

January 5, 2016

Mr. Steven Cook, Quality Assurance Manager  
Sulzer Pumps (US) Inc.  
4126 Caine Lane  
Chattanooga, TN 37412

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION REPORT OF  
SULZER PUMPS (US) INC. NO. 99901361/2015-201

Dear Mr. Cook,

On November 16-20, 2015, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Sulzer Pumps (US), Inc. (Sulzer) facility in Chattanooga, TN. The purpose of this limited-scope routine inspection was to assess Sulzer's compliance with provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

This inspection specifically evaluated Sulzer's implementation of quality activities associated with the fabrication and inspection of the safety-related pumps for the operating nuclear reactors fleet. In addition, the inspectors evaluated Sulzer's dedication and manufacturing process that may have contributed to the September 2014 failure of the Division 3 shutdown service water pump at Exelon's Clinton Power Station. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance (QA) or Part 21 programs.

Within the scope of this inspection, no violations or nonconformances were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System), accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response, (if applicable), should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is

S. Cook

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necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Sincerely,

*/RA/*

Richard McIntyre, Acting Chief  
Mechanical Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Docket No.: 99901361

Enclosure:  
Inspection Report No. 99901361/2015-201  
and Attachment

necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Sincerely,

**/RA/**

Richard McIntyre, Acting Chief  
Mechanical Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
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**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NEW REACTORS  
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS  
VENDOR INSPECTION REPORT**

Docket No.: 99901361

Report No.: 99901361/2015-201

Vendor: Sulzer Pumps (US) Inc.  
4126 Caine Lane  
Chattanooga, TN 37412

Vendor Contact: Mr. Steven Cook  
Quality Assurance Manager  
E-mail: Steven.Cook@sulzer.com  
Phone: (423) 296-1954

Nuclear Industry Activity: Sulzer Pumps (US), Inc. (Sulzer) manufactures safety-related pumps for the operating nuclear reactor fleet.

Inspection Dates: November 16-20, 2015

Inspectors:	Edgardo Torres	NRO/DCIP/MVIB	Team Leader
	Jonathan Ortega	NRO/DCIP/MVIB	
	Aixa Belen	NRO/DCIP/MVIB	
	William Schaup	RIII/DRP	
	Thomas Kendzia	NRO/DCIP/QVIB	
	Robert Wolfgang	NRR/DE/EPNB	
Zhang Biye	NRO/DCIP/MVIB	Observer	

Approved by: Richard McIntyre, Acting Chief  
Mechanical Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Enclosure

## **EXECUTIVE SUMMARY**

Sulzer Pumps (US), Inc.  
99901361/2015-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a vendor inspection at the Sulzer Pumps (US), Inc. (Sulzer) facility to verify that it had implemented an adequate quality assurance (QA) program that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." Also, the inspectors evaluated Sulzer's commercial-grade dedication and manufacturing process that may have contributed to the September 2014 failure of the Division 3 shutdown service water pump at Exelon's Clinton Power Station. In addition, the inspectors also verified that Sulzer implemented a program under 10 CFR Part 21, "Reporting of Defects and Noncompliance," that met the NRC's regulatory requirements. The inspectors conducted the inspection from November 16-20, 2015. This was the third NRC vendor inspection at the Sulzer facility.

Some of the specific activities reviewed, observed and verified by the inspectors included:

- Receipt inspection of commercial-grade dedication (CGD) purchase order (PO) 4500894803-1 for a retaining ring. Quality control receipt inspection for a safety-related plate ring.
- In-process receipt inspection for PO 4500833350-0, four machined socket welded flanges.
- Nondestructive examination (NDE) techniques performed by qualified inspectors: liquid penetrant testing, ultrasonic thickness measure testing and wet fluorescent magnetic particulate testing.
- Gas Tungsten Arc Welding (GTAW) performed in a column.
- CGD for Pump Shaft (57.560" LG).

The following regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21

During the course of this inspection, the inspectors implemented Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors"; IP 43004, "Inspection of Commercial-Grade Dedication Programs"; and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance."

The information below summarizes the results of this inspection.

### **Design Control**

The inspectors concluded that Sulzer established a program that adequately controls design changes in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors also determined that Sulzer is effectively implementing its design control program. No findings of significance were identified.

### Other Inspection Areas

The inspectors concluded that Sulzer is implementing its program for 10 CFR Part 21, as well as its programs for training and qualification of personnel, control of purchased materials and services, control of special processes, receipt inspection, control of measuring and test equipment, control of nonconformances, and corrective actions in accordance with the applicable regulatory requirements of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the inspectors also determined that Sulzer is implementing its policies and procedures associated with these programs. No findings of significance were identified.

## REPORT DETAILS

### 1. 10 CFR Part 21 Program

#### a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern its Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," program to verify that the requirements had been effectively implemented for evaluating deviations and failures to comply. The inspectors reviewed Sulzer's procedures that govern corrective actions, the control and correction of nonconforming items, as well as interviewed quality assurance (QA) staff members and engineers, to verify an adequate and direct connection to the Part 21 program, and compliance with regulatory requirements. In addition, the inspectors reviewed a sample of evaluations of deviations to ensure that the correct process was followed, specifically the Part 21 evaluation for the failure of the Division 3 shutdown service water pump in 2014 at Exelon's Clinton Power Station.

Additionally, the inspectors evaluated the Part 21 posting and a sample of Sulzer's purchase order (PO) for compliance with the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation," and 10 CFR 21.31, "Procurement Documents." The inspectors verified the content of Sulzer's Part 21 posting, as well as the location.

The inspectors discussed the Part 21 program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

#### b. Observations and Findings

No findings of significance were identified.

#### c. Conclusion

The inspectors concluded that Sulzer established a Part 21 program in accordance with the regulatory requirements of Part 21. Based on the limited sample of documents reviewed, the inspectors also determined that Sulzer is effectively implementing its policies and procedures associated with the Part 21 program. No findings of significance were identified.

### 2. Training and Qualification of Personnel

#### a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the training and qualification program to verify compliance with the requirements of Criterion II, "Quality Assurance Program," of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

The inspectors reviewed Sulzer's long-range and short-range training plans and the system used to track training. The inspectors reviewed the indoctrination, training, and qualification of NDE Level I, II and III examination personnel, quality control personnel auditors and lead auditors, and welding personnel to ensure that proficiency is achieved and maintained. The inspectors verified that all personnel performing activities affecting quality had completed the required training and met all the specified requirements in accordance with Sulzer's policies and implementing procedures.

The inspectors discussed the training and qualification program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors concluded that Sulzer is implementing its training and qualification program in accordance with the regulatory requirements of Criterion II of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors also determined that Sulzer is implementing its policies and procedures associated with the training and qualification program. No findings of significance were identified.

3. Design Control

a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the design control program to verify compliance with the regulatory requirements in Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The inspectors also reviewed Sulzer's policies and implementing procedures that govern the design control program to verify compliance with requirements of Subsection ND, "Class 3 Components," of Section III, "Rules for Construction of Nuclear Facility Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code.

The inspectors reviewed Exelon PO 00462656 for Pump Assembly, Centrifugal, Type: 2 Stage, Vertical, Model 8 X 14A VCM (SQAD-6 CDR-5), Revision 0 through Revision 6, which contained Amendment 3 to Specification K-2828B (Revised for Contract June 29, 1977) for "Shutdown Service Water Pump Clinton Power Station – Unit 1 Illinois Power Company," dated October 25, 1985. The inspectors verified that the PO requirements were properly translated into Sulzer drawings, analyses, and calculations in accordance with Sulzer procedures and Subsection ND, "Class 3 Components," of Section III of ASME B&PV Code 1974 Edition, Summer 1976 Addenda. The documentation was reviewed for appropriate technical detail and meeting the Exelon PO requirements, including pump drawings, bill of materials, pump performance curve, design report, seismic report, and engineering change notices.

The inspectors reviewed portions of a recently completed engineering package for residual heat removal service water system vertical replacement pumps for the



Tennessee Valley Authority (TVA) for the Browns Ferry Nuclear Plant. The inspectors verified that the PO requirements were properly translated into Sulzer drawings, analyses, and calculations in accordance with Sulzer procedures and Subsection ND, "Class 3 Components," of Section III of ASME B&PV Code 1974 Edition, Summer 1976 Addenda. The documents were reviewed for appropriate technical detail and meeting the TVA PO requirements, which included pump drawings, design report, mechanical calculations and a seismic analysis.

The inspectors reviewed two reverse engineering analyses, for the acceptability of engineering calculations and determination of tolerances for pump specifications in accordance with regulatory requirements. Specifically the inspectors reviewed the Reverse Engineering Analyses for "20H-500, 2 Stage Pump Components, Ginna Nuclear Generating Station," dated June 11, 2013, and for "28KXL 1 Stage Vertical Pump, Cooper Nuclear Station," dated April 11, 2012.

In addition, the inspectors reviewed Sulzer's evaluation and analysis for the Clinton Power Station Division 3 shutdown service water pump failure that occurred in September 2014. The inspectors reviewed a November 5, 2014, letter to Exelon from Sulzer, "SX Pump Sulzer failure Analysis Review 8x14A VCM 2 Stage Vertical Pump, Serial Number:1A278, Sulzer Sales Order: 100170784, Exelon PO 00531541," for the failure to start of Exelon's Clinton Power Station Division 3 shutdown service water pump (1SX01PC). The inspectors participated in a conference call with the Sulzer Portland office to discuss the manufacturing process of the failed pump. The inspectors reviewed photographs of the failed pump and Sulzer's failure analysis report. The inspectors also reviewed the failed pump design specification established in the purchase order.

The inspectors discussed the design control program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

b. Observations and Findings

The pump that failed at Exelon's Clinton Power Station in September 2014, was originally supplied by Sulzer's Portland manufacturing facility. The original pump suction bell bearing design was a rubber cutlass. In 1990, the Division 3 shutdown service water pump failed to start as a result of excessive amounts of mud and silt in the bushings, enclosure tube and casing cooling/flush lines. In 1992, Exelon's Clinton Power Station requested a design modification to change the rubber bell suction bearing to a self-lubricated bronze. In 1995, Clinton Power Station retrofitted the original pump with the new suction bell bearing design supplied by Sulzer.

In accordance with the evaluation provided by Sulzer to Exelon on November 5, 2014, the pump that failed to start was identical to a spare pump that Sulzer provided in 2012, except for the application method of the hard facing on the shaft sleeves in the bearing areas. At the time, Sulzer's evaluation assumed that the shaft sleeves in the failed pump had thermal spray overlay of Colmonoy #6 as a hard face surface, while the 2012 spare pump hard facing was welded overlay Colmonoy #6. After further evaluation, Sulzer determined that the Colmonoy #6 hard facing application for the pump that failed in 2014 was welded overlay Colmonoy #6, similar to the spare pump manufactured in 2012. Therefore, a common failure mechanism could not be ruled out. The inspectors noted that Sulzer did not update Exelon with this information. This information was

crucial to Exelon's operability determination for the spare pump, which was installed to replace the failed pump. Sulzer issued a corrective and preventive actions (CAPA) report, CAPA 0142, to address the incorrect information supplied to Exelon.

The photographs taken of the failed pump internals showed that the pump was significantly clogged with silt/mud, as well as significant damage to the lower shaft bearing and shaft sleeve hard facing. However, after pump internals were cleaned (i.e., bead blasting referenced), the physical inspection of the suction bell bearing did not show signs of damage from abrasive materials, such as those materials presumably present in lake water containing silt and mud. No specific cause of the failure has been determined.

The failed pump design specification stated that the pumped fluid was lake water. There was no mention of any particulates in the water, and no mention of the water quality. The inspectors reviewed the failed pump design specification established in the purchase order and noted that Sulzer's pump design met the design requirements specified by Exelon.

No findings of significance were identified.

c. Conclusion

The inspectors concluded that Sulzer established a program that adequately controls design changes in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors determined that Sulzer is also effectively implementing its design control processes. No findings of significance were identified.

4. Commercial-Grade Dedication

a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the dedication of commercial-grade items for use in safety-related applications to verify compliance with the applicable regulatory requirements of 10 CFR Part 21 and Criterion III, "Design Control," of Appendix B to 10 CFR Part 50.

The inspectors reviewed dedication packages to assess the different elements of the commercial-grade dedication (CGD) program which included POs, the technical evaluation process including the commercial-grade item evaluations, receipt inspection reports, certificates of compliance, quality control source inspection reports, various design drawings, and technical information. The team evaluated the criteria for the identification of item safety functions, credible failure mechanisms/modes, selection of critical characteristics and acceptance criteria, and the identification of verification methods to verify effective implementation of Sulzer's dedication process.

The inspectors discussed the CGD program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors concluded that Sulzer is implementing its design control program in accordance with the regulatory requirements of 10 CFR Part 21 and Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 for CGD and the conduct of commercial-grade surveys, respectively. Based on the limited sample of documents reviewed, the inspectors also determined that Sulzer is effectively implementing its policies and procedures associated with CGD. No findings of significance were identified.

5. Control of Purchased Material, Equipment, and Services

a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the implementation of oversight of Control of Purchased Material, Equipment, and Services to verify compliance with the requirements of Criterion IV, "Procurement Document Control," Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50.

The inspectors reviewed Sulzer's Approved Vendor List to ensure that qualified and approved suppliers were listed. The inspectors verified that for the sample of vendors selected, Sulzer performed supplier audits as required and that the corrective actions related to these audits were implemented in a timely manner. The inspectors reviewed a sample of six external supplier audits performed by Sulzer and Nuclear Industry Assessment Committee (NIAC) members and their annual audits/performance assessments. The inspectors verified that Sulzer prepared and approved plans that identified the audit scope, focus, and applicable checklist criteria before the initiation of the audit activity.

The inspectors confirmed that the audit reports contained a review of the relevant QA criteria in Appendix B to 10 CFR Part 50 for the activities that individual suppliers performed, as well as documentation of pertinent supplier guidance associated with each criterion. For audits that resulted in findings, the inspectors verified that the supplier had established a plan for corrective action and that Sulzer had reviewed and approved the corrective action and verified its satisfactory completion and proper documentation in a timely manner. In the case of third-party audits performed by NIAC members, the inspectors verified that Sulzer reviewed and accepted the supplied third-party audit scope and its implementation, before accepting the NIAC audit results. The inspectors reviewed a sample of certified material test reports provided by suppliers of materials used to fabricate replacement parts to verify that those materials met the design requirements as specified in the PO with the supplier.

The inspectors discussed the oversight of contracted activities program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors concluded that Sulzer is implementing its oversight of Control of Purchased Material, Equipment, and Services program in accordance with the regulatory requirements of Criterion IV, "Procurement Document Control," Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors also determined that Sulzer is effectively implementing its policies and procedures associated with the oversight of oversight of contracted activities and external audit programs. No findings of significance were identified.

6. Control of Special Processes

a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the implementation of the special processes program to verify compliance with Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50. The inspectors reviewed a sample of welding and nondestructive examination (NDE) documents associated with the fabrication of service water pumps for operating reactors.

The inspectors observed welders performing welding activities and verified that qualified welders performed welding in accordance with approved welding procedure specifications (WPSs) and the ASME B&PV Code. The inspectors reviewed WPSs and their associated procedure qualification records (PQRs) and confirmed that the WPSs and PQRs were developed and qualified in accordance with the requirements of Subsection NB, "Class 1 Components," of Section III and Section IX, "Qualification Standards for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators," of the ASME B&PV Code.

The inspectors performed a walk down of the welding material storage and welding material issue areas and verified that welding material was adequately controlled. The inspectors observed that Sulzer clearly identified welding materials at all times, and retained identification of acceptable material throughout storage, handling, and use until the material was actually consumed in the welding process. The inspectors verified that each reviewed weld traveler and associated WPS recorded data was within its acceptance criteria and specifications.

The inspectors reviewed Sulzer's NDE procedures for in-process visual (VT), ultrasonic testing (UT), liquid penetrant (PT), and magnetic particle (MT), to verify they are developed and qualified in accordance with the requirements of ASME Section V, "Nondestructive Examination," and qualified in accordance with the requirements of ASME Section III. The inspectors reviewed and verified that Sulzer's NDE personnel qualification and certification program was established in accordance with the American Society for Nondestructive Testing (ASNT) SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing." The inspectors observed a sample of PT and MT operations and verified the NDE materials were identified by their lot/batch number

and expiration date. The inspectors verified that Sulzer NDE processes are performed using calibrated equipment and certified traceable materials.

The inspectors discussed the control of special processes program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors concluded that Sulzer is implementing its control of special processes program in accordance with the regulatory requirements of Criterion IX of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and operations witnessed, the inspectors also determined that Sulzer is effectively implementing its policies and procedures associated with the control of special processes program. No findings of significance were identified.

7. Receipt Inspection

a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the implementation of receipt inspection to verify compliance with Criterion X, "Inspection," of Appendix B to 10 CFR Part 50. The inspectors observed the performance of two receipt inspections and reviewed the documentation associated with an in-process inspection. The inspectors verified that the inspections were performed with calibrated measuring and test equipment (M&TE) in accordance with Sulzer's policies and implementing procedures. The inspectors reviewed the associated documentation for the inspections to verify that the required information was being recorded. The inspectors verified that for an unacceptable measurement, a nonconformance report (NCR) was generated.

The inspectors discussed the receipt inspection program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that Sulzer established a receipt inspection program consistent with the regulatory requirements of Criterion X, "Inspection," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors determined that Sulzer is adequately implementing its receipt inspection program. No findings of significance were identified.

## 8. Control of Measuring and Test Equipment

### a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the implementation of control of M&TE to verify compliance with Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The inspectors observed seven different pieces of M&TE being used and verified that the equipment was marked with calibration due date, identification number, and the equipment appeared in good condition. The inspectors reviewed the associated documentation for the seven pieces of M&TE to verify that the M&TE information on the equipment matched the information in the database, was calibrated to a nationally recognized standard, and included the calibration performed and due dates. The inspectors reviewed the M&TE database to ensure that M&TE past the due date was not in service. The inspectors reviewed six reports in Sulzer's corrective action program database associated with M&TE out of calibration or broken, to ensure M&TE program requirements were being met and previous usage of the equipment was addressed.

The inspectors discussed the MT&E program with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

### b. Observations and Findings

No findings of significance were identified.

### c. Conclusions

The inspectors concluded that Sulzer established a M&TE program consistent with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors determined that Sulzer is adequately implementing its M&TE program. No findings of significance were identified.

## 9. Nonconforming Materials, Parts, or Components & Corrective Action

### a. Inspection Scope

The inspectors reviewed Sulzer's policies and implementing procedures that govern the nonconformance and corrective action program (CAP) to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50.

The inspectors reviewed Sulzer's CAPA and NCR control logs and several NCRs and CAPAs to verify that Sulzer's implemented an adequate program to ensure that nonconforming items and conditions adverse to quality were promptly identified and corrected. The inspectors verified that nonconforming components were properly identified, marked, and segregated when practical, to ensure they were not reintroduced into the manufacturing processes. In addition, the inspectors reviewed Sulzer's semi-annual trend reports of CAPAs and NCRs that assess the adequacy and effectiveness of corrective actions to address adverse trends. The inspectors verified that the Sulzer's

nonconformance program and CAP provided a link to the 10 CFR Part 21 program. Finally, the inspectors reviewed the corrective actions for a Notice of Violation (NOV) and five Notices of Nonconformance (NONs) issued to Sulzer in an inspection conducted at Sulzer facility in May 2010 and documented in inspection report 99901361/2010-201 (ML101230395).

The inspectors discussed the nonconformance and CAP with Sulzer's staff. The attachment to this inspection report lists the personnel interviewed and documents reviewed by the inspectors.

b. Observations and Findings

b.1 Corrective Action Associated with Notice of Violation 99901361/2010-201-01

During an NRC inspection conducted at the Sulzer facility in May 2010, the NRC issued Violation 99901361/2010-201-01 for Sulzer's failure provide adequate guidance to meet the requirements of 10 CFR Part 21. Specifically, Sulzer procedure CHQ-001, "Compliance with 10CFR Part 21," did not provide guidance to inform the purchasers or affected licensees when Sulzer makes the determination that they do not have the capability to perform the evaluation to determine if a defect exists, and did not reflect the time requirements of 10 CFR 21.51 for maintenance and retention of Part 21 records.

In its response to the NRC, Sulzer's corrective actions included the revision to CHQ-001 to address the identified deficiencies in their Part 21 implementing procedure.

Based on the review of CHQ-001, Revision 3, dated January 25, 2012, and the objective evidence available, the inspectors determined that the corrective actions documented in Sulzer's response letter to the NRC, dated on June 2, 2010, (ML101620171), were adequate to address the identified violation. Based on the inspectors' review, NOV 99901361/2010-201-01 is closed.

b.2 Corrective Action Associated with Nonconformance 99901361/2010-201-02

The NRC issued Nonconformance 99901361/2010-201-02 for Sulzer's failure to adequately categorize the shaft coating for safety-related pumps as a safety-related activity. Specifically, procurement documentation associated with Farley Nuclear Generating Station (Farley) service water pumps procured the shaft coating services from a commercial supplier without dedicating those services.

In its response to the NRC, Sulzer indicated that as a corrective action, CGD activities were implemented for shaft coatings. These activities include the dedication of a specific coating batch and dedication of shaft coating during production application of the coating on safety-related shafts.

Based on the review of the objective evidence available, the inspectors determined that the corrective actions documented in Sulzer's response letter to the NRC, dated June 2, 2010, (ML101620170), were adequate to address the identified nonconformance. Based on the inspectors review, NON 99901361/2010-201-02 is closed.

**b.3 Corrective Action Associated with Nonconformance 99901361/2010-201-03**

The NRC issued Nonconformance 99901361/2010-201-03 for Sulzer's failure to provide evaluations for deviations from approved design inputs through design change control measures or approvals, and control of associated documentation for the change. Specifically, no technical justification was documented for a deviation from a PO design requirement for Farley service water pump rotors. Also, the inspectors identified another deviation between a Sulzer design standard and component drawings.

In its response to the NRC, Sulzer corrective actions to address the Farley service water pump design deviation included a series of recommendations based on structural and seismic analysis performed by Sulzer. At the time of the response, the analysis documents along with drawings required final review and approval. To address the deviation between a Sulzer design standard and a component drawing, Sulzer up dated the design drawings of the affected pump to match the Sulzer design standard. The change was evaluated by Sulzer engineering. Sulzer determined that the changes were acceptable for the safety-related pump.

Based on the review of the objective evidence available, the inspectors determined that the corrective actions documented in Sulzer's response letter to the NRC, dated June 2, 2010, (ML101620170), were adequate to address the identified nonconformance. Based on the inspectors review, NON 99901361/2010-201-03 is closed.

**b.4 Corrective Action Associated with Nonconformance 99901361/2010-201-04**

The NRC issued Nonconformance 99901361/2010-201-04 for Sulzer's failure to provide a systematic method for the review and follow up of corrective actions to determine if they are being completed in a timely fashion and are effective in precluding recurrence of the deficiencies. Specifically, the inspectors noted that corrective actions for some of the CARs reviewed took an extended amount of time to be completed. The CAP procedure did not provide specific guidance regarding timely evaluation and closure of CARs.

In its response to the NRC, Sulzer corrective actions included a revision to procedure CHQ-028, "Corrective and Preventive Action." The procedure was revised to specify processing times, Part 21 evaluations, enhanced follow up requirements and a better defined system for extending due dates if necessary.

Based on the review of CHQ-028, Revision 5, dated August 30, 2015, and the objective evidence available, the inspectors determined that the corrective actions documented in Sulzer's response letter to the NRC, dated June 2, 2010, (ML101620170), were adequate to address the identified nonconformance. Based on the inspectors review, NON 99901361/2010-201-04 is closed.

**b.5 Corrective Action Associated with Nonconformance 99901361/2010-201-05**

The NRC issued Nonconformance 99901361/2010-201-05 for Sulzer's failure to perform commercial-grade surveys instead of audits for several commercial-grade



suppliers. Specifically, Sulzer did not perform a CGD survey focused on critical characteristics for several suppliers.

In its response to the NRC, Sulzer corrective action included the review of commercial-grade supplier's audits and reconciled them to commercial-grade surveys. Sulzer developed procedure CHQ-031, "Conducting Commercial Grade Surveys," to prevent recurrence.

Based on the review of CHQ-031, Revision 1, dated December 7, 2012, and the objective evidence available, the inspectors determined that the corrective actions documented in Sulzer's response letter to the NRC, dated June 2, 2010, (ML101620170), were adequate to address the identified nonconformance. Based on the inspectors review, NON 99901361/2010-201-05 is closed.

#### b.6 Corrective Action Associated with Nonconformance 99901361/2010-201-06

The NRC issued Nonconformance 99901361/2010-201-06 for Sulzer's failure to adequately verify by survey or receipt inspection the rubber material supplied by a commercial-grade supplier (Duramax Marine) during the dedication process. Specifically, Sulzer used method 1 to dedicate rubber material used for safety-related bronze sleeve bearings without completing a survey of the Duramax Marine to credit a certificate of conformance for the material composition critical characteristic during the dedication process.

In its response to the NRC, Sulzer corrective actions included the performance of commercial-grade surveys for the commercial rubber supplier in accordance with procedure CHQ-031, and conduct visual inspection to verify durometer characteristics.

Based on the review of "Duramax Marine Final Survey Report," dated July 10, 2013; and CHE-032, "Nuclear Parts Commercial Dedication Program Classification and Critical Characteristics Worksheets," PG. 100V.11, Revision 2, dated October 5, 2015; and the objective evidence available, the inspectors determined that the corrective actions documented in Sulzer's response letter to the NRC, dated June 2, 2010, (ML101620170), were adequate to address the identified nonconformance. Based on the inspectors review, NON 99901361/2010-201-06 is closed.

No findings of significance were identified.

#### c. Conclusion

The inspectors concluded that Sulzer is implementing its nonconformance and CAP in accordance with the regulatory requirements of Criterion XV, "Nonconforming Materials, Parts, and Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors also determined that Sulzer is implementing its policies and procedures associated with the CAP. No findings of significance were identified.

## 10. Entrance and Exit Meetings

On November 16, 2015, the inspectors discussed the scope of the inspection with Mr. Stephen Dunlevy, General Manager, and other members of Sulzer's management and technical staff. On November 20, 2015, the inspectors presented the inspection results and observations during an exit meeting with Mr. Stephen Dunlevy, and other members of Sulzer's management and technical staff. The attachment to this report lists the attendees of the entrance and exit meetings, as well as those individuals whom the inspectors interviewed.

## ATTACHMENT

### 1. ENTRANCE AND EXIT MEETING ATTENDEES

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
Edgardo Torres	Team Leader	NRC/NRO	X	X	
Jonathan Ortega	Inspector	NRC/NRO	X	X	
Aixa Belen	Inspector	NRC/NRO	X	X	
Robert Wolfgang	Inspector	NRC/NRR	X	X	
William Schaup	Inspector	NRC/RIII		X	
Thomas Kendzia	Inspector	NRC/NRO	X	X	
Zhang Biye	Observer	NRC/NRO	X	X	
Stephen Dunlevy	General Manager	Sulzer	X	X	
Steven Cook	Quality Assurance Manager	Sulzer	X	X	X
Julie Duryee	Engineering Manager	Sulzer	X	X	X
Art Washburn	Nuclear Technical Support Manager	Sulzer	X	X	X
Colin Gabhart	Operations Manager	Sulzer	X	X	
Kevin Burrows	Quality Assurance Engineer	Sulzer	X	X	
Frank Davis	Quality Control Supervisor	Sulzer	X	X	X
James Alva	Quality Assurance Engineer	Sulzer	X		X
Chris Harper	Quality Assurance Engineer	Sulzer	X	X	X
Jesse Pressley	Quality Assurance Engineer	Sulzer	X	X	
Gabriel Lepeak	Repair Engineering Manager	Sulzer	X	X	
Michael Layne	Quality Control Inspector	Sulzer			X
Jocelyn Garrett	Level II NDE Examiner	Sulzer			X
Terry Emery	Welder	Sulzer			X
Nathan Reeves	QC Inspector	Sulzer			X

2. INSPECTION PROCEDURES USED

Inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012.

IP 43002, "Routine Inspections of Nuclear Vendors," dated July 15, 2013.

IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated November 29, 2013.

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Type	Description	Applicable ITAAC
99901361/2010-201-01	Closed	NOV	Part 21	N/A
99901361/2010-201-02	Closed	NON	Criterion II	N/A
99901361/2010-201-03	Closed	NON	Criterion III	N/A
99901361/2010-201-04	Closed	NON	Criterion XVI	N/A
99901361/2010-201-05	Closed	NON	Criterion VII	N/A
99901361/2010-201-06	Closed	NON	Criterion III	N/A

DOCUMENTS REVIEWED

Procedures:

CHE-001, Design Control and Reconciliation, Revision 4, November 12, 2012

CHE-002, Drawings, Revision 5, November 12, 2012

CHE-003, Design Reconciliation, Revision 1, January 13, 2010

CHE-004, Design Analysis, Revision 3, November 12, 2012

CHE-007, Bill of Material Preparation, Review and Approval, Revision 2, February 5, 2009

CHE-011, Reverse Engineering, Revision 3, April 3, 2013

CHE-021, Technical Bulletins, Revision 1, October 23, 2014

CHE-024, Technical Manual, Revision 0, August 1, 2006

CHE-032, Nuclear Parts Commercial Dedication Program Classification and Critical Characteristics Worksheets, Revision 10, dated October 5, 2015

CHE-036, Commercial Grade Dedication (CGD) of SUME METCO Powders and Supplied Coatings, Revision 1, dated 2 May 2013

CHM-002, Order Review, Acceptance and Entry, Revision 1, dated November 12, 2012

CHM-010, Management Risk, Revision 1, dated November 12, 2012

CHM-012, Return Material Authorization, Revision 0, dated July 13, 2015

CHQ-001, Compliance with 10 CFR Part 21, Revision 3, dated January 25, 2012

CHQ-005, Qualification and Certification of Nondestructive Examination Personnel, Revision 4, dated Dec 1, 2011.

CHQ-004, Receipt Inspection, Revision 9, dated April 14, 2015

CHQ-007, Commercial Grade Dedication Program, Revision 7, dated January 2, 2014

CHQ-015, Conducting Audits, Revision 2, dated December 7, 2012

CHQ-018, Calibration, Revision 10, March 27, 2015

CHQ-019, Calibration of Measuring and Test Equipment, Revision 5, October 15, 2015

CHQ-020, Procedure Distribution and Control, Revision 1, January 16, 2010

CHQ-021, Control of Nonconforming Items or Activities, Revision 12, October 16, 2015

CHQ-022, Liquid Penetrant Examination, Revision 4, dated February 5, 2014

CHQ-024, Ultrasonic Thickness Measurement, Revision 2, dated September 8, 2009

CHQ-023, Magnetic Particle Examination, Revision 4, dated January 4, 2012

CHQ-025, Visual Inspection Procedure, Revision 2, dated December 5, 2012

CHQ-028, Corrective and Preventive Actions, Revision 5, August 30, 2015

CHQ-031, Conducting Commercial Grade Surveys, Revision 1, dated December 7, 2012

CHQ-036, Niton Material Analyzer Usage, Revision 1, dated March 15, 2013

CHQ-041, Wet Fluorescent Magnetic Particle Examination, Revision 0, dated October 4, 2012

CHQ-043, Lead Auditor Qualification, Revision 0, dated November 15, 2012

CHQ-044, Management Review, Revision 4, dated September 11, 2015

CHQ-045, Surveillance/Inspection, Revision 2, dated April 4, 2013

CHQ-046, Approved Vendor List Maintenance, Revision 0, dated February 25, 2013

CHQ-047, Inspection, Revision 2, April 22, 2015

CHQ-050, Certification of Material or Services, Revision 1, dated August 6, 2015

Form S0402-10, Commercial Grade Dedication Check sheet, dated February 5, 2015

Form S2001-3, Liquid Penetrant Report for Work Order 10911888, dated October 16, 2015

Form S2010-3, Shaft T.I.R. Report, Sale Order 100180284

WPS AS-3, GTAW: 300 Series Stainless Steel ASME IX Procedure, Revision 19, dated June 27, 2013

### Drawings

PCS463565-01, 8x14A VCM Sectional Drawing, Revision A, dated May 16, 2012

E204513372, Bowl – 14 – A V.C.R. (Ferrous,) Revision - dated August 2, 2011

B204513370, Rev. -, 2/17/12, Bowl-Top 14-A VCM, Revision - dated February 17, 2012

B204513353, Rev. B, 2/17/12, Discharge Head, Revision B, February 17, 2012

D204513369, Suction Bell 14-A V.C.M., Revision -, dated August 2, 2011

D27381, Shaft, Pump Finish Machine Drawing, Revision A, dated January 20, 1992

D27382, Shaft, Line Finish Machine Drawing, Revision A, dated January 24, 1992

D27383, Shaft, Head Finish Machine Drawing, Revision A, dated January 27, 1992

D19143, Impeller 14-A V.C.R. Machine Drawing, Revision A, December 5, 1977

D19144, Impeller 14-A VCR, Revision A, December 5, 1977

A65896, Sleeve, Packing Finish Machine Drawing, Revision - dated January 24, 1992

A65898, Sleeve, Throttle, Column & Suct. Bell Finish Machine Drawing, Revision - dated January 24, 1992

A65887, Sleeve, Bowl, Finish Machine Drawing, Revision - dated January 22, 1992

A504600295, Sleeve Throttle w/Overlay Finish Machine Drawing, Revision - dated June 28, 2011

B204513354, Column Pipe 8-5/8 O.D. x 56" Long - With Bearing Spider, Revision - February 17, 2012

A65913, Detail Drilling First Used: N7665 dated January 21, 2015

D27088, Shaft Right Hand, CW First Used: N7665, ENC 3528-54 Machining Drawing, dated January 21, 2015

Corrective and Preventive Actions:

CAPA-0042, Material Type 416 contains Sulfur and compared to Type 410 and would be more susceptible to IGSCC, dated May 20, 2014

CAPA-0062, Out of calibration Plug Gauges, dated January 30, 2015

CAPA-0063, Finished part shipped that had been verified by out of calibration thread gauge, dated February 6, 2015

CAPA-0077, Found 3 pieces of M&TE past due date, dated February 23, 2015

CAPA-0072, No CGD plan for non-safety-related M&TE calibration service, dated February 23, 2015

CAPA-0089, NUPIC Finding 2015-0018-02, Critical Characteristics did not meet the 10CFR21 definition, dated May 8, 2015

CAPA-0103, Exelon Quad Cities requests Sulzer to perform a review of Sulzer to perform a review of Sulzer pump components with material Type 416, which contains Sulfur as compare to type 410 and would be more susceptible to Intergranular Stress Corrosion Cracking (IGSCC) Initiated 7/28/2015, dated on November 2, 2015

CAPA-0109, Torque Wrench used past calibration date, dated August 29, 2015

CAPA-0113, Material Supplied incorrectly & Released for Assembly, dated September 24, 2015

CAPA-0114, Part Tags not being used in shop, dated September 24, 2015

CAPA-0119, Issued Incorrect Impeller to Service Order, dated September 28, 2015

CAPA-0123, Ring and plug gauges with expired calls sored in boxes marked out of calibration, dated October 9, 2015

CAPA-0120, Out of calibration ring gauge used, dated September 30, 2015

CAPA-0121, Marking and Documentation Errors, dated October 7, 2015

CAPA-0122 Survey Temperature Gauges found out of calibration, dated October 8, 2015

CAPA-0127, Exelon Quad Cities' requests material review for IGSCC, dated November 2, 2015

CAPA-0129, Design report Certification to Incorrect Class, dated November 4, 2015

### Nonconformance Reports

NCR # 200071956, Coating Thickness Gauge 42314 and ETG01, Micrometers SS0321, NM-14 and NM01, found out of tolerance during calibration, dated April 2, 2013

NCR# 200094251, IST point: 181.6ft @ 5000 gpm Efficiency: 82%, dated June 6, 2014

NCR# 200098279, Bore on first end measures (3.999), second end measures (4.1245). O-ring groove is (.110) deep, dated August 25, 2014

NCR# 200098374, OP of Bar is 9.079" per PO OD to be 8.875" +.188" -.000, dated August 25, 2014

NCR# 200101933, The FAO Groove width is .195"; The .63 length of the ID is 2.68", different that drawing specs, dated October 30, 2014

NCR# 200103218, Holes are 33 degrees off center of key. Print calls for 30 degrees +- 1 degree, dated November 11, 2014

NCR# 200103336, Visual criteria of counter bore is unacceptable per procedure CHI-003 Rev. 3 section 4.1 because there is a group of 4 or more relevant indications within 4 square inches, dated November 21, 2014

NCR# 200111947, Finished chrome diameter is 11.1185 this is .00075 per side thickness of chrome, dated May 28, 2015

NCR# 200116617, We sent customer 1/2"-13UNC x 1 3/4" long hex head cap screws, dated August 25, 2015

NCR# 200117811, Dings around the ID and OD on chamfer end of wear ring all no greater than 1/8" in length, September 18, 2015

NCR# 200118762, Customer sent stationary seal ring due to lapped back seating surface being concave instead of convex, dated October 6, 2015

### CAPAs generated during inspection

CAPA-0131, Perform Survey of C&S Plating (NRC Inspection) dated November 17, 2015

CAPA-0132, Develop and Implement a Procedure on How to Perform Apparent & Root Cause, dated November 17, 2015

CAPA-0133, Enhance the training for the use of PMI and CGD requirements for critical elements when PMI is used, dated November 17, 2015



CAPA-0134, Enhance CHQ-031 to provide more detail in performing CG Surveys as relate to the Program: new EPRI Document (NRC Inspection), dated November 18, 2015

CAPA-0135, 2010 NRC Inspection No. 99901361/2010-201 Notice of Violation and Nonconformance – Corrective Actions, dated November 18, 2015

CAPA-0136, CHQ-019 Add statement to Procedure that OOC M&TE requires NCR for Resolution, dated November 18, 2015

CAPA-0137, CHQ-004 Review sampling plan as it relates to CGD, currently no sampling is allowed but procedure need to clearly state such (NRC Inspection), dated November 18, 2015

CAPA-0138, Welding Machines calibration expired causing all welding to be stopped, dated November 19, 2015

CAPA-0139, Review Commercial Grade Dedication Worksheet (S0402) to ensure critical characteristics are related to the safety function of the component (NRC Inspection), dated November 19, 2015

CAPA-0140, Review Commercial Grade Suppliers that CGD was used to determine adequacy of the dedication process for the supplied item on the completion of CAPA-0139 (NRC Inspection), dated November 19, 2015

CAPA-0141, Quality Control Inspector used a purple tag “Engineering Hold Tag” that was not identified in the QA Procedures, dated November 20, 2015

#### Purchase Orders:

PO 00462656 Exelon to Sulzer for Pump Assembly, Centrifugal, Type: 2 Stage, Vertical, Model 8 X 14A VCM (SQAD-6 CDR-5), Revision 0 (dated July 28, 2010) Through Revision 6 (dated October 25, 2011)

PO 4500315383-3 to Fisher Products for Colmonoy hardfacing (AISI 410) overlay per Welding procedure 90695 For Shaft Sleeves (Throttle) (Packing) (Column Bell) (Column Bell) and (Packing), dated August 26, 2011

PO 4500737440-0 to Krueger Bearing Inc. for a Journal Bearing, dated August 15, 2014

PO 4500817700-0 to DuBose National Energy Services for a Bar, Round, dated March 11, 2015

PO 4500822807-0 to Palmer Products Inc. for a Bushing (Bearing), dated March 24, 2015

#### Other documents:

Audit Report for NIAC Member Assessment of Applied Technical Services, Nuther Audit # 14-01/NIAC 19045

C&S Plating & Machine Inc. Certificate of Compliance to Sulzer Pump PO 4500865907 Commercial Grade Survey of Precision Equipment Inc. dated October 31, 2014

Commercial Grade Survey of Waukesha Foundry, dated September 30, 2014

Document Number 5001961330, Goods Receipt dated November 16, 2015

NIAC Assessment Report of Tioga Pipe & Supply Company, Inc. dated August 24, 2015

NIAC Member Assessment of Nova Machine Products NIAC Audit No. 20021, LISEGA Audit No. 15-SUP-003, dated July 7, 2015

NIAC Member Assessment of PRL Industries Inc., dated February 26, 2015

Sulzer Pumps Source Surveillance Report for Metco Coating dated May 11, 2010

Sulzer Pump Inc Audit Report Checklist for PRL Industries, dated October 28, 2015

Sulzer Pump Inc. Audit Report of Transcat Calibration Laboratory dated April 1, 2013

Sulzer Pumps Commercial Grace Survey for Metco Coating dated August 28, 2012

Sulzer Pumps Inc Audit Report Checklist for Nova, dated October 28, 2015

Sulzer Pumps Source Surveillance Report for Metco Coating dated April 26, 2010

Sulzer Pumps Source Surveillance Report for Metco Coating dated August 16, 2010

Sulzer Pumps Source Surveillance Report for Metco Coating dated August 22, 2011

Sulzer Pumps Source Surveillance Report for Metco Coating dated January 24, 2011

Sulzer Pumps Source Surveillance Report for Metco Coating dated July 19, 2010

Sulzer Pumps Source Surveillance Report for Metco Coating dated July 8, 2010

Sulzer Pumps Source Surveillance Report for Metco Coating dated June 15, 2010

Sulzer Pumps Source Surveillance Report for Metco Coating dated March 31, 2011

Sulzer Pumps Source Surveillance Report for Metco Coating dated May 20, 2010

Sulzer Pumps Source Surveillance Report for Metco Coating dated May 21, 2010

Sulzer Pumps Source Surveillance Report for Metco Coating dated October 2, 2012

Surveillance Inspection Report of C&S Plating dated June 1, 2015

Work Order 10911888, "MCN# S0082 ASTM A276 Type 431230-280HB," dated July 9, 2015

Certificate of Compliance/Conformance from Weldstar to Sulzer, Customer PO#: 4500730533-0

Weld rods 1/8" X 36", ER316/316L, dated July 29, 2014

Certificate of Compliance/Conformance from Weldstar to Sulzer, Customer  
PO#: 4500568207-2

Weld rods 3/32" X 36", ER316/316L, dated July 29, 2014

Work Order No. 10856888, Oper No. 150, Job No. 100143776, Liquid Penetrant Inspection Report, J.Garrett, dated November 17, 2015

Work Order No. 10856893, Oper No. 150, Job No. 100143776, Liquid Penetrant Inspection Report, J.Garrett, dated November 18, 2015

Work Order No. 10928527, Oper No. 085, Job No. 100193513, Ultrasonic Thickness Measure Inspection Report, J.Alva, dated November 18, 2015

Work Order No. 10856887, Oper No. 140, PO. 4500568207, Job No. 100143776, GTAW Welding, T.Emery, dated November 18, 2015

Receipt Inspection Report for PO 4500905652-0 from Dubose National Services, for a Plate ring, dated November 19, 2015

For failed Clinton Pump Sulzer As Found Report & Repair Plan for Excelon Clinton Nuclear Station, PO 00531541, SX Pump Sulzer 8x 14A VCM / 2 Stage Pump S/N 1A278, September 3, 2015

PFE1001437760020-01, "Design Report – ASME Pressure Vessel Calculations 14x20BX VCM 2-Stage Vertical Pump, Residual Heat Removal Service Water System Vertical Replacement Pumps for Browns Ferry Nuclear Plant," Revision 2, dated November 6, 2015

PFE1001437760020-02, "Mechanical Calculations – 14x20X VCM 2-Stage Vertical Pump," Rev. 4, November 6, 2015

Document No. PSV1001437760020-01, "Seismic Qualification Analysis for SJT 14x20 BX 2-Stage Vertical Pump," Rev. 4, November 6, 2015

Sargent & Lundy – "Amendment 3 to Specification K-2828B (Revised for Contract 06-29-77) for Shutdown Service Water Pump Clinton Power Station – Unit 1 Illinois Power Company," October 25, 1985

Bill of Material for Sales Order 100052553-000010, Rev. 7 dated December 3, 2010

PFE100052553-01, "Design Report – ASME Pressure Vessel Calculations for Sulzer 8 X 14A VCM 2-Stage Vertical Pump," Revision 0, dated June 12, 2012

Seismic Report – SES/TR-79-01, "Model 8 X 14A VCM 2-Stage Shutdown Service Water Pump for Clinton Power Station – Unit 1 Illinois Power Company," Revision 0, dated January 19, 1979

Procedure No. EPP-T04.3, Addendum No. 100052553, "General Performance Test Addendum," Rev. 1, dated May 5, 2012, Reverse Engineering Analysis for 20H-500, 2 Stage Pump Components, Customer - Ginna Nuclear Generating Station, dated June 11, 2013

Reverse Engineering analysis for 28KXL 1 Stage Vertical Pump, Customer - Cooper Nuclear Station, dated April 11, 2012

Semi-annual Management review of NCR' and CAR's from 2013 through 2015

Duramax Marine Final Survey Report Review, dated July 7, 2013

#### Training and Qualification Records

Kent Huber, Lead Auditor

Chris Harper, Lead Auditor

Jocelyn Garrett, Level II Examiner, Qualification binder

James Alba, Level II Examiner, Qualification binder

Michael Layne, Level II Examiner, Qualification binder

Gary Wade, Level III Examiner, Qualification binder

Welder Qualification Record, Steve James, Process Type GTAW, manual, Groove, Uphill, WPS No. JCP-GTA-2, Revision 0, dated October 11, 1988

Bulletin CHE-021.002, "Technical Bulletin CHE-021.002 Welder Performance Qualification Variables (QW-350) Reference: ASME Section IX (QW-350)," Revision 7, dated October 2, 2015