

September 22, 2006

Mr. Tommy Craig,
Quality Assurance Manager
Sulzer Pumps Inc
4126 Caine Lane
Chattanooga, TN 37421

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION
REPORT 99901361/2006-201

Dear Mr. Craig:

On August 15-17, 2006, the U.S. Nuclear Regulatory Commission (NRC) inspection team conducted an inspection at your Sulzer Pumps Inc. (Sulzer) facility in Chattanooga, Tennessee. The NRC team reviewed selected portions of your quality assurance program (QAP) and its implementation, as it relates to your safety-related QAP controls on pumps manufactured by Sulzer. At the conclusion of the inspection, Mr. Talbot of my staff held an exit meeting to discuss the team's preliminary findings with you and your staff on August 17, 2006.

This was a limited-scope inspection which focused on assessing your compliance with the provisions of *Title 10 of the Code of Federal Regulations* (CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of 10 CFR Part 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," as it related to the disposition of safety related pump bowls and impellers for the Farley, Indian Point and Hatch nuclear power plants. This NRC inspection report is not intended to endorse or approve your overall quality assurance or 10 CFR Part 21 program. This inspection consisted of an examination of procedures and representative records, interviews with personnel, and work-in-progress observations by the NRC inspection team.

During this inspection, the team observed that the Sulzer QAP was adequately documented and being adequately implemented in the areas reviewed. Based upon the limited review of records and discussions with Sulzer personnel, the inspection team concluded that the controls in the Sulzer's 10 CFR Part 21 program and related QAP activities appeared to be acceptable. One observed weakness, with two examples, was identified in your implementation of the Sulzer QAP related to the requirements of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," and Criterion IX, "Control of Special Processes." The areas examined during the inspection are discussed in detail in the enclosed report.

T. Craig

- 2 -

In accordance with §2.390, "Public inspections, exemptions, requests for withholding," of 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be made available electronically for public inspection in the NRC Public Document Room (PDR) or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

/ra/

Michael E. Mayfield, Director
Division of Engineering
Office of Nuclear Reactor Regulation

Docket No. 99901361

Enclosure: Inspection Report 99901361/2006-201

T. Craig

- 2 -

In accordance with §2.390, "Public inspections, exemptions, requests for withholding," of 10 CFR 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be made available electronically for public inspection in the NRC Public Document Room (PDR) or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

/ra/

Michael E. Mayfield, Director
Division of Engineering
Office of Nuclear Reactor Regulation

Docket No. 99901361

Enclosure: Inspection Report 99901361/2006-201

DISTRIBUTION:

EQVB R/F

PUBLIC

Central Files/Docket File No. 99901361

Glenn Tracy

Patrick Hiland

Elmo Collins

ADAMS ACCESSION NO.: ML062630327

To receive a copy of this document, indicate in the box: "C" = Copy without enclosures "E" = Copy with enclosures "N" = No copy

OFFICE	DE/EQVB	DCI/CPNB	DE/EQVB	DE/EQVB	DE
NAME	FTalbot	GGeorgiev	KNaidu	HHamzehee	MMayfield
DATE	9/11/06	9/14/06	9/14/06	9/20/06	9/22/06

OFFICIAL RECORD COPY

**U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION**

REPORT NO: 99901361/2006-201

ORGANIZATION: Sulzer Pumps Incorporated
4126 Caine Lane
Chattanooga, TN 37421

VENDOR CONTACT: Tommy Craig,
Quality Assurance Manager
(423) 296-1935

NUCLEAR ACTIVITY: The Sulzer Pump Chattanooga facility manufactures safety-related pumps, and rebuilds pumps manufactured by others, for the nuclear industry. The facility also has a basic component and commercial grade dedication program for the nuclear industry.

INSPECTION DATES: August 15-17, 2006

NRC INSPECTORS: Kamal Naidu, Lead Inspector, NRR/DE/EQVB
Francis Talbot, NRR/DE/EQVB
George Georgiev, NRR/DCI/CPNB
Tarun Roy, NRR/DE/EQVB

APPROVED BY: Hossein Hamzehee, Chief
Quality and Vendor Branch B (EQVB)
Division of Engineering
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

ENCLOSURE

1.0 INSPECTION SUMMARY

1.1 General Information

Sulzer Pumps (US) Inc. (Sulzer) located in Chattanooga, Tennessee, was formerly known as Johnston Pump Company Nuclear Services Divisions. Sulzer informed the staff that it has the facilities and capability to completely rebuild ASME Code Section III, Classes 2 and 3 pumps. At this facility, Sulzer services many original equipment manufacturers and assumes the design responsibility for reverse engineering pumps manufactured by others. Besides repairing pumps, Sulzer manufactures both vertical and horizontal Johnson Pumps, and Sulzer Pumps for ASME Code, Section III, Class 2 and 3 applications.

On August 15-17, 2006, members of the U.S. Nuclear Regulatory Commission (NRC) inspection team performed an inspection at the Sulzer facility. The purpose of the inspection was to verify compliance with the regulations contained in Title 10 of the Code of Federal Regulations (CFR) Part 21, "Reporting of Defects and Noncompliance." and 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The scope of the inspection focused on selected portions of the Sulzer quality assurance (QA) and Part 21 programs and the implementation of these programs for the design and manufacturing of safety-related service water pump bowl castings for Farley and service water pump impeller castings for Hatch and Indian Point.

1.2 NONCONFORMANCES

The NRC staff did not identify any nonconformances.

1.3 OBSERVATIONS

The NRC staff identified one observation, Observation 9901361/2006-201-01, with two examples, which is discussed in Section 3.2.b.4 of this report.

2.0 STATUS OF PREVIOUS INSPECTION FINDINGS

This is the first NRC inspection of the Sulzer Pump Incorporated at the manufacturing facility in Chattanooga, Tennessee.

3.0 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 10 CFR PART 21 PROGRAM

a. Inspection Scope

The NRC inspection team reviewed a sample of the Sulzer QA and 10 CFR Part 21 (Part 21) program documentation and implementing procedures, Part 21 postings and a sample of Part 21 reports, evaluations, purchase orders (POs), and PO specifications to verify that Sulzer met the requirements of Part 21.

b. Observations and Findings

The NRC inspection team observed that the procedures used to verify compliance with Part 21 including a team review of Sulzer's Quality Assurance Manual (QAM) which is organized into 27 QA documents entitled SN-0.1, "Quality Assurance Manual for ASME Code Section III, Division 1 and 10 CFR 50, Appendix B/10CFR Part 21, Title Page," through SN-25.0, "Quality Assurance Manual for ASME Code Section III, Division 1 and 10 CFR 50, Appendix B/10CFR Part 21, Exhibits," Edition 3, Revision 0, dated January 31, 2006, and ANS-01, "Compliance with 10 CFR Part 21," Revision 0, dated September 2005. The team observed that Sulzer had posted the 10 CFR Part 21 related documents in two conspicuous locations.

On May 20, 2006, Sulzer, in accordance with the provisions of 10 CFR Part 21 reported to the NRC that on May 7, 2006, it became aware of what appeared to be unauthorized weld repairs on two pump bowl castings. These components were intended for replacement of essential service water pumps at Farley. The Part 21 report also indicated that unapproved weld repairs may have occurred on impeller castings shipped in pumps delivered to Indian Point and Hatch. The NRC team also reviewed Sulzer PO to Stainless Foundry and Engineering (SF&E) and a SF&E letter to Sulzer dated May 16, 2006, which contained the results of SF&E's investigation of unapproved welds on pump castings. Based on these documents, the team summarized the following:

- (1) Sulzer issued PO number 734890 to SF&E for a Johnston Pump impeller. The Sulzer PO required SF&E to submit Weld Procedure Specification (WPS) and Weld Procedure Qualification Record (PQR) to Sulzer for approval before commencing welding activities to repair the impeller casting. SF&E performed weld repairs on the impeller without Sulzer's approval.
- (2) Sulzer issued PO number 732672 to SF&E for a Johnston Pump impeller. This PO did not require SF&E to submit WPS and PQR to obtain Sulzer's approval prior to performing welding. SF&E performed welding on the impeller.
- (3) Sulzer issued PO number 734885 to SF&E for a Johnson Pump impeller. The PO did not require SF&E to obtain prior approval of WPS and WPQ. The traveler confirmed that welding was performed on the impeller. Sulzer returned 3 castings for repairs and are reported to be "on hold" at SF&E.
- (4) Sulzer issued PO number 732915 for four Johnson Pump castings impellers. The PO required SF&E to submit WPS and PQR to Sulzer for approval prior to welding. The traveler stated that no welding was performed. However, Sulzer observed that welding was performed on two castings without documentation establishing traceability to a WPS, filler material, and a weld map.
- (5) Sulzer issued PO 8407520 to SF&E for one Top Bowl for a pump. There were no indications either in SF&E's traveler or the certified material test reports (CMTR) that welding was performed. However the Top Bowl casting exhibited indications caused by welding.
- (6) Sulzer issued PO 8407520 to SF&E for an intermediate Bowl. Even though there were no indications in the SF&E traveler and CMTR that weld repairs were performed,

Sulzer observed that SF&E performed weld repairs on the intermediate bowl casting.

In most of the POs referenced above, Sulzer required SF&E to obtain Sulzer's approval for the WPS and PQR before commencing any welding activities. SF&E neither obtained Sulzer's approval, nor recorded that weld repairs had been performed either on the certificates of conformance (CoC) or CMTRs. SF&E also reported in all of the POs noted above that even though welders used filler material conforming to the requirements of ASME Section II, Part C, during the weld repair process, SF&E considered the weld material non-nuclear grade because the weld filler material was not controlled in accordance with its nuclear quality assurance program.

Metallurgical evaluations determined that there were some areas where welding was performed with some burn-through on the backside of vane to shroud junctions. The SF&E CoCs erroneously certified that no welding was performed on the castings supplied to Sulzer. The team reviewed the actions taken by SF&E to correct this nonconformance. The corrective actions are discussed in Section 3.2.b.5 of this report. There are no adverse findings in this area because Sulzer scrapped all the castings and returned them to SF&E.

c. Conclusions

Based on the information above, the team determined that the procedures Sulzer used to verify compliance with Part 21 were acceptable, and met the reporting requirements of Part 21. SF&E had performed welding on the castings without Sulzer's prior approval of its WPS and PQR, and did not document in the CoCs and other documents that welding had been performed.

3.2 REVIEW OF SAFETY RELATED PURCHASE ORDER QA ACTIVITIES

a. Inspection Scope

The NRC team reviewed the Sulzer Quality Assurance Manual (QAM) and related QA documents and procedures as noted in Section 3.1 of this report. This included Sulzer's QAM, Edition 3, Revision 0, dated January 31, 2006, and the new Sulzer QAM, Edition 4, Revision 0, dated June 16, 2006. During this inspection, the team evaluated Sulzer's QAM, Edition 3, Revision 0 for QA compliance because this QAM was in effect when Sulzer issued its Part 21 report for Farley, Hatch and Indian Point.

The NRC team reviewed Sulzer activities supporting the safety-related Southern Nuclear Operating Company (SNOC) PO number QP060449. The review included PO specifications, nonconformance reports (NCRs) related to safety-related pump service water pump bowls and shaft upgrades built at the Sulzer facility. The team also reviewed the POs for Farley Nuclear Station Units 1 and 2, Hatch Units 1 and 2, and Indian Point Units 2 and 3. The POs required Sulzer to meet 10 CFR Part 21, "Notices of Defects and Noncompliance," 10 CFR 50.55a, "Codes and Standards," 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and the ASME Code, Section III requirements referenced in 10 CFR 50.55a.

b. Observations and Findings

b.1. Sulzer Purchase Orders (POs) to SF&E

The NRC team reviewed Sulzer POs to SF&E and determined that all the reviewed POs required the following QA documents:

- Certified Material Test Reports (CMTRs) with traceability to the heat number, lot number of the material supplied
- Certificates of Compliance (CoC) stating that the material being supplied conformed to the PO requirements
- Invoked applicable portions of 10 CFR 50, Appendix B, provisions of 10 CFR Part 21.
- Right of access for source inspections or audits
- SF&E to submit all NCRs generated during manufacture of castings for Sulzer for approval before implementing corrective action
- SF&E to supply all new items to Sulzer, and not used or refurbished items
- SF&E to submit WPSs with PQRs, welder qualifications, continuity records, weld repair maps, non-destructive examination (NDE) procedures, personal qualification and eye examinations to Sulzer, and obtain approval before using them

The team also reviewed the control of nonconformances by Sulzer. Section SN-19.0, Edition 3, Revision 0, of the QA manual, Control of Nonconforming Items, which discusses the control of nonconforming material, and requires nonconforming conditions to be documented in an NCR, Form 561A. The nonconforming material is affixed with a NCR sticker and segregated when possible. The number of the NCR is entered on the work order (WO). The NCR is prepared by the quality control (QC) inspector, and distributed to the quality engineer and the QA manager. The material review board (MRB) reviews and disposes the NCR. The person who disposes the NCR has the choice of choosing one of the following: the nonconforming material is used as-is, scraped, or repaired by restoring it to compliance with the specification. The NRC inspection team review of selected NCRs is provided in detail in the following paragraphs:

b.2. Review of NCRs 150201, 150170, 150171, 150193, 150197 and 150199.

Review of NCR 150201 dated May 8, 2006, indicates that Sulzer observed unauthorized welding in the top of bowls for pump intended for the SNOC Farley Nuclear Plant. SF&E supplied the bowls. In its PO to SF&E, Sulzer's required SF&E to obtain approval of WPSs and PQRs before commencing any welding activities on the castings. SF&E provided QA records on the bowls to Sulzer certifying that no welding was performed on the bowls when in fact welding was performed. The team reviewed the Sulzer PO package on the bowls which included all the following quality requirements:

- NCRs with repair or "use-as-is" require Sulzer's approval before final disposition
- CMTRs required for the material supplied
- Heat treatment chart with traceable heat numbers
- Parts or materials supplied to be manufactured under a program in compliance with ASME Code, Section III, NC 3800
- Vendors approved by Sulzer shall identify the manual revision and the date on which Sulzer QA approved the vendor QA manual revisions

- Vendors qualification by Sulzer shall report QA manual changes to Sulzer for acceptance prior to implementation
- Certificate of conformance (CoC) required for heat treatment
- NDE to be performed to ASME Code, Section III, Subsection ND
- WPSs, PQRs, and welder qualifications require Sulzer's approval before commencing welding activities
- Compliance with 10 CFR Part 21

SF&E provided the following certifications for ASME SA-351 material for heat numbers identified as E-48 and G-05:

- Compounds containing halogens were neither used nor came into contact with the material
- Castings were heated to 2000E F, held for 5 hours, and water quenched to below 800E F, within 3 minutes
- Thermo-couples were attached to the load during heat treatment
- Castings were visually inspected and found acceptable per Manufacturers Standardization Society (MSS) - Standard Practice (SP) 55, "Quality Standards for Steel Castings for Valves, Flanges, Fittings, and Other Piping Components (Visual Method)."
- No welding performed on these castings

Heats Treating Engineers, Inc. in Milwaukee, Wisconsin, supplied a CoC to SF&E certifying that it heat treated two castings and that the castings did not come into contact with mercury or any of its compounds . The castings were heat treated in furnaces at 2000E F for 5 hours and water quenched to below 800E F. within 3 minutes. All the heat treatment charts showed that the castings were heated for 5 hours at 2000E F. The chart does not indicate that the castings were water quenched to below 800E F within 3 minutes because the thermocouples are removed before the casting is quenched. The castings are subjected to tensile and hardness test, and the results confirm that heat treatment was acceptable. Anderson Laboratories, in Greendale, Wisconsin, provided the CMTR with the traceability to the heat number and included tensile strength and the Brinell hardness number values.

When the material is quenched the color of the specimen changes from red to black to indicate that the temperature reached 800E F. The specimen is subjected to tensile and hardness (Brinell's) test, and the results confirm that the heat treatment was effective and acceptable. Contrary to the statement in SF&E's CoC, that no welding was performed on the bowls, Sulzer found that SF&E had indeed performed unapproved welding on the castings. The team did not identify any adverse findings in this area.

b.3. Review of POs QP 060449

The team reviewed PO QP060449, Change Order QP050445/002, PO Specification FM-S-05-001 and determined that it contained the specifications for replacement of service water pumps at Farley. Also, the PO required that the service water pumps be designed and constructed to meet the applicable portions of ASME Code, Section III, 1971 edition through 1972 Addenda, Class 3 requirements and referenced PO Specification FM-S-05-001. On Page 13 of the PO, it stated that "material shall be supplied in accordance with the ASME Code, Section III, Subsection ND for Class 3 Nuclear Components."

b.4. Review of NCRs Related to NDE Controls for Welds

The NRC team reviewed NCRs 150170, 150171 and 150199 related to the Part 21 report and NDE controls. The NCRs indicated that the Sulzer staff rejected the castings and returned them to the SF&E. The NRC team found that this action was acceptable.

The team reviewed a SNOC trip report dated June 22, 2006, documenting its findings during a trip to Sulzer. The trip report stated, in part, that "it was SNOC's judgement that Sulzer currently has a minimum compliance approach to quality even when their own QC inspector recommends additional NDE verifications as reflected in NCR 150199." Based on this information, the team had one observation with respect to a potential weakness concerning NDE controls and it is discussed below. This may cause a potential compliance issue in the future with QA procedures used to implement 10 CFR Part 50, Appendix B, if established ASME Code, Section III requirements and procedures are not adhered to. The NRC team provided Sulzer with the following observation with two examples:

Example 1

NCRs 150170 and 150171 documented that pump bowls had leaks during pressure boundary hydrostatic testing. The PO specification invoked ASME Code, Section III, Division 1, Class 3 requirements. The Code references Paragraph ND-2571, "Required Examinations," which required the casting to be examined in accordance with Material Specification SA-351. Specification SA-351, Paragraph 16.1 states, in part, that:

If the defect is a crack or if the defect was removed by methods involving high temperature, the cavity shall also be inspected using Magnetic Particle (MT) examination methods. When the MT is not feasible, the cavity shall be inspected using Liquid Penetrant (LP) examination method.

In addition, MSS SP-55, which Sulzer specified in its quality control procedures, states that Type I defects such as hot tears and cracks are not acceptable.

Even though the pump bowls had leaks during hydrostatic testing, Sulzer staff decided to perform visual examination and not to perform required LP examination. The Sulzer staff stated that the reason for this decision was that the Sulzer staff classified these defects as porosity defects instead of Type I defects. The NRC team disagrees with this decision since there were through wall leaks indicating major defects in pump bowl cast material. The team did not identify this violation of ASME Code, Section III, as a nonconformance of 10 CFR Part 50, Appendix B, because Sulzer scrapped the castings and returned them to SF&E.

Example 2

NCR 150199 documented that a pump bowl casting had imperfections. The document contained a note from a certified QC inspector stating:

Visual examinations of surface finish as presented may not be adequate to determine the actual removal of Type I indications.

Sulzer management overruled its certified QC inspector stating that:

The design required quality factor for this non-pressure boundary part is 0.80; therefore, visual is the engineering required acceptance criteria. No further action is required.

The NRC team concluded that Type I indications on a pressure boundary pump bowl should be examined by LP testing because MSS-SP-55 clearly stated that Type I defects are not acceptable and because specification SA-351 requires LP examination of cracks. The Sulzer staff stated that the area of the casting is not the pressure retaining portion of the casting and as such the ASME Code, Section III does not apply. The NRC team disagreed with this decision because the casting was ordered as ASME Section III integral casting and the material supplier is required to certify that the whole casting meets the material specification requirements; therefore, Sulzer should have performed LP testing on the integral casting as recommended by Sulzer's Certified QC Inspector. The team did not identify this violation of ASME Code, Section III, as a nonconformance of 10 CFR Part 50, Appendix B, because Sulzer scrapped the castings and returned them to SF&E.

Based on the information in NCR 150170, 150171, and 150199, the team found that this was another example of an observed weakness with the implementation of the QAP for NDE requirements implemented under 10 CFR Part 50, Appendix B, Criterion IX, "Control of Special Processes," and Criterion V, "Instructions, Procedures, Drawings." This weakness with two examples is identified as Observation 99901361/2006-201-01.

b.5. Review of Corrective Action

On May 16, 2006, SF&E issued a letter to Sulzer on the results of their investigation concerning unapproved welds performed on castings at their facility in Milwaukee, Wisconsin. SF&E reviewed its job orders translating the requirements in Sulzer PO's and found that its job orders did not accurately translate the requirements. In the letter, SF&E acknowledged that this inaccurate translation of specific requirements resulted in a 10 CFR part 21 condition. SF&E admitted that castings produced by it for Sulzer did not meet the specified customer requirements. For instance, the PO stipulated that if SF&E were to perform any welding, it should submit the WPS, PQR, welder personnel qualification record, and filler material certifications and obtain Sulzer's approval before commencing any welding. SF&E corrective actions included written warnings to welders for unauthorized welding on the pump castings for Sulzer PO 08407520. This included retraining the welders on WPSs, welder personnel qualifications and proper use of weld filler material. For additional details, see Section 3.4 of this report.

Based on the letter from SF&E to Sulzer, on May 20, 2006, Sulzer issued a Part 21 report on the unapproved welds for the pump bowl and impeller castings for Farley, Indian Point and Hatch. The Sulzer management were under a tight schedule to complete manufacturing activities on the safety-related service water pumps for Farley. This commitment appeared to have placed some pressure on Sulzer management to finish the job order and accept the castings for use-as-is. However, certain Sulzer staff realized that the castings were pressure boundary components and that corrective actions were needed to discipline and retrain SF&E welders who performed welds on the pump bowl castings without Sulzer approval. Sulzer staff also determined that the purchaser would not accept the pump castings with unapproved welds,

therefore, Sulzer management rejected the castings and returned them to SF&E. Sulzer management also revised Sulzer PO specifications establishing mandatory witness and hold points during the SF&E manufacturing process to eliminate the possibility of welds being performed on safety-related castings without prior approval of SF&E's WPS, PQR, and welder qualifications.

b.6. Review of Shaft Straightening Methods

During the manufacturing process of pump shafts, Sulzer uses three methods to straighten the shafts. These methods are mechanical bending, heat straightening and peening. Mechanical bending is usually used for large diameter shafts if the raw material is more than 0.005 inches out of tolerance and is usually subcontracted to an outside source by Sulzer. Heat straightening (oxy-acetylene torch) is also used as a last resort for straightening large diameter shafts if the raw material is more than 0.005 inches out of tolerance. The peening process is the most frequently used method by Sulzer and is used exclusively for shafts having diameters that are less than 3.118 inches.

NCR 150193 documented that three pump shafts, heat number 52014-630, had been straightened using the peening method. The NCR record showed that the shafts were straightened per Sulzer's QA procedure CEP-030, "Shaft Straightening," Revision 1, dated August 1, 1997. The final surfaces of the shaft that was affected by the peening process was examined per Sulzer's QA Procedure JCP-10, "Liquid Penetrant Examination," Revision 1, dated August 1, 1994, and the examination surfaces showed that the final shaft surfaces were free of defects.

The NRC team found that Sulzer's shaft straightening methods were acceptable because these activities were performed in accordance with CEP-030. The team also found that Sulzer LP examination of shafts were acceptable because these activities were performed in accordance with JCP-10.

b.7. Review of Qualifications of Inspection Personnel

The NRC inspection team reviewed the LP procedure JCP-10 and found it acceptable. Further, the team also reviewed the qualification records for the three NDE technicians and found that all three technicians were certified NDE level II technicians to the applicable requirements of the ASME Code, Section III and Section V.

The NRC inspection team also reviewed PO number 4500050412 which related to an order for replacement of upper and lower half pump cases for the Cooper Nuclear Power Plant. The documentation showed that weld repairs were performed on the cases followed by examination using the MT method.

The NRC inspection team reviewed Sulzer Procedure IBS-02, "Magnetic Particle Examination," Revision 1, dated September 1, 2005, and found that it was acceptable because it met the applicable requirements of ASME Code, Section III and Section V. The team also reviewed Sulzer welding procedures, SWI-001, "Supplementary Weld Instructions," AS-3, "Welding Procedure for Manual Tungsten Arc Welding of Austenitic Stainless Steel," Revision 9, dated June 23, 2006, and CS-5M, "Welding Procedure for Flux Cored Wire Welding of Carbon Steel," Revision 1, dated February 17, 2006, and document number WI001 which is related to welded

joints used during the shielded metal arc welding process. The NRC team found that the WPSs and their associated PQRs met the applicable requirements of ASME Code, Section III and Section IX.

The team reviewed the qualification records for four welders; three were identified with stamp numbers 2, 6, and 27 and one welder was identified as clock number 91824. All four welders were determined to be qualified in accordance with the applicable requirements of the ASME Code, Section III and Section IX. The NRC team also determined that the welder qualification test records met the applicable requirements of the ASME Code, Section III and IX.

b.8. Material and Calibration Records

The NRC inspection team also reviewed a CMTR dated January 19, 2005, for the weld material used to repair the pump cases. ESAB Group Incorporated supplied the material. The CMTR indicated that the weld material met the requirements of ASME material specification SFA 5.1 of Section II and subsection NB (Class 1) of Section III. The team determined that the material records meet the applicable requirements of ASME Code, Section III. The team reviewed the calibration record for one thermometer that was used to control the temperature in the welding electrode holding ovens. The thermometer, identified as Ashcroft thermometer 601, was calibrated to a standard traceable to the National Institute of Standards and Technology (NIST). The team found that the calibration record was acceptable.

c. Conclusions

Based on the limited NRC inspection team review of the Sulzer QAM, the team found that the old QAM and the organizational changes added to new Sulzer QAM were acceptable. The team found that Sulzer specified adequate QA requirements in its POs to SF&E. The team found one observed QAP weakness with two examples related to Sulzer's NDE controls as noted in Observation 99901361/2006-201-01 above. The team also found that Sulzer's corrective actions for unauthorized welding done by SF&E, shaft straightening methods, the qualifications of inspection personnel, and material and calibrations records were acceptable.

3.3 COMMERCIAL DEDICATION PROCESS

a. Inspection Scope

The team reviewed implementing procedures for dedication of commercial grade items and sampled Commercial Grade Dedication (CGD) POs. The team reviewed the implementation of Procedure CHQ-007 Revision 0, dated 08/01/2006, Commercial Grade Dedication Programs, for dedicating 2-261 7x 0.125x6.75 type BUNA-N O-rings which were supplied by Chattanooga Rubber & Gasket, Chattanooga in response to Sulzer PO 08407809 dated 3/14/2006. The team also reviewed the CGD for one 316 stainless steel bearing bushing stuff box.

b. Observations and Findings

The O-rings were supplied with the followings documents:

- CoC
- Cure date for these O-rings

- Shelf life statement
- 10 CFR Part 21 was applicable.
- QA program critical non-ASME

Sulzer personnel performed receipt inspections and verified various attributes including critical dimensions, material, and dates of cure and expiration. The results are documented in a receipt inspection report (RIR). The measuring devices used to verify the dimensions of the O-rings were identified along with the due dates of calibration. The calibration dates on the measuring devices used to verify the dimensions of the O-rings were current.

The team reviewed Sulzer's PO 08407753 dated 2/23/2006 for one 316 stainless steel bearing bushing stuff box which required the following documents:

- CoC
- Cure date
- Shelf-life statement
- Non-ASME program
- Verification of the colors of the shell (metallic luster) and bearing (black)
- Dimensions verification

No adverse findings were identified in the areas reviewed.

c. Conclusions

Based on the small sample of CGD POs reviewed, the team concluded that the commercial grade dedication process was acceptable.

3.4 TRAINING AND QUALIFICATION OF PERSONNEL

a. Inspection Scope

The NRC team reviewed the following training records and procedures related to QA and Part 21 requirements for Sulzer and SF&E personnel: (1) Sulzer's training procedures and the training records; (2) SF&E training records supplied to Sulzer; (3) Sulzer qualification records for four of its welders; and (4) Sulzer qualification records for three of its NDE technicians.

b. Observation and Findings

The result of the review showed that Sulzer Pump's and SF&E had a well documented quality control program for training personnel. The team found that all four welders were properly qualified in accordance with the requirements of the ASME Code, Section III and Section IX. The team also found that all three technicians were certified NDE level II technicians per the requirements of ASME Code, Section III.

The team also found that Sulzer identified that some Johnston Pump staff that joined the Sulzer Pump staff needed additional training to meet ASME Code, Section III, NCA 4000 and related QAP training requirements. Sulzer planned additional training in the future to correct this issue.

On May 16, 2006, SF&E submitted a letter to Sulzer stating that they identified a number of

SF&E welders who performed authorized welds on Sulzer pump castings. As part of SF&E corrective action related to the Sulzer Part 21 report, SF&E gave training to 12 SF&E management and staff on welder specification and procedures and documented personnel actions for 6 SF&E staff. The team found that these actions appeared to be acceptable; however, the NRC staff may need to consider additional inspection activities at SF&E.

c. Conclusions

The results of the inspection revealed that Sulzer and SF&E had well documented training and qualification records; thus, these records were acceptable. Since SF&E personnel conducted authorized welds on safety-related pump castings, the NRC staff may need to consider additional inspection activities at SF&E to verify SF&E compliance with 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

3.5 AUDITS

a. Inspection Scope

The NRC team reviewed a Sulzer internal audit report, A05-02, and a SNOC QA trip report, dated June 22, 2006, which evaluated the Sulzer Part 21 report related to the unapproved welds on pump components castings for Farley. Specifically, the SNOC QA review included a review of the receipt inspection which found that the casting had undocumented welds during the final pump assembly that resulted in a Part 21 report.

b. Observations and Findings

The team reviewed the Sulzer's Supplier Audit Report, A05-02, for SF&E and found it acceptable. The results of the Sulzer audit of SF&E show that the vendor has a documented QAP. The audit was conducted using a Sulzer approved checklist based on the criteria of ASME Code, Section III, NCA 3800 and 10 CFR Part 50, Appendix B. The team found that the Sulzer audit report of SF&E established new requirements for hold and witness points for manufacturing safety-related castings prior to shipping the castings to Sulzer.

The team also reviewed a Sulzer internal audit report. The team found that the audit report identified that some Johnston Pump staff that joined the Sulzer Pump staff needed additional training to meet ASME Code, Section III, NCA 4000 and related QAP training requirements. Sulzer planned additional training in the future to correct this issue.

The team reviewed a SNOC QA audit trip report related to the Sulzer Part 21 report for the Farley service water pump castings. The SNOC QA audit report stated, in part, that "Sulzer had taken measures to avoid performance of MT and LP to ensure cracks are fully removed from castings (Reference NCR 150170, 150171 and 150199). While these practices are in compliance with the ASME Code, Section III for castings with Quality Factor 0.80, the ASME Code, Section XI would require a MT or LP to confirm crack removal following weld repair. As it relates to quality, it was SNOC's judgement that Sulzer currently has a minimum compliance approach to quality even when their own OC inspector recommends additional NDE verifications as reflected in NCR 150199. SNOC should consider adding a requirement to fully NDE the castings to avoid future costs associated with more diligent examinations performed during repair."

The NRC staff found that ASME Code, Section III actually requires NDE (MT or LP) to confirm crack removal following weld repairs on safety-related pump castings as noted in the observed weakness identified in Section 3.2 of this report.

c. Conclusions

The team found that the audit reports reviewed provided useful findings for improving Sulzer's implementation of the QAP; thus, the team found that the audit reports were acceptable.

4.0 ENTRANCE AND EXIT MEETINGS

During the entrance meeting on August 15, 2006, the NRC inspection team discussed the scope of the inspection, outlined the areas to be inspected, and established interfaces with Sulzer staff and management. During the exit meeting on August 17, 2006, the NRC team discussed their preliminary observations and findings with Sulzer management and staff.

5.0 PARTIAL LIST OF PERSONS CONTACTED

Warren Brandon	Manager, Nuclear Service Center	Sulzer ***
Art Washburn	Engineering Manager, Nuclear Service Center	Sulzer ***
Thomas Matuszak	Nuclear Materials Coordinator, Nuclear Service Center	Sulzer **
Joe Wood	Lead Auditor, Nuclear Service Center	Sulzer **
Robert Johnson	Quality Engineer, Nuclear Service Center	Sulzer ***
Tommy Craig	Quality Assurance Manager, Nuclear Service Center	Sulzer ***
Don Spencer	General Manager, Customer Support Services	Sulzer ***
Neil Jackson	Authorized Nuclear Inspector/Hartford Steam Boiler Connecticut	*

* Attended Entrance Meeting

** Attended Exit Meeting

*** Attended Entrance & Exit Meeting