

July 6, 2015

Mr. Tom Horner  
Quality Assurance Manager  
Engine Systems Inc.  
175 Freight Road  
Rocky Mount, NC 27804

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION OF ENGINE  
SYSTEMS INC., REPORT NO. 99901362/2015-201 AND NOTICE OF  
NONCONFORMANCE

Dear Mr. Horner:

On May 18 to May 22, 2015, the U.S. Nuclear Regulatory Commission (NRC) conducted a joint inspection under the Multinational Design Evaluation Programme (MDEP) Protocol VICWG-01 at the Engine System Inc. (ESI) facility in Rocky Mount, NC. The NRC inspection team was supplemented with two inspectors from the Korean Institute of Nuclear Safety (KINS). The purpose of the limited scope inspection was to assess ESI's compliance with the provisions of selected portions 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," and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

This inspection specifically evaluated ESI's qualification and commercial-grade dedication (CGD) of diesel engine components supplied to U.S. operating reactor plants. The enclosed report presents the results of this inspection. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance (QA) or 10 CFR Part 21 programs.

Based on the results of this inspection, the NRC inspection team found that the implementation of your QA program did not meet certain NRC requirements imposed on you by your customers or NRC licensees in the areas of control of purchased material, equipment, and services, and corrective action. Specifically, ESI failed to ensure that either a commercial grade survey or source verification was performed on a commercial laboratory for testing services for the four ball wear test performed for a safety-related grease. Also ESI failed to perform a root cause evaluation on a self-identified significant condition adverse to quality and failed to implement corrective actions to preclude repetition. Specifically, ESI shipped untested generator brush wire material to Tennessee Valley Authority, then subsequently shipped two voltage regulators without completing testing requirements to Energy Northwest Columbia. ESI also failed to evaluate a disparity on a material analysis performed on an emergency diesel generator air start motor spring seat. The specific findings and references to the pertinent requirements are identified in the enclosures to this letter.

Please provide a written statement or explanation within 30 days from the date of this letter in accordance with the instructions specified in the enclosed Notice of Nonconformance. We will consider extending the response time if you show good cause for us to do so. In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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, which is accessible from the NRC Web site at <http://www.nrc.gov/readingrm/adams.html>. To the extent possible, your response 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 necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

**/RA/** (JJacobson for)

Richard A. Rasmussen, Chief  
Electrical Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Docket No.: 99901362

Enclosures:

1. Notice of Nonconformance
2. Inspection Report 99901362/2015-201  
and Attachment

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Sincerely,

/RA/ (JJacobson for)

Richard A. Rasmussen, Chief  
Electrical Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Docket No.: 99901362

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and Attachment

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NRO-002

OFFICE	NRO/DCIP/EVIB	NRO/DCIP/QVIB	NRO/DCIP/MVIB	NRO/DCIP
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DATE	06/23/15	06/24/15	06/24/15	07/01/15
OFFICE	NRR/DE/EEEB	KINS/QAD*	KINS/MMED*	NRO/DCIP/EVIP
NAME	TMartinez*	Sungho Yang*	Seon Ho Song	RRasmussen (JJacobson for)
DATE	06/23/15	07/01/15	06/29/15	07/01/15

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## NOTICE OF NONCONFORMANCE

Engine Systems Inc.  
175 Freight Road  
Rocky Mount, NC 27804

Docket No.: 99901362  
Report No.: 99901362/2015-201

Based on the results of a Nuclear Regulatory Commission (NRC) inspection conducted at the Engine Systems Inc. (ESI) facility in Rocky Mount, NC on May 18-22, 2015, certain activities were not conducted in accordance with NRC requirements which were contractually imposed on ESI by NRC licensees:

- A. Criterion VII "Control of Purchased Material, Equipment, and Services" of Appendix B to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 states, in part, "Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery."

ESI Procedure PSP-201, "Dedication of Safety Related Items," states, in part, "that for third-party qualification of items, an order specific dedication procedure shall be developed to define the special test and/or inspections required by the customer's purchase order. An order specific Dedication/Inspection Report shall be prepared to document the results obtained in accordance with the dedication procedure generated for the order."

Contrary to the above, as of May 22, 2015, ESI failed to establish measures to assure that purchased services conform to the procurement documents. Specifically, ESI dedication report D-EMD-8249819-1, stated that critical characteristics for Shell Cyprina RA grease were color, worked cone penetration, dropping point, and four ball wear scar test. In two instances, ESI contracted Herguth Laboratories, Inc. for the testing of the critical characteristics. Herguth did not perform the four ball wear test of grease, and subcontracted performance of the test to a commercial laboratory. However, ESI had not conducted a commercial-grade survey or a source verification of the commercial laboratory subcontracted to perform the four ball wear test on the grease.

This issue has been identified as Nonconformance 99901362/2015-201-01.

- B. Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50 states, that, "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management."

Section 6.4. of ESI's Quality Procedure Controls (QPC)-301, "Control Of Nonconforming Conditions and Corrective Actions and 10 CFR 21 Reportable Conditions," states in part, that, "CARS shall be classified as either Level I or Level II. Significant Conditions Adverse to Quality shall be classified as Level I. Level I CARS require a root cause evaluation.

Contrary to the above, as of May 22, 2015, ESI failed to assure that the causes of significant conditions adverse to quality were determined and that the corrective actions taken would preclude repetition. Specifically;

- A root cause analysis was not performed for Corrective Action (CAR) #2014-04 which was identified by ESI as a Level 1 Significant Condition Adverse to Quality; nor were sufficient corrective actions taken, and as a consequence a similar problem re-occurred. CAR #2014-04 was generated on April 22, 2014, after ESI identified that an order was certified and shipped to Tennessee Valley Authority on September 26, 2013 without the completion of material testing on the generator brush wires. This CAR was closed on May 22, 2014, without the completion of a root cause evaluation. Subsequently, in March 2015, ESI fulfilled Energy Northwest PO 00337942 for two voltage regulators for Columbia Generating Station without completing specific testing requirements specified in the PO. The PO required that at least one of the voltage regulators be tested on an actual engine prior to shipment.
- ESI failed to issue a CAR to promptly identify and correct a disparity between their own laboratory results and the contracted laboratory to determine which of the two tests were valid or what caused the different material testing results. ESI issued nonconformance report (NCR) #8983 dated April 3, 2015, to document a nonconforming material (carbon content) in the commercial grade dedication of a spring seat for an emergency diesel generator air start motor. Material analyses performed by ESI's on-site laboratory yielded low out-of-specification results. As a result, ESI contracted an outside laboratory to re-perform the analysis. The same sample tested high out-of-specification. The NCR evaluation stated that the Chemical Test Report received from the outside laboratory was acceptable. ESI accepted the material because, even though carbon was slightly high, all other chemical elements compositions were correct. However, ESI failed to consider the effects of out-of specification carbon on the properties of the alloy, or how a failure of the spring seat would impact the ability of the air start motor to perform its safety-related function in accordance with the dedication process.

These issues have been identified as examples of Nonconformance 99901362/2015-201-02.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Electrical Vendor Inspection Branch, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should include for each noncompliance: (1) the reason for the noncompliance, or if contested, the basis for disputing the noncompliance; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken

to avoid noncompliances; and (4) the date when your corrective action will be completed. Where good cause is shown, consideration will be given to extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or through the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it 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 withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (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 necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this the 6<sup>th</sup> day of July 2015.

**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NEW REACTORS  
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS  
VENDOR INSPECTION REPORT**

Docket No.: 99901362

Report No.: 99901362/2015-201

Vendor: Engine Systems Inc.  
175 Freight Road  
Rocky Mount, NC 27804

Vendor Contact: Tom Horner, Quality Assurance Manager  
Tom.Horner@kirbycorp.com

Nuclear Industry Activity: The ESI facility is located in Rocky Mount, NC. This facility is a third-party supplier of safety-related components, commercial-grade dedication, and qualification testing services such as seismic and environmental qualification of mechanical and electrical components, for diesel engine equipment replacement.

Inspection Dates: May 18-22, 2015

Inspection Team Leader: Annie Ramirez                      NRO/DCIP/EVIB                      Team Leader

Inspectors: Laura Micewski                      NRO/DCIP/MVIB  
Aaron Armstrong                      NRO/DCIP/QVIB  
Tania Martinez-Navedo                      NRR/DE/EEEB  
Seon Ho Song                      KINS/MMED  
Sungho Yang                      KINS/QAD

Approved by: Richard A. Rasmussen, Chief  
Electrical Vendor Inspection Branch  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

## **EXECUTIVE SUMMARY**

Engine Systems Inc.  
99901362/2015-201

The U.S. Nuclear Regulatory Commission (NRC) conducted a joint inspection under the Multinational Design Evaluation Programme (MDEP) Protocol VICWG-01 at Engine Systems Inc. (hereafter referred to as ESI) facility located in North Carolina. The NRC inspection team was supplemented with two inspectors from the Korean Institute of Nuclear Safety (KINS). The purpose of the inspection was to verify that ESI 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," and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

This inspection specifically evaluated ESI's qualification and commercial-grade dedication (CGD) of diesel engine components supplied to U.S. operating reactor plants. The NRC inspection team reviewed the environmental and seismic qualifications of a sample of components and observed testing and CGD activities performed during the inspection. In addition, the inspection team reviewed ESI's nonconformance, corrective action, and 10 CFR Part 21 programs. The NRC conducted this inspection at ESI's facility in Rocky Mount, North Carolina.

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

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

Inspection procedures (IP) used included 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.

### **10 CFR Part 21**

The NRC inspection team determined that ESI established a program that appropriately translated the requirements of 10 CFR Part 21 into implementing procedures and, for those activities that the inspectors reviewed, implemented them as required. No findings of significance were identified.

### **Design Control and Qualification**

The NRC inspection team determined that ESI established a program that adequately controls procedures for the qualification of Class 1E components to verify compliance with Criterion III, "Design Control," and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. No findings of significance were identified.



### Commercial-Grade Dedication

The NRC inspection team determined that ESI established a program that adequately controls commercial grade dedication in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50.

### Oversight of Contracted Activities and Audits

The NRC inspection team determined that ESI did not adequately implement the requirements of Criterion VII "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC issued Nonconformance 99901362/2015-201-01, for ESI's failure to ensure a commercial-grade survey or source verification was performed on a commercial laboratory subcontracted for the four ball wear scar testing services on safety-related grease.

### Measuring and Test Equipment

The NRC inspection team concluded that ESI established a program that adequately controls calibration and use of measuring and test equipment (M&TE) in accordance with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

### Nonconformances and Corrective Actions

The NRC inspection team concluded that ESI established a program that adequately implements the regulatory requirements of Criterion XV, "Nonconforming Materials, Parts, or Components."

The NRC inspection team determined that ESI did not adequately implement the requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The NRC issued Nonconformance 99901362/2015-201-02, for ESI's failure to perform a root cause evaluation on a self-identified significant condition adverse to quality, or implement corrective actions to preclude repetition. Specifically, ESI shipped untested generator brush wire to Tennessee Valley Authority, and then subsequently shipped two voltage regulators to Energy Northwest without completing testing requirements. In addition, ESI did not adequately evaluate the acceptability of material despite the disparity in the results of material testing performed in their own laboratory versus testing performed by an outside contractor.

## **REPORT DETAILS**

### **1. 10 CFR Part 21 Program**

#### **a. Inspection Scope**

The inspectors reviewed ESI's policies and implementing procedures that govern its 10 CFR Part 21 program to verify compliance with the requirements of 10 CFR Part 21. ESI's Quality Assurance Manual (QAM) discussed the high level program requirements and responsibilities of implementing Part 21. The inspectors also interviewed the vendor's QA staff members who are responsible for implementation of the program. The inspection team verified that ESI's nonconformance and corrective action processes provide adequate links to the Part 21 procedure. In addition, the inspectors reviewed a sample of evaluations of deviations to ensure that the correct process was followed. The documents reviewed by the inspectors are included in the attachment to this inspection report.

#### **b. Observations and Findings**

No findings of significance were identified.

#### **c. Conclusions**

The NRC inspection team determined that ESI established a program that appropriately translated the requirements of 10 CFR Part 21 into implementing procedures and, for those activities that the inspectors reviewed, implemented them as required. No findings of significance were identified.

### **2. Design Control and Equipment Qualification**

#### **a. Inspection Scope**

The inspectors reviewed ESI's policies and implementing procedures for qualification of Class 1E components to verify compliance with Criterion III, "Design Control," and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. The inspectors evaluated a sample of qualification packages to ensure that they were properly performed in accordance with Institute of Electrical and Electronics Engineers (IEEE) standards as required by customer purchase orders (POs). The documents reviewed by the inspectors are included in the attachment to this inspection report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team determined that ESI established a program that adequately controls procedures for the qualification of Class 1E components to verify compliance with Criterion III, "Design Control," and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

**3. Commercial Grade Dedication**

a. Inspection Scope

The inspectors reviewed ESI's commercial grade dedication (CGD) policies and procedures to verify compliance with Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, which is supported by the CGD definitions in 10 CFR Part 21, including ESI procedure PSP-201, "Dedication of Safety Related Items." The inspectors reviewed completed CGD documentation for a fuel oil transfer pump assembly, replacement parts for an air start motor assembly, a 125 VDC speed switch, and for lubricant used during refurbishments of a GM/EMD Model A20-C2 synchronous generator to verify implementation. The sample of completed documentation included inspection of safety function assessment, failure modes and effects analyses and determination of critical characteristics. The documents reviewed by the inspectors are included in the attachment to this inspection report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team determined that ESI established a program that adequately controls CGD in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

**4. Oversight of Contract activities and Audits**

a. Inspection Scope

The inspectors reviewed ESI's policies and implementing procedures that govern the implementation of its oversight of contracted activities 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 a sample of commercial-grade surveys (CGSs) and annual evaluation reports. The inspectors confirmed that CGSs contained sufficient objective evidence of the review and verification of relevant critical characteristics of items and services controlled by the supplier and the invoked PO restrictions. The inspectors also verified a sample of Certified Material Test Reports (CMTRs) and Certificates of Conformance (CoCs) for components, consumables and services. The inspectors confirmed that the CGSs, audits, and annual evaluations are performed in accordance with regulatory requirements.

The inspectors discussed the purchase order (PO) issuance process with ESI personnel and sampled issued PO documentation to verify implementation. The sample of PO documentation included laboratory testing services, EMI/RFI testing services, and components procured commercially as part of CGD. The documents reviewed by the inspectors are included in the attachment to this inspection report.

In addition, the inspectors reviewed a sample of external audits. The inspectors confirmed that the audit reports contained objective evidence of the review of the relevant QA criteria of Appendix B to 10 CFR Part 50. For audits that resulted in findings, the NRC inspection team verified that ESI initiated adequate corrective actions. The documents reviewed by the inspectors are included in the attachment to this inspection report.

b. Observations and Findings

The inspectors identified two instances in which ESI did not establish measures to assure that testing services performed by a third party commercial laboratory were adequately dedicated. Specifically, Dedication Report Number D-EMD-8249819-1, for Shell Cyprina RA grease, dated July 3, 2013, stated that critical characteristics for the grease were color, worked cone penetration, dropping point, and four ball wear scar test. The grease is used as packing grease for generator bearings. ESI contracted Hergruth Laboratories, Inc., an audited Appendix B supplier on the Approved Supplier List, for the testing. However, Hergruth does not perform the four ball wear test of grease, and subcontracted this test to a commercial laboratory. Neither Hergruth nor ESI performed a commercial-grade survey or source inspection to ensure that the services procured from the commercial laboratory met the safety-related requirements on the purchase orders. ESI contracted Hergruth in two instances:

- On September 2013, ESI sent grease to Hergruth for testing and subsequently used the grease during a refurbishment of an AC synchronous generator for Browns Ferry Nuclear Plant, in accordance with PO 494435 with Tennessee Valley Authority.
- On June 2014, ESI sent grease to Hergruth for testing and subsequently used the grease during a refurbishment of an AC synchronous generator for Surry Power Station, in accordance with PO 70269337 with Dominion Virginia Power.

c. Conclusions

The NRC inspection team determined that ESI did not adequately implement the requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team issued Nonconformance 99901362/2015-201-01 for ESI's failure to ensure a commercial-grade survey or source verification was performed on a commercial laboratory subcontracted for the four ball wear test testing services on safety-related grease.

**5. Measuring and Test Equipment (M&TE)**

a. Inspection Scope

The inspectors reviewed ESI's M&TE policies and implementing procedures to verify compliance with Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The inspectors verified the implementation of M&TE control through direct observation of inspection activities of ESI personnel and review of certificates of calibration for a sample of M&TE. In addition, the NRC inspectors evaluated a sample of M&TE associated with the dedication testing for pressure boundary integrity of hoses and functional testing for digital controllers. Furthermore, the inspectors observed Fourier Transform Infrared spectroscopy (FTIR) analyses for the insulation of hoses. The inspectors sampled instruments used during testing to ensure that they were calibrated and appropriate for the range of operation for each described activity. The documents reviewed by the inspectors are included in the attachment to this inspection report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that ESI established a program that adequately controls calibration and use of M&TE in accordance with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

**6. Nonconformance and Corrective Action**

a. Inspection Scope

The inspectors reviewed ESI's policies and procedures governing the implementation of nonconforming components and corrective actions to verify compliance with Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The inspectors reviewed ESI's documented conditions adverse to quality, such as corrective action reports, to verify actions to resolve the identified conditions were implemented in a timely matter. In addition, the inspectors reviewed nonconformance report justifications to verify

appropriate disposition of items. The inspectors also conducted several interviews of ESI's management and technical staff regarding the evaluation of nonconforming components and corrective actions. The inspectors verified that ESI's nonconformance and corrective action processes provides guidance to evaluate issues for reportability under ESI's 10 CFR Part 21 program. The documents reviewed by the inspectors are included in the attachment to this inspection report.

b. Observations and Findings

Incomplete testing

The inspectors reviewed ESI's Quality Control Procedures (QCP)-30, "Control of Nonconforming Conditions and Corrective Actions and 10 CFR 21 Reportable Conditions." Procedure QCP-30 identifies, controls, documents, and resolves conditions or items, that do not conform to specified requirements. QCP-30 ensure that significant conditions adverse to quality are promptly identified and corrected. QCP-30, Section 6.6 requires Corrective Action Reports (CARs) to be classified as either Level I or Level II. Significant conditions adverse to quality are classified as Level I. Level I CARs require a root cause evaluation, and the evaluation must be a separate document that includes the problem statement, the extent of condition, collection and investigation of data, sequencing of events and identification of the root cause.

The inspectors reviewed a sample of CARs and Non-Conformance Reports (NCR). During the review, the NRC inspection team noted that CAR # 2014-14, dated April 22, 2014, was a Level I (significant condition adverse to quality) CAR. CAR # 2014-14 identified that the Tennessee Valley Authority (TVA) Purchase PO 8002012 for a generator was certified and shipped on September 26, 2013, without the completion of material testing on the generator brush wires. ESI identified the condition and tested the generator brush wires on November 19, 2013. The results of the testing were acceptable and the condition had no effect on the shipped product. The CAR was closed without any further evaluation or extent of condition evaluation. The NRC inspectors requested the root cause evaluation for CAR # 2014-14, but ESI had not performed a root cause evaluation as prescribed in QCP-30, Section 6.6. ESI and the NRC inspection team discussed the potential for shipment of other products without completion of testing requirements. Subsequently, the inspectors noted that in March 2015, ESI shipped Energy Northwest PO 00337942 to Columbia Generating Station without the completion of required testing specified on the purchase order. The purchase order required that two voltage regulators be bench tested and that at least one of the units be tested on an actual engine prior to shipment. ESI failed to ensure that the voltage regulator testing was completed prior to shipment and issued a certificate of conformance stating that all the testing specified on the purchase order was completed. The failure to evaluate and correct the cause of CAR#2014-14 is one example of inadequate corrective action and is cited in nonconformance 99901362/2015-201-02.

### Nonconforming carbon content

The inspectors reviewed the dedication report for the replacement air start motor spring seat. The dedication report included the material composition for a spring seat used in an air start motor as a critical characteristic. The dedication report specified that the spring seat carbon percentage to be within a range of 0.6-1.0% per original equipment manufacturer (OEM) design specifications. Once ESI received the air start motor a technician performed a material evaluation on the seat at ESI's material laboratory. The material analyses performed by ESI's on-site laboratory yielded low out-of-specification results. The same sample was sent to a contracted laboratory for testing and tested high out-of-specification (1.1%). On May 15, 2015, the ESI engineering staff wrote on the Chemical Test Report, "Results acceptable. Though carbon was slightly high (0.1%), all other elements were correct. Furthermore, the density was within specified range (one of the only physical verifications). Material meets specification." However, ESI did not evaluate the disparity between their own laboratory results and the contracted laboratory results as a nonconformity, and thus did not evaluate or justify the reliability and accuracy of their own laboratory equipment, test procedures, or sample preparation procedures. In addition, ESI failed to consider the effects of out-of specification (low or high) carbon percentage on the properties of the alloy, or how a failure of the spring seat would impact the ability of the air start motor to perform its safety-related function. The failure to evaluate the disparity in the results of material testing performed in their own laboratory versus testing performed by an outside contractor, plus the failure to adequately evaluate the basis for accepting the material constitutes a second example of inadequate corrective action and is cited in nonconformance 99901362/2015-201-02.

### c. Conclusions

The NRC inspection team concluded that ESI established a program that adequately implements the regulatory requirements of Criterion XV, "Nonconforming Materials, Parts, or Components."

The NRC inspection team determined that ESI did not adequately implement the requirements of Criterion XVI, "Corrective Action," in Appendix B to 10 CFR Part 50. The NRC issued Nonconformance 99901362/2015-201-02, for ESI's failure to perform a root cause evaluation on a self-identified significant condition adverse to quality or implement adequate corrective actions to preclude repetition. Specifically, ESI shipped untested generator brush wires to Tennessee Valley Authority, then subsequently shipped two voltage regulators without completing testing requirements to Energy Northwest Columbia Generating Station. In addition, ESI did not adequately evaluate the acceptability of the material despite the disparity in the results of material testing performed in their own laboratory versus testing performed by an outside contractor.

## **7. Entrance and Exit Meetings**

On May 18, 2015, the NRC inspection team presented the inspection scope during an entrance meeting with ESI personnel including Tom Horner. On May 22, 2015, the inspectors presented the inspection results during an exit meeting with ESI personnel including John Manno, Vice President of ESI.



## ATTACHMENT

### 1. PERSONS CONTACTED AND NRC STAFF INVOLVED:

Name	Title	Affiliation	Entrance	Exit	Interviewed
Tom Horner	Quality Assurance Manager	ESI	X		X
Michael Thiel	Operations Manager	ESI	X	X	x
Dan Roberts	Sales Support Engineer	ESI	X	X	x
Jack Murray	Service Manager	ESI	X	X	X
Nick Kerr	Dedication Engineer Supervisor	ESI	X	X	X
Darryl Hartley	Customer Service Manager	ESI	X	X	
Chis Payne	Production Manager	ESI	X	X	X
Greg Winstead	Materials Manager	ESI	X	X	
John Kriesel	Engineering Manager	ESI	X	X	x
Anoy Pate	Quality Engineer	ESI	X	X	
Seth Topps	Quality Engineer	ESI	X	X	X
Kevin Broussard	Quality Engineer	ESI	X	X	X
John Manno	Vice President	ESI		X	
Annie Ramirez	Inspection Team Leader	NRC	X	X	
Aaron Armstrong	Inspection Team Member	NRC	X	X	
Tania Martinez-Navedo	Inspection Team Member	NRC	X	X	
Laura Micewski	Inspection Team Member	NRC	X	X	
Sung Ho Yang	Inspector	KINS	X	X	

Seon Ho Song	Inspector	KINS	X	X	
Brian Byron	Technician	ESI			X
Stephen Oskeria	Dedication Engineer	ESI			X
Scott Anderson	Technician	ESI			X
Damon Cooper	Technician	ESI			X

## 2. **INSPECTION PROCEDURES USED:**

IP 43002, "Routine Inspections of Nuclear Vendors"

IP 43004, "Inspection of Commercial-Grade Dedication Programs"

IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance"

## 3. **ITEMS OPENED, CLOSED, AND DISCUSSED:**

<u>Item Number</u>	<u>Status</u>	<u>Type</u>	<u>Description</u>
99901362/2015-201-01	OPEN	NON	Criterion VII
99901362/2015-201-02	OPEN	NON	Criterion XVI

## 4. **DOCUMENTS REVIEWED:**

### Procedures

- ESI Quality Assurance Manual, 5th Edition, Revision 0, dated July 13, 2007
- Quality Assurance Procedures (QAP) -100, Management Responsibilities, Revision 5 April 7, 2015.
- QAP-701 Preparation of the Inspection and test procedure, Revision 5, dated October 23, 2000.
- QCP-600 Measuring and Test Equipment Control Revision 26, dated April 6, 2015.
- SCP-500 XRF Operation and prevention of Potential radiation exposure, Revision 0, dated February 15, 2011.
- PSP-303 In house Material Testing, Revision 7, dated January 25, 2012.
- PSP-304 In house seismic and environmental testing, Revision 3, August 22, 2001.
- PSP-204 Equipment Qualification Training Plan, Revision 2, August 5, 2002.
- QCP-30, "Control of Nonconforming Conditions and Corrective Actions and 10 CFR Part 21 Reportable Conditions," Revision 24, dated April 9, 2015.
- EP-813, "Control and Distribution 10CFR21 – Reportable Defects Reporting," Revision 5, dated February 15, 2010.

- PSP-113, "Packing and Shipping of Material, Parts and Components," Revision 3, dated January 22, 2004.
- PSP-201, "Dedication of Safety Related Items," Revision 18, dated March 23, 2015.
- TP-ESI506100, "Functional Test Procedure for Fuel Transfer Pump/Motor Assembly," revision 1, dated March 16, 2015.
- PCP-201, "Procurement Document Preparation and Processing, revision 24, dated January 7, 2011.
- PSP-202, "Processing Nuclear Replacement Parts Orders," Revision 18, dated August 23, 2010.
- QAP-302, Management Review, Revision 6, dated March 31, 2014.
- QCP-700, Quality Assurance Records, Revision 9, dated March 3, 2010.
- EP-201, "Design Control," Revision 3, dated March 14, 2012
- EP-203, "Design Verification," Revision 3, dated November 11, 2011
- EP-801, "Drawing/Document Control," Revision 11, dated October 10, 2012
- PSP-201, "Dedication of Safety Related Items," Revision 18, March 23, 2015
- PSP-303, "In-house Material Testing," Revision 7, January 25, 2012

#### Nonconformance Reports (NCRs) and Corrective Action Reports (CARs)

- NCR# 8570 dated September 5, 2014 \*Closed
- NCR# 8828 dated January 28, 2015 \* Closed
- NCR#8841 dated February 2, 2015 \* Closed
- NCR# 8850 dated February 4, 2015 \* Closed
- NCR#9025, dated April 28, 2015.
- NCR#9022, dated May 11, 2015.
- NCR#8916, dated March 3, 2015.
- NCR#8937, dated March 9, 2015.
- NCR#9024, dated April 28, 2015.
- NCR#9003, dated April 20, 2015.
- NCR#8995, dated April 14, 2015.
- NCR#8954, dated March 17, 2015.
- NCR#8936, dated March 9, 2015.
- NCR#8919, dated March 3, 2015.
- NCR#8912, dated March 2, 2015.
- NCR#8907, dated February 27, 2015.
- NCR#8882, dated February 19, 2015.
- NCR#8875, dated February 19, 2015.
- NCR#8969, dated March 25, 2015.
- NCR#9013, dated April 23, 2015.
- NCR#9020, dated April 28, 2015.
- NCR#9025, dated April 28, 2015.
- NCR#9047, dated May 11, 2015.
- NCR#7098, dated April 28, 2015.
- NCR#8702, dated November 18, 2014.
- NCR#8955, dated March 18, 2015.

- NCR#8983, dated April 3, 2015.
- NCR#9047, dated May 11, 2015.
- NCR#9048, dated May 11, 2015.
- NCR#9049, dated May 12, 2015.
- NCR#9050, dated May 12, 2015.
- CAR#2012-23, dated October 3, 2012.
- CAR#2013-06, dated March 29, 2013.
- CAR#2013-07, dated April 9, 2013.
- CAR#2013-18, dated October 29, 2013.
- CAR#2013-04, dated February 22, 2013.
- CAR#2013-07, dated April 9, 2013.
- CAR#2013-14, dated July 26, 2013.
- CAR#2014-01, dated February 10, 2014.
- CAR#2014-02, dated February 12, 2014.
- CAR#2014-04, dated April 22, 2014.
- CAR#2014-06, dated June 5, 2014.
- CAR#2014-14, dated September 10, 2014.
- CAR#2014-17, dated April 28, 2014.
- CAR#2015-01, dated January 16, 2015.
- CAR#2015-03, dated February 19, 2015.
- CAR#2015-08, dated March 30, 2015.
- CAR# 2015-20, dated May 21, 2015 (Open)

#### Commercial Grade Dedication Packages

- Dedication Report GEN-HAN-84114 75RR-1, Rev 0 (undated)
- Dedication Report GEN-HAN-8002204-1, Rev. 0 (undated)
- Dedication Report PA-ESI-ESI506100-1, for Fuel Transfer Pump Assembly P/N ESI506100, dated March 25, 2015
- Dedication Report D-EMD-8466066-1, for Air Start Motor Piston Ring EMD P/N 8466066, revision 2, dated February 15, 2012
- Dedication Report GA-WOOD-GOV-RR-1, for Woodward Governor Assembly, revision 3, dated May 27, 2010
- Specification Number MPS-2172 from Xcel Energy to ESI, "Specification for the Procurement of Emergency Diesel System Diesel Oil Transfer Pumps," revision 3, dated February 9, 2015
- Dedication Inspection of Pinion (P/N 101BPMD-17) for Dedication Report No. D-EMD-8491326-1, revision 1, dated January 31, 2012
- Dedication Inspection of End Plate (P/N 150LF-12A) for Dedication Report No. D-EMD-8466060-1, revision 1, dated January 31, 2012
- Dedication Inspection of Vane Kit (P/N 10BM-42-51) for Dedication Report No. MRP-IR-AIRSTART-1, "Major Repair Parts – 150BMPD series Air Start Motor" revision 20, dated October 1, 2014.
- Dedication Inspection of Retaining Ring (P/N C6H20A-6) for Dedication Report No. MRP-IR-AIRSTART-1, "Major Repair Parts – 150BMPD series Air Start Motor" revision 20, dated November 18, 2014.

- Dedication Inspection of Rotor (P/N 10BMP-53) for Dedication Report No. MRP-IR-AIRSTART-1, "Major Repair Parts – 150BMPD series Air Start Motor" revision 20, dated December 15, 2014.
- Dedication Report MRP- IR-AIRSTART-1, "Major Repair Parts – 150BMPD series Air Start Motor" revision 20, dated October 1, 2014.
- Dedication Report No. D-EMD-8249819-1, "Cyprina RA, Bearing Grease, "Revision 0, dated July 3, 2013.
- Dedication Inspection of fuel oil transfer pump assembly (P/N ESI506100) for Dedication Report No. PA-ESI-ESI506100-1, "Safety-Related Commercial Grade Item Fuel Oil Transfer Pump Assembly," dated March 27, 2015.
- Dedication Inspection of 125 VDC speed switch (P/N ESI50267B) for Dedication Report SS-DYN-SST2400A416-1, dated April 16, 2015.
- Dedication Inspection of lubricant (P/N 9517921) for Dedication Report No. D-EMD-9517921-1, dated March 16, 2014.
- Dedication Report VRC-ESI-800065401-1 for Safety-Related Commercial Grade Item, "Voltage Regulator Chassis ESI P/N: 800065401," dated December 20, 2006.
- Dedication Report IC-VAR-LM723J883-1, "Dedication Report IC-VAR-LM723J883-1 for Safety-Related Commercial Grade Item, Integrated Circuit P/N: LM723J/883," dated September 18, 2014.
- Dedication Report AVR-ES-ESI50136-1, "Dedication Report AVR-ES-ESI50136-1 for Safety-Related Commercial Grade Item, Automatic Voltage Regulator ESI P/N: ESI50136," dated July 16, 2007.
- Dedication Report AVR-ESI-720000100RR-1, Revision 3, "Repair and Return of a safety-Related Commercial Grade Item for Automatic Voltage Regulator P/N: 72-05000-100-RR," dated August 18, 2014.
- Dedication Report GA-WOOD-GOV-RR-1 for Safety-Related Commercial Grade Item, Revision 3, May 27, 2010.
- Dedication Report, EG-WOOD-9903470-1 for Safety-related commercial grade item, Part/Component: Digital Reference Unit (DRU) P/N: 9903-470, Supplier : Wood Governor Company, Engine and Turbine Controls Division, Fort Collins, Colorado, dated March 25, 2010.

#### Audits

- Vendor Audit Survey to Ja King Company, LLC dated January 2, 2014. (Followed QAP-501 Supplier/Audits and Source Verification, Revision 15, December 7, 2011).
- Global Quality Assurance Inc. performed internal Audit on April 14-17, 2014.
- Global Quality Assurance Inc. Performed internal Audit on February 23-25, 2015.
- Audit Plan for supplier audit of Applied Technical Services, Marietta, GA, dated July 16, 2012.
- Applied Technical Services, Inc. Audit Report Number: ATS 2012-08, dated August 16, 2012.
- Audit Plan for supplier audit of Herguth Laboratories, Inc. dated January 11, 2013.
- Herguth Laboratories 1-2013 Audit report, dated April 3, 2013.
- Audit Plan for supplier audit of Analysis and Measurement Services Corp., dated July 2, 2013.

- Analysis and Measurement Services Audit Report Number: 7-2013, dated August 28, 2013.
- Test Report for Order 8002411, "Fuel Transfer Pump," dated March 20, 2015.

#### Procurement Documents

- PO# 121390, Revision 0, April 16, 2015
- PO # 8002468, April 14, 2015.
- PO #8002012, Rev 0 (undated)
- PO#120291, dated January 14, 2015.
- PO#120867, dated March 15, 2015.
- PO#120867, dated April 22, 2015.
- PO#121562, dated April 22, 2015.
- PO#121457, dated April 27, 2015.
- PO#0020853, dated September 26, 2014.
- PO#118916, dated October 17, 2014.
- PO#113970, dated July 26, 2013.
- Contract #554455, dated January 7, 2015.
- PO#12145, dated April 22, 2015.
- PO# 00207040, Undated.
- PO# 70269337, dated March 15, 2013.
- PO#223993, dated September 18, 2014.
- PO# 500550848, Rev 7 dated December 3, 2014.
- Change Order 500558142, Revision 2, dated June 7, 2012.
- PO # 500575890, dated June 26, 2013.
- PO# 500586109, dated August 27, 2014.
- Change Order 500586109, Revision 1, dated September 2, 2014.
- Change Order 500586109, Revision 2, dated September 3, 2014.
- PO # 500584937, dated July 14, 2014.
- PO # 00337942, "Energy Northwest – Columbia Generating Station," dated April 18, 2013.
- PO # 00337942, Revision 4, dated May 5, 2014.
- PO # 00613128, dated September 16, 2014.
- Change Order 00613128, Revision 1, dated December 12, 2014.

#### Qualification Reports and Test Procedures/Reports

- Metallurgical Test Report Ref. D233863 from Applied Technical Services, Inc. to ESI, for Purchase Order 121562 for case depth testing, dated May 7, 2015.
- Chemical Test Report Ref. DC233433N from Applied Technical Services, Inc. to ESI, for Purchase Order 121471 for material testing of seat, dated May 1, 2015.
- Metallurgical Test Report Ref. DC233433N from Applied Technical Services, Inc. to ESI, for Purchase Order 121471 for material testing of seat, dated May 1, 2015.
- Chemical Test Report Ref. DC233430 from Applied Technical Services, Inc. to ESI, for Purchase Order 121457 for material testing of piston skirt, dated April 27, 2015.

- Metallurgical Test Report Ref. DC233430 from Applied Technical Services, Inc. to ESI, for Purchase Order 121457 for hardness testing of piston skirt, dated April 27, 2015.
- Tensile Test Report Ref. DC233430 from Applied Technical Services, Inc. to ESI, for Purchase Order 121457 for tensile testing of piston skirt, dated April 27, 2015.
- Metallurgical Test Report Ref. D233430 from Applied Technical Services, Inc. to ESI, for Purchase Order 121457 for case depth testing, dated April 27, 2015.
- Plastics Test Report Ref. D203876 from Applied Technical Services, Inc. to ESI, for Purchase Order 114424 for hardness testing of vane from kit, dated September 17, 2013.
- Letter Report # ESI150302R0-L, "Impedance Measurements of Ferrite Beads for Engine Systems Inc.," dated March 10, 2015.
- Test Report ESI150401R0-F, "EMI/RFI Testing of the Dynalco Speed Switch P/N SST2400A-416 for Engine Systems, Inc.," dated April 2015.
- Certificate of Analysis V5014875, from Herguth Laboratories, Inc. for analyses of Dow Corning G-n Metal Assembly Paste, S/N 8002204-7.1-1, dated July 2, 2014.
- Certificate of Analysis V5014876, from Herguth Laboratories, Inc. for analyses of Shell Cyprina RA, S/N: 8002204-8.1-1 dated July 2, 2014.
- Certificate of Analysis V5014877 from Herguth Laboratories, Inc. for analyses of Bestolife ZN50, S/N: 8002204-9.1-1, dated July 2, 2014.
- Certificate of Analysis V5012135A, from Herguth Laboratories, Inc. for analyses of Dow Corning Molykote G-n Metal Assembly Paste, S/N 8002012-14.1, dated September 18, 2013.
- Certificate of Analysis V5012136A, from Herguth Laboratories, Inc. for analyses of Shell Cyprina RA, S/N: 8002012-15.1 dated September 18, 2013.
- Certificate of Analysis V5012137A from Herguth Laboratories, Inc. for analyses of Bestolife ZN50, S/N: 8002012-16.1, dated September 18, 2013.
- Certificate of Analysis V5015568, from Herguth Laboratories, Inc. for analyses of grease (3013216-1.1-1, Lot # 00356203U04617SEP11), dated September 19, 2014.
- ESI Seismic Qualification Report ESI-SR-12-108, Revision 2, "Seismic Qualification of Voltage Regulator Chassis ESI P/N: D72-12200-100-PVNGS," dated 7/25/12.
- Washington Laboratories Ltd. Report No. 11900-01, Revision 2, "EMI/EMC Test Report for the Engine Systems, Inc. Auto Voltage Regulator (AVR) P/N D72-12200-100-PVNGS," dated June 20, 2012.
- Test Procedure TP-LM723J883, "Functional Test Procedure for Integrated Circuit, P/N: LM723J/883," Revision 0, dated September 8, 2014.
- Engine Systems, Inc., Document No. TP-ESI50136/ESI50137, Revision 2, "Functional Test Procedure for Voltage Regulator and/or Remote Gate Firing Module, ESI P/N: ESI50136/ESI50137," dated September 24, 2014.
- ESI Functional Test Procedure TP-7205000100, "Functional test Procedure for Automatic Voltage Regulator NEI P/N: 72-05000-100," Revision 2, dated June 5, 2012.
- Seismic Qualification of Fuel Pump CES P/N: RB-007-000 for First Energy Corporation, Perry Nuclear Station Customer PO# 45171478, ESI SO# 3001743, Report Number: ESI-SR-06-07, March 20, 2006.
- Seismic Qualification of 2301A Electric Governor P/N: 9903-445 & DRU Reference Unit P/N: 9903-470 for KHNP Shin Wolsung NPP Unit 1 Customer PO # W120014141, ESI SO# 3010053, and Report Number: ESI-SR-13-058, March 27, 2013.

- Nuclear Environmental and Seismic Qualification of 2301A Dual Dynamics Load Sharing & Speed Control P/N: 8272-769 for Installation in a mild Environment, Report No.: ESI-SR-97-23, Rev.0, June 11, 1998.
- Environmental and Seismic Qualification of 2301A Electro Governor (P/N 9903-470) for KHNP Younggwang Unit 6 Customer P.O. #Y100717141, ESI SO#3007961, Report No. ESI-SEQR-11-20, Rev.1: 04/21/11

#### Measuring and Test Equipment Documents

- Certificate #: RTP-17194-138691-1- Dial Indicator (ID 3392), dated April 16, 2015.
- Certificate #: 17194-304004-1- Angle Gage (ID 4325), dated April 16, 2015.
- Certificate # RTP-17194-452435-1- Timer (ID 4395) dated April 16, 2015.
- ESI- CAL-07-01 Calibration for Seismic Table Control System Vibrational Research Corp. Model VR85500, Revision 3, May 10, 2013.
- ESI-CAL-07-01 Calibration for Seismic Table Control System Vibrational Research Corp. Model VR85500, dated May 15, 2014.

#### Miscellaneous Documents

- Drawing No. ESI506100, "Fuel Transfer Pump Assembly," Revision A, dated March 9, 2015.
- Drawing No. ESI506100-1, "Base Assembly Fuel Transfer Pump," dated February 11, 2015.
- Drawing No. ESI50694-2, "Coupling Guard," dated December 17, 2013.
- Ingersoll-Rand Drawing No. 03021623, "Spring Retainer," dated November 6, 1963.
- Ingersoll-Rand Drawing No. 03020633, "Vane," dated March 6, 1970.
- Ingersoll-Rand Drawing No. 03242260, "Retaining Ring," revision 1, dated January 30, 2002.
- Ingersoll-Rand Drawing No. 03021649, "Piston Ring, Compression," revision 2, dated October 12, 1984.
- Safety Related Certificate of Conformance from ESI to Omaha Public Power District, for air start motor pinion, dated December 22, 2014.
- Safety Related Certificate of Conformance from ESI to Omaha Public Power District, for air start motor retaining ring, December 22, 2014.
- Safety Related Certificate of Conformance from ESI to Omaha Public Power District, for air start motor rotor, dated December 22, 2014.
- Safety Related Certificate of Conformance from ESI to Omaha Public Power District, for air start motor vane kit, dated December 22, 2014. Safety Related Certificate of Conformance - Repair and Return, for Order No. 8001720, Customer Purchase Order 500550848, 500558142, and 500575890, dated 6/27/13, quantity 1.
- Safety Related Certificate of Conformance - Repair and Return, for Order No. 8001720, Customer Purchase Order 500550848, 500558142, and 500575890, dated May 30, 2013, quantity 4.
- Safety Related Certificate of Conformance for Order No. 3012504, Customer Purchase Order 500586109, dated September 18, 2014.



- Safety Related Certificate of Conformance, ESI Order No. 3012504, Customer Purchase Order 500586109, dated September 8, 2014, quantity 10.
- Safety Related Certificate of Conformance for Order No. 3013105, Customer Purchase Order 500584937, dated September 30, 2014, quantity 2.
- Safety Related Certificate of Conformance for Order No. 3013105, Customer Purchase Order 500584937, dated October 3, 2014, quantity 1.
- Safety Related Certificate of Conformance – Repair and Return, ESI Order No. 8002148, Customer Purchase Order 00337942, dated August 21, 2014, quantity 1.
- Safety Related Certificate of Conformance – Repair and Return, ESI Order No. 8002148, Customer Purchase Order 00337942, dated March 10, 2015, quantity 1.
- Safety Related Certificate of Conformance for Order No. 8002365, Customer Purchase Order 00613128, dated December 12, 2014, quantity 1.
- Xcel Energy Monticello Nuclear Generating Plant Unit No. 1 Specification MPS-2172, “Specification for the Procurement of Emergency Diesel System Diesel Oil Transfer Pumps,” revision 3, dated February 9, 2015.
- Safety Related Certificate of Conformance from ESI to Omaha Public Power District, for air start motor spring seat, dated May 18, 2015.
- Safety Related Certificate of Conformance from ESI to Northern States Power Company, for fuel transfer pump, dated March 27, 2015.
- Cooper Energy Services Materials Specification No. M-70RN, “Hardened Ductile (Nodular) Iron Castings for Nuclear Applications,” revision 1, dated March 3, 1995
- Inspection Report for AC Tech Job No. 03-341-04-AE, for piston skirt, dated September 12, 2014.
- Commercial Grade Survey Checklist for SGS Herguth Laboratories, Inc. survey of Chevron Energy Technology Company – Lubricants Laboratory Technologies, dated October 3, 2014.
- Certificate of Accreditation for Herguth Laboratories, Inc., for chemical testing of petroleum products, dated May 1, 2012.
- Sales Order 8001720 ESI Nuclear, “Arizona Public Service Co. – Palo Verde,” originally dated 10/26/10, revised on June 26, 2013.
- Specification Revision/Title Sheet No. 13-EN-0650, Revision C, “Emergency Diesel Generator Auto Voltage Regulator Modification Design Specification,” dated December 15, 2009.
- ESI Proposal # 8001720 letter dated November, 1, 2010 on EMI/RFI requirements in Specification D72-12200-100-PVNGS for testing performed at Washington Labs and verified by ESI.
- Sales Order 3012504 ESI Nuclear, “Arizona Public Service Co. – Palo Verde,” dated August 27, 2014.
- Sales Order 3013105 ESI Nuclear, “Arizona Public Service Co. – Palo Verde,” dated July 16, 2014.
- Document Number SA-14-11, Revision 0, “Similarity Analysis of Voltage Regulator ESI P/N: ESI50136, Rev. D, for use at APS-Palo Verde,” dated September 26, 2014.
- Sales Order 8002148 ESI Nuclear, “Columbia Generating Station,” dated April 22, 2013.
- Sales Order 8002365 ESI Nuclear, “PPL Susquehanna LLC,” dated September 17, 2014.
- SCP-201, Shop Traveler, Rev 4, November 3, 2008

- Shop Traveler ST-8002115-3 Revision 2: October 8, 2014, ESI S/N: 800 2115-2.1-1
- Shop Traveler ST-ESI51110, April 1, 2014, ESI S/N: 3011516-1.1-1
- Shop Traveler ST-3012642, April 9, 2014, ESI S/N: 3012642-1.1-1

#### Part 21 Evaluations and Reports

- Evaluation #21E-2014-01, "Starting Air Pressure Regulator Nordberg P/N 1776 506 FOR Brunswick Nuclear Plant" dated February 2, 2014.  
 Repot # 10CFR21-0111, "Starting Air Pressure Regulator Nordberg P/N 1776 506 FOR Brunswick Nuclear Plant," dated February 2, 2014.
- Evaluation #21E-2013-18, "CR7 Diode Wiring Reversed AVR Panels for APS-Palo Verde P/N: D72-12200-100-PVNGS," dated November 13, 2013  
 Repot # 10CFR21-0110, "CR7 Diode Wiring Reversed AVR Panels for APS-Palo Verde P/N: D72-12200-100-PVNGS," dated November 13, 2013.
- Evaluation #21E-2013-07, "EMD Fuel Injectors P/N 40084720 & 40099335," dated May 3, 2013  
 Repot #10CFR21-0109, "EMD Fuel Injectors P/N 40084720 & 40099335," dated May 3, 2013.
- Evaluation #21E-2013-06, "KSV Cylinder Head with Missing Keeper Seals, Cylinder Head Part Numbers 10-KSV-11-3-RR, 12-KSV-11-3-RR, AND 13-KSV-11-6-RR," dated April 23, 2013.  
 Repot #10CFR21-0108, "KSV Cylinder Head with Missing Keeper Seals, Cylinder Head Part Numbers 10-KSV-11-3-RR, 12-KSV-11-3-RR, AND 13-KSV-11-6-RR," dated April 23, 2013
- Evaluation #21E-2012-23, "KSV Cylinder Head With Foreign Material In Intake Port, P/N 13-KSV-11-6-RR," dated December 6, 2012 Repot #10CFR21-0106, "KSV Cylinder Head With Foreign Material In Intake Port, P/N 13-KSV-11-6-RR," dated December 6, 2012.

## 5. **ACRONYMS USED:**

ADAMS	Agencywide Documents Access and Management System
CAR	corrective action report
CGD	commercial-grade dedication
CFR	<i>Code of Federal Regulations</i>
COC	Certificate of Conformance
DCIP	Division of Construction Inspection and Operational Programs
EPRI	Electric Power Research Institute
EVIB	Electrical Vendor Inspection Branch
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	inspection procedure
M&TE	measuring and test equipment
NCR	nonconformance report
NON	Notice of Nonconformance
NRC	(U.S.) Nuclear Regulatory Commission
NRO	Office of New Reactors
PO	purchase order
QA	quality assurance
QAM	quality assurance manual
QAP	quality assurance procedure
U.S.	United States (of America)
XRF	X-Ray Fluorescence