July 20, 1981, states, "Preheat 60°F minimum (200°F actual)", thus allowing a decrease of more than 100°F from the preheat temperature qualified, without requalification being recorded in another PQR.

K. HTPC QA Manual Section 12.0, paragraph 12.4 states in part, "All welding personnel performing welds governed by the Code shall be qualified in accordance with the ASME B & PV Code, Sections III and IX . . . ."

ASME Code Section IX, paragraph QW-351 states in part, "A welder shall be requalified whenever a change is made in one or more of the essential variables listed for each welding process. . . ."

Paragraph QW-353 includes the addition of other welding positions than those already qualified as a performance qualification essential variable for the shielded metal arc welding process; i.e. QW-405.1.

Contrary to the above, WPS 6.3.3/3-1.1 allowed performance of welding in a position (2G, horizontal) for which welders had not been qualified.

L. HTPC QA Manual Section 12.0, paragraph 12.7 states in part, " . . . Each welder shall use the Route Sheet covering the welding to obtain the necessary welding material. This Route Sheet shall specify the batch numbers released for the contract by the Q.A. Systems Engineer . . . ."

Paragraph 12.8 states in part, "The Q.C. Inspector has the responsibility for inspection of the welding in accordance with the requirements specified on the applicable Route Sheet . . . ."

The Route Sheet used for Bill of Material Item No. 1402, Diffuser, Contract 0173-8232, specified the following operations and requirements, and included welding material, batch number 731U, as permissible material:

Operation 050 - Verify filler metal identity.

Operation 070 - Weld repair per WPS 6.3.3/3-5.1 or 6.3.3/3-6.1, both Revision 01.

Operation 080 - Verify compliance during performance of operation 070.

These operations were performed, and stamped off as having been verified by the QC Inspector (Stamp No. QC 14). It was further documented that filler metal batch number 731U and WPS 6.3.3/3-5.1 were used.

Contrary to the above, specifying and verifying the use of batch number 731U filler metal (R CUAL-A2), by Quality Assurance and the Quality Control Inspector, were not in accordance with the requirements of WPS 6.3.3/3-5.1, in that this filler metal is 1/8" diameter while the WPS requires the use of 3/32" diameter filler metal.

ORGANIZATION: HAYWARD TYLER PUMP COMPANY
BURLINGTON, VERMONT

REPORT NO.: 99900345/82-02	INSPECTION DATE(S) 1/25-29/82	INSPECTION ON-SITE HOURS: 90

CORRESPONDENCE ADDRESS: Hayward Tyler Pump Company
ATTN: Mr. B. P. Lyons
Manager, Process Industry Products
P. O. Box 492
Burlington, VT 05401

ORGANIZATIONAL CONTACT: Mr. R. C. Groeschel, QA Manager
TELEPHONE NUMBER: (802) 863-2351

PRINCIPAL PRODUCT: Pumps.

NUCLEAR INDUSTRY ACTIVITY: Eight contracts for ASME Section III Code pumps applicable to one foreign and six domestic sites.

ASSIGNED INSPECTOR: L. E. Ellershaw 2-16-82
L. E. Ellershaw, Reactive & Components Section (RCS) Date

OTHER INSPECTOR(S): I. Barnes, Chief, RCS
U. Potapovs, Chief, Vendor Program Branch

APPROVED BY: I. Barnes 2-16-82
I. Barnes, Chief, RCS Date

INSPECTION BASES AND SCOPE:

A. BASES: 10 CFR Part 50, Appendix B.

B. SCOPE: This inspection was made as a result of the receipt by the Nuclear Regulatory Commission of allegations pertaining to implementation and enforcement of the Hayward Tyler Quality Assurance (QA) program. Specific pertinent subject areas included in the inspection were indoctrination and training, design control, nonconformance and corrective action, manufacturing process control, assembly and test, and control of special processes.

PLANT SITE APPLICABILITY:

Components/records identified with the following nuclear facilities were examined during this inspection: Docket Nos. 50-498/499, 50-566/567, and 50-354/355.

A. VIOLATIONS:

None

B. NONCONFORMANCES:

1. Contrary to Criterion V of Appendix B to 10 CFR Part 50, Section 20 of the QA Manual and Engineering Std. 9.0.5/1-1 dated January 4, 1977, review of current and historical training and indoctrination schedules and records showed the following:

   a. The current (1982) training schedule and the schedules for the past three years were not consistent with the training requirements identified in Exhibit I of Engineering Std. 9.0.5/1-1.

   b. Only about one-half of the training specified in the 1981 schedule was actually completed, with none of the scheduled training for manufacturing personnel being performed.

   c. Performance of training in Process Control and Nonconformities for Methods Technicians, although indicated by the 1980 training schedule as having been completed, could not be verified from review of course attendance records.

   d. Training records were retained only for QA/QC personnel and not for other employees with quality assurance program responsibilities.

2. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 6 of the QA Manual, the following was observed with respect to processing of Engineering Change Requests (ECRs):

   a. ECR 260 was dispositioned by the Project Engineer without his obtaining the required input from the Manufacturing Engineering Supervisor.

   b. ECR 254 was signed off by the Project Engineer without his indicating an appropriate disposition (e.g. acceptance, requirement for design review, referral to customer, etc.).

   c. ECR 261 did not identify Quality Level, contract number or disposition.

   d. ECR 274 (Quality Level I) was closed out by the Project Engineer without his obtaining the required sign off by the QA Systems Engineer.

3. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 16 of the QA Manual, corrective actions were not implemented by appropriate management with responsibility for shop compliance with QA program manufacturing process control provisions, as evidenced by manufacturing process control implementation being identified as discrepant in each of the seven QA manager's biannual reports, for the time period from December 2, 1977, to June 30, 1981.

4. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 10 of the QA Manual, mandatory sequences of operations were not completed in the order indicated on the Route Sheet, and QC/QA operations were performed out of numerical sequence.

Examples:

a. Machining operations on Route Sheet 3-0173-8223, B/M Item 1102 and 1110, Top-Bottom Casing, Yellow Creek, were signed off as complete prior to performance of the initial operation on the Route Sheet, a QC inspection point for verification of casing material identity.

b. An operation for installation of studs and nuts on the Route Sheet referenced in a. above was signed off as complete prior to an earlier operation for QC verification of stud and nut material identity. It was additionally noted that the Route Sheet sign offs indicated that the stud holes had not been drilled and tapped until after the studs had been installed, and that assignment of studs and nuts had been deferred to a later Route Sheet.

c. Pump assembly and tack welding of the impeller retaining screw head to the impeller on Revision B of Route Sheet 3-0173-8049, Pump Serial No. 804901, Hope Creek, were made without performing earlier designated QC inspection operations for verification of cleanliness and welding controls.

5. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 3 of the QA Manual, each operation listed on Route Sheets was not signed off on completion, as evidenced by:

a. Operation Nos. 100, 102, 104 and 106 on Route Sheet 3-0173-8127, B/M Item 0202, Base Plate, South Texas, were unsigned for the completed and shipped item.

b. Operation Nos. 130 and 140 on the Route Sheet for Casing Assembly D910-001 and 002, Pump Serial No. 804002, South Texas, were unsigned for the completed and shipped item.

6. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 10 of the QA Manual, Route Sheets did not control and document all operations, as evidenced by:

a. Manufacture of O-rings by Hayward Tyler was not controlled by Route Sheets.

b. A dimensional change was instructed to be made on December 15, 1981, from that specified by the applicable drawing listed by Route Sheet 3-0173-8232, B/M Item 1602, Batch No. 664U-001. The change was not permitted or documented by the Route Sheet and was made without the required prior submittal and approval of an Engineering Change Request for a drawing revision.

c. A gland dimension was instructed to be changed on August 21, 1981, from the specified part drawing requirements, as a result of clearance problems during pump assembly on Route Sheet 3-0173-8223, B/M Item 1101, Yellow Creek. This change was not documented by the Route Sheet and was made without either issue of a Non Conformity Report by QC for the assembly operation, or making the required prior submittal and approval of an Engineering Change Request for a drawing revision.

7. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and Section 10 of the QA Manual, inspection operations on certain Route Sheets (applicable to shipped items) had not been signed off to denote satisfactory completion of the operations.

Examples:

a. Operation No. 110 on Route Sheet 3-0173-8127, B/M Item 0202, Base Plate, had not been signed off to denote a QA review had been performed of the Route Sheet for completeness. Operation No. 050, an Authorized Nuclear Inspector hold point, was not signed on this Route Sheet.

b. Operation Nos. 120 (Inspect Visual), 150 (Final Inspect Visual) and 160 (QA Review Route Sheet) were unsigned on the Route Sheet for Casing Assembly D 910-001 and 002, Pump Serial No. 804002.

8. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and paragraph NCA-4134.12 in Section III of the ASME Code, measures were not established in regard to a pump assembly torque wrench (Serial No. HTS 51-029) to assure necessary accuracy and to allow determination of required corrective actions if the tool was found discrepant at calibration; i.e. Purchase Order 21831 (February 26, 1981) to a calibration service vendor required the vendor to calibrate and adjust as required. Neither specific accuracy limits were provided to the vendor, nor was any statement included in regard to the error value on initial calibration check at which the customer must be informed.

9. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 9.0, the allocation of a batch number to certain welding material and subsequent recording of that batch number when the welding material was issued and used, did not assure its traceability, in that the welding material used was not the same material that the batch number had been allocated to.

   Batch number Y622 had been assigned to a container of 1/8" type E316L-16 electrodes, for which the Certified Material Test Report and the container identified the electrodes as being from Lot Number 3099003. However, observation of the electrodes in the container revealed that they were identified (stenciled) with Lot Number 2999003.

   The records show that this batch number was recorded as being used on Emergency Service Water Pumps for Carolina Power and Light Company's Shearon Harris Nuclear Power Plant.

10. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 12.0, a violation of an ASME Code essential variable (preheat temperature) was allowed by a welding procedure specification (WPS); i.e., a decrease of more than 100°F from the qualified preheat temperature was permitted. WPS 6.3.3/3-1.1, Revision 0, dated July 20, 1981, states, "Preheat 60°F min. (200°F actual)," while the Procedure Qualification Record (PQR) 6.3.3/3-1.1A dated July 20, 1981, states in regard to preheat, "200°F actual."

11. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 12.0, WPS 6.3.3/3-1.1 permitted the use of welding positions for which HTPC welders had not been qualified.

12. Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QA Manual Section 12.0, welding was not performed in accordance with the welding procedure specification (WPS) and the QC Inspector stamped off the operation on the Route Sheet to show that he had verified the acceptability of the welding.

    The Route Sheet used for Bill of Material Item No. 1402, Diffuser, Contract 0173-8232, specified the following operations and requirements and included welding material, batch number 731U, as a permissible material:

    Operation 050 - Verify filler material identity.

    Operation 070 - Weld repair per WPS 6.3.3/3-5.1 or 6.3.3/3-6.1, both Revision 01.

    Operation 080 - Verify compliance during performance of operation 070.

    The QC inspector verified that welding material batch number 731U and WPS 6.3.3/3-5.1, Revision 01, had been used. However, the WPS specifies the use of 3/32" diameter filler metal, while the filler metal actually used was 1/8" diameter.

C. UNRESOLVED ITEMS:

None

D. OTHER FINDINGS OR COMMENTS:

1. This inspection was performed concurrently with an investigation by members of the Region IV Investigation and Enforcement Staff. Investigative findings are contained in Report No. 99900345/82-01.

2. Indoctrination and Training - Applicable QA Manual (QAM) requirements as well as training and indoctrination schedules and training course attendance records for 1979 through 1982 were reviewed. In addition to the nonconformance identified in paragraph B.1. it appears that not all employees received the applicable training specified in the training schedule before being assigned to code work. At least one welder received no training in the QAM requirements for welding until after 9 months on the job. None of the welders received any training in Process Control during 1981, although this training was designated as applicable in the training schedule.

3. Design Control - The applicable QA Manual requirements for processing Engineering Change Requests (ECRs) were reviewed and approximately 20 recent (1981) ECRs examined for conformance with the QAM requirements.

   Nonconformance B.2 was identified.

4. Nonconformance and Corrective Action - The applicable QA Manual requirements were reviewed and an inspection performed of current practices used to resolve nonconforming conditions. A review was performed of nonconformance trend information generated by the QA Manager for the time period from 1977 through mid-1981 (last available report) and an inspection made in regard to QA program compliance in the resolution of six Non Conformity Reports (NCRs) pertaining to out of tolerance dimensions. In addition to the nonconformance identified in paragraph B.3, two items requiring additional inspection were identified. During review of NCR A0593 (which pertaining to an impeller undersized diameter dimension on South Texas Route Sheet 3-0173-8040/1, B/M Item 2102) it was noted that a repair build-up disposition had been lined out. The remaining words indicated that manufacture of a special wear ring and drawing revision were the final disposition. No information was available to indicate that this disposition had, in fact, been accomplished. The NCR had, however, been signed off by a QC inspector which programmatically indicates completion and acceptance of the required actions. Examination of the NCR log maintained by QC showed closeout of the item, with no entry made to show voiding of the item and replacement by a NCR with a different disposition. During the inspection a further NCR was produced which indicated that the original repair build-up had been performed. Insufficient time was available, however, to fully evaluate this NCR and determine whether the NCR had been appropriately identified in the manufacturing Route Sheets.

   During review of current work, an NCR (B2047) was examined which pertained to traceability, excess material and casting defects in five received suction bowls. The initial Route Sheets had been closed out and work was proceeding on machining Route Sheets. Part of the disposition, removal of excess material and defects in the excess material, required the use of the machining Route Sheet to accomplish the action. NCR B2047 was not entered, however, on the machining Route Sheet as being applicable, and was listed only by the NCR log as an open item. The QA Manual, as presently written, would preclude this practice, in that Route Sheet sign off by QA for completeness is only supposed to occur after resolution of all nonconformities.

5. Manufacturing Process Control - The applicable QA Manual requirements were reviewed and examinations made for QA program compliance of Route Sheets completed during 1977, 1979, and 1981. In addition to the nonconformances identified in paragraphs B.4, B.5, B.6, and B.7, one item requiring additional inspection was identified. Examination of the sign off dates on Route Sheet 3-0173-8223, B/M Item 1102 and 1110, Top-Bottom Casing, Yellow Creek, showed the following: (a) Studs and nuts were installed on August 13, 1981; (b) Stud holes were not drilled and tapped until August 17, 1981; and (c) Studs and nuts were indicated by QC on August 20, 1981, to have not been assigned to the Route Sheet. NRC personnel were informed, that the probable explanation of the question on stud issue, was manufacturing personnel used temporary studs in order to avoid damage to the studs used in final pump assembly. In regard to insertion of studs prior to drilling and tapping of the stud holes, a possible explanation of the date inconsistencies is that manufacturing personnel were not following the operational sequence specified by an individual Route Sheet, but rather were combining operations from different Route Sheets. This subject will be examined in detail during a future inspection.

6. Assembly and Test - A review was made of the applicable QA Manual requirements and an inspection performed of the assembly and test of Pump Serial No. 804901, Route Sheet 1-0173-8049, Hope Creek. Documents examined included final assembly and performance test procedures, performance test data, the procedure and requirements for bolt torquing in assembly, Certified Material Test Reports for compliance with Bill of Materials requirements, and calibration practices in regard to the torque wrench used in pump assembly. One nonconformance was identified which is described in paragraph B.8.

7. Control of Special Processes - The applicable QA Manual requirements and implementing procedures were reviewed for QA Program compliance. The areas inspected to verify implementation included: Nondestructive Examination (NDE) personnel qualifications; welding procedure qualifications; welding process control, and weld material control. In process NDE and welding could not be reviewed, in that these activities were not performed on ASME Code pumps/components during this inspection.

During inspection of weld material control which consisted of observing weld material holding ovens, electrode identification and review of certified test reports, nonconformance B.9 was identified.

Welding procedure specifications (WPS), identified as having been used on certain nuclear contracts, and their qualifications were reviewed in conjunction with the qualifications of the identified welders. Identification was made by review of Route Sheets associated with South Texas Project and Hope Creek. Nonconformances B.10, B.11, and B.12 were identified.

The NRC inspector expressed concern over the adequacy of the monitoring/inspection of welding. In addition to nonconformance B.12, it was observed on certain Route Sheets that amperages and voltages had been recorded by the QC inspectors during the welding operations. However, the values were incorrect in that they were reversed.

Records pertaining to the qualifications of NDE personnel were reviewed which included written examinations, eye examinations, and training. The two NDE disciplines performed at Hayward Tyler Pump Company are liquid penetrant examination, and visual examination. An area of concern was identified pertaining to visual examinations performed on ASME Code pumps and component supports manufactured prior to December 1979. The personnel qualification records indicated that the earliest certification date for a visual examiner was December 17, 1979.