



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

December 15, 2021

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

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NO.  
99901362/2021-201 AND NOTICE OF VIOLATION FOR VENDOR  
INSPECTION OF ENGINE SYSTEMS, INC.

Dear Mr. Roberts:

From November 1 through November 5, 2021, the U.S. Nuclear Regulatory Commission (NRC) staff conducted a routine vendor inspection at the Engine Systems, Inc. (hereafter referred to as ESI) facility in Rocky Mount, NC. The purpose of this limited-scope inspection was to assess ESI'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 Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

This technically-focused inspection specifically evaluated ESI's implementation of the quality activities associated with safety-related testing services provided to U.S. nuclear power plants. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of ESI's overall quality assurance (QA) program.

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The NRC evaluated the violation in accordance with the agency's Enforcement Policy, which is available on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>.

The enclosed Notice of Violation (NOV) cites the violation, and the subject inspection report details the circumstances surrounding it. The NOV cites ESI for failing to evaluate a deviation related to a returned pressure regulating valve as soon as reasonably practicable.

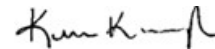
You are required to respond to this letter and to follow the instructions specified in the enclosed NOV when preparing your response. In your response to the enclosed NOV, ESI should document the results of the extent of condition review for this finding and determine if there are any effects on other safety-related components. If you have additional information that you believe the NRC should consider, you may provide it in your response to the NOV. The NRC's review of your response to the NOV also will determine if further enforcement action is necessary to ensure compliance with regulatory requirements.

Please provide a written statement or explanation within 30 days of this letter in accordance with the instructions specified in the enclosed NOV. 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," the NRC will make available electronically for public inspection a copy of this letter, its enclosure, and your response through the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response (and 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, 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 be 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 would 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,

Kerri A. Kavanagh, Chief



Signed by Kavanagh, K  
on 12/15/21

Quality Assurance and Vendor Inspection Branch  
Division of Reactor Oversight  
Office of Nuclear Reactor Regulation

Docket No.: 99901362

EPID No.: I-2021-201-0062

Enclosures:

1. Notice of Violation
2. Inspection Report No. 99901362/2021-201  
and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NO.  
99901362/2021-201 AND NOTICE OF VIOLATION FOR VENDOR INSPECTION  
OF ENGINE SYSTEMS, INC. Dated: December 15, 2021

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**ADAMS Accession No.: ML21341B189****NRR-106**

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<b>DATE</b>	12/7/2021	12/10/2021	12/10/2021
<b>OFFICE</b>	NRR/DRO/IQVB	NRR/DRO/IRAB	NRR/DRO/IQVB
<b>NAME</b>	DZhang	BHughes	KKavanagh
<b>DATE</b>	12/10/2021	12/14/2021	12/15/2021

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## NOTICE OF VIOLATION

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

Docket No. 99901362  
Report No. 2021-201

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at the Engine Systems, Inc. (hereafter referred to as ESI) facility in Rocky Mount, NC, from November 1, 2021 through November 5, 2021, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Section 21.21, "Notification of failure to comply or existence of a defect and its evaluation," of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, requires that "Each individual, corporation, partnership, dedicating entity, or other entity subject to the regulations in this part shall adopt appropriate procedures to evaluate deviations and failures to comply to identify defects and failures to comply associated with substantial safety hazards as soon as practicable."

Contrary to the above, as of August 19, 2021, ESI failed to adopt appropriate procedures to evaluate deviations and failures to comply and identify defects as soon as practicable. Specifically, Engine Systems received a failed pressure regulating valve on February 24, 2021 from a facility subject to the regulations in 10 CFR Part 50. Due to inappropriate procedures in place, six months elapsed between the arrival of the failed part at ESI and the evaluation of that valve on August 19, 2021 which resulted in a Part 21 notification to the NRC.

This issue has been identified as Violation 99901362/2021-201-01.

This is a Severity Level IV violation (Section 6.9.d of the NRC Enforcement Policy).

Under the provisions of 10 CFR Part 2.201, "Notice of Violation," ESI is hereby required to submit 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, Quality Assurance and Vendor Inspection Branch, Division of Reactor Oversight, Office of Nuclear Reactor Regulation, within 30 days of the date of the letter transmitting this notice of violation. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include (1) the reason for the violation or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence if the correspondence adequately addresses the required response. Where good cause is shown, the NRC will consider extending the response time.

If you contest this enforcement action, provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is 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 (SGI) so that the agency can make it 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 be withheld, 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 would 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 SGI 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 15th day of December 2021.

**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
DIVISION OF REACTOR OVERSIGHT  
VENDOR INSPECTION REPORT**

Docket No.: 99901362

Report No.: 99901362/2021-201

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

Vendor Contact: Mr. Dan Roberts  
Quality Assurance Manager  
Email: Dan.Roberts@kirbycorp.com  
Phone: 252-407-8204

Nuclear Industry Activity: The Engine Systems, Inc. facility is located in Rocky Mount, NC. This facility provides diesel engine replacement equipment and services to U.S. nuclear power plants including safety related components, seismic and environmental qualification services and commercial grade dedication services for diesel engine parts and components.

Inspection Dates: November 1 - 5, 2021

Inspectors: Andrea Keim           NRR/DRO/IQVB           Team Leader  
Deanna Zhang           NRR/DRO/IQVB  
Laura Smith           NRR/DRO/IQVB  
Paul Prescott           NRR/DRO/IQVB

Approved by: Kerri A. Kavanagh, Chief  
Quality Assurance and Vendor Inspection Branch  
Division of Reactor Oversight  
Office of Nuclear Reactor Regulation

## **EXECUTIVE SUMMARY**

Engine Systems, Inc.  
99901362/2021-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a routine vendor inspection at the Engine Systems, Inc. (hereafter referred to as ESI) facility in Rocky Mount, NC, 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," and 10 CFR Part 21, "Reporting of Defects and Noncompliance." The NRC inspection team conducted this inspection from November 1, 2021 through November 5, 2021. This was the third NRC vendor inspection at the ESI facility.

This technically-focused inspection specifically evaluated ESI's implementation of quality activities associated with safety-related testing services provided to the U.S. nuclear power plants. Specific activities observed by the NRC inspection team included witnessing:

- A set of seismic qualification tests for Purchase Order (PO) 1143071 for DEL Engine pressure switches with part number F-577-046.
- The disassembly and replacement of capacitors on a Woodward governor control (model number SSF2400A) and functional testing.

These regulations served as the bases for the NRC inspection:

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

During this inspection, the NRC inspection team implemented Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017, IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated January 27, 2017, and IP36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated May 16, 2019.

With the exception of the notice of violation described below, the NRC inspection team concluded that ESI's QA policies and procedures comply with the applicable requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21, and that ESI personnel are implementing these policies and procedures effectively. The results of this inspection are summarized below.

### **10 CFR Part 21 Program**

The NRC inspection team reviewed ESI's policies and procedures associated with the 10 CFR Part 21 program to verify adequate implementation of the regulatory requirements. The NRC inspection team: (1) reviewed the 10 CFR Part 21 posting; (2) reviewed a sample of nonconformance and corrective action reports to verify that ESI adequately considered issues for evaluation under their 10 CFR Part 21 Program; (3) verified that ESI's nonconformance and corrective action procedures provide a link to the 10 CFR Part 21 program; and reviewed ESI's Part 21 evaluations.

The NRC inspection team issued Violation 99901362/2021-201-01 in association with ESI's failure to implement the regulatory requirements of 10 CFR Part 21. Violation 99901362/2021-201-01 cites ESI for failing to evaluate deviations and failures to comply associated with substantial safety hazards as soon as practicable. Specifically, ESI failed to enter a returned product into its corrective action program, allowing a defective part to remain in processing for six months before it was adequately evaluated.

### Design Control

The NRC inspection team reviewed ESI's policies and implementing procedures that govern the design, implementation, and testing of basic components supplied by ESI to verify compliance with the regulatory requirements of Criterion III, "Design Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50. The NRC inspection team reviewed a select sample of the design, qualification, and testing documentation associated with a set of pressure switches and a turbine control panel project. The NRC inspection team also witnessed seismic testing performed on these pressure switches. The NRC inspection team identified an instance where the ESI failed to adequately identify applicable design requirements to confirm these requirements were correctly translated into specifications, drawings, procedures, and instructions. The NRC inspection team also identified an instance where ESI failed to remove a retired reference from a design procedure. The NRC identified these issues as minor because the inspection team did not find any negative impacts to the turbine control project based on the documentation sampled. ESI entered these minor issues into ESI's corrective actions program, and the NRC inspection team reviewed and confirmed the accurate capture of these issues in the associated corrective action report (CAR). No findings of significance were identified.

### Commercial-Grade Dedication

The NRC inspection team reviewed ESI's policies and implementing procedures that govern the implementation of its commercial-grade dedication (CGD) program to verify compliance with the requirements of Criterion III, "Design Control," and Criterion VII, "Control of Purchase Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed and evaluated a sample of completed CGD documentation including technical evaluations used to identify critical characteristics and acceptance criteria. The NRC inspection team also reviewed a sample of surveys and confirmed that the surveys addressed the appropriate critical characteristics and were performed based on a plan and by trained personnel. No findings of significance were identified.

### Control of Measuring and Test Equipment

The NRC inspection team reviewed ESI's policies and implementing procedures that govern the control of the measuring and test equipment (M&TE) program to verify compliance with the requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspection team sampled the calibration records used for the seismic testing instruments of pressure switches for PO 1143071 and observed that the calibrations were performed in accordance with ESI's M&TE procedures and adequately documented. No findings of significance were identified.



### Nonconforming Material, Parts, or Components and Corrective Action

The NRC inspection team reviewed nonconformance and corrective action reports to ensure that technical and manufacturing deficiencies have been appropriately evaluated, dispositioned, and reported to customers as required. The NRC inspection team verified that nonconformance reports (NCRs) were closed with sufficient objective evidence and that they were reviewed by qualified personnel for adequacy, completeness, disposition, and prioritization. The NRC inspection team verified that any NCRs dispositioned as “repair” included supplemental work instructions to address the repairs and that the Quality Control inspectors inspected and signed-off on them. The NRC inspection team verified the implementation and closure of ESI’s corrective actions in response to any internal or external audits. In addition, the NRC inspection team reviewed the implementation and closure of the corrective actions opened to address the Notice of Nonconformance documented in the NRC’s inspection report No. 99901362/2015-201, dated July 6, 2015. No findings of significance were identified.

### Audits

The NRC inspection team reviewed ESI’s policies and procedures that govern the implementation of the internal audits program to verify compliance with the regulatory requirements in Criterion XVIII, “Audits,” of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed the results of ESI’s internal audits for 2020 and 2021 and verified that ESI was implementing its processes for internal audits and no findings of significance were observed in this area. No findings of significance were identified.

### Identification and Control of Materials, Parts, and Components

The NRC inspection team reviewed ESI’s policies and procedures that govern the implementation of its materials, parts, and components control program to verify compliance with the requirements of Criterion VIII, “Identification and Control of Materials, Parts, and Components,” of Appendix B to 10 CFR Part 50. The NRC inspection team observed receipt, fabrication and storage activities associated with on-going production orders and reviewed a sample of completed shop work orders to confirm ESI personnel were performing material control activities in accordance with the policies and procedures established for those activities. No findings of significance were identified.

## REPORT DETAILS

### 1. 10 CFR Part 21 Program

#### a. Inspection Scope

The Nuclear Regulatory Commission (NRC) inspection team reviewed Engine System Inc's (hereafter referred to as ESI) policies and implementing procedures that govern the implementation of its Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," program to verify compliance with the regulatory requirements. In addition, the NRC inspection team reviewed the 10 CFR Part 21 posting and a sample of ESI's nonconformance and corrective action reports to verify that ESI adequately considered issues for evaluation under their 10 CFR Part 21 program. The NRC inspection team also verified that ESI's nonconformance and corrective action procedures provide a link to the 10 CFR Part 21 program.

The NRC inspection team reviewed a sample of 10 CFR Part 21 evaluations performed within the past three years and confirmed that ESI had effectively implemented the requirements for evaluating deviations and failures to comply. The NRC inspection team verified that ESI's procedure directs notifications be performed in accordance with the requirements of 10 CFR 21.21, as applicable. ESI provided sufficient documentation to support their engineering evaluations regarding potential 10 CFR Part 21 reportability over the period of the past three years.

The NRC inspection team also discussed the 10 CFR Part 21 program with ESI's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

#### b. Observations and Findings

During the review of the nonconformances and corrective action reports, one report identified a part that did not perform as expected by the customer. ESI authorized the return of the item. It was received in February 2021. The returned item was placed in the segregated area for evaluation upon receipt. Due to a lack of systemic solutions, a non-conformance report (NCR) was not written and the item was left for in process. After approximately six months a review of the segregation area identified the returned item and a 10 CFR Part 21 evaluation was performed. The evaluation determined that the part had a defect that was subject to the 10 CFR Part 21 reporting requirements.

ESI neglected to evaluate the returned item in a timely manner due to the lack of procedure guidance for processing returned items in a timely manner. Instead, ESI relied upon employees to remember each part as it came in and what was to be done with it upon arrival. When the part arrived, the receiving employee placed it back in for processing. The part was then left there for approximately six months before a routine review of the process area led to the discovery of the part.

Once the part was discovered and evaluated, the required Part 21 notifications were performed in a timely manner. A corrective action report was written to address the failure to evaluate the part in a timely manner. The corrective action taken, in part, was to write a NCR for all returned items, regardless of the reason for return.

This issue fails to meet the “as soon as practicable” clause of 10 CFR 21. This issue is cited in notice of violation 99901362/2021-201-01

c. Conclusion

The NRC inspection team issued Violation 99901362/2021-201-01 in association with ESI’s failure to implement the regulatory requirements of 10 CFR Part 21. Violation 99901362/2021-201-01 cites ESI for failing to evaluate deviations and failures to comply associated with substantial safety hazards as soon as practicable. Specifically, ESI failed to enter a returned product into its corrective action program, allowing a defective part to remain in receiving for six months before it was adequately evaluated.

2. Design Control

a. Inspection Scope

The NRC inspection team reviewed ESI’s policies and implementing procedures that govern the design, implementation, and testing of basic components supplied by ESI to verify compliance with the regulatory requirements of Criterion III, “Design Control,” of Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” to 10 CFR Part 50. The NRC inspection team reviewed a select sample of the design, qualification, and testing documentation associated with purchase order (PO) 1143071 for a set of pressure switches and PO 902443 for a turbine control panel project. The NRC inspection team also witnessed seismic testing performed on these pressure switches and observed that the test procedures were adhered to for this project.

The NRC inspection team discussed the ESI design control processes with ESI’s management and technical personnel. The references and attendance list in the attachment to this inspection report identify the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observations

The NRC inspection team identified an instance where the vendor failed to adequately identify applicable design requirements to confirm these requirements are correctly translated into specifications, drawings, procedures, and instructions. Specifically, the vendor failed to identify which requirements from the customer’s specifications (as identified in PO 902443) are applicable to ESI’s portion of the turbine control system (i.e., the turbine control panel) to confirm that these applicable requirements are correctly translated into ESI’s design specifications, drawings, and test and configuration procedures for this project. In addition, the NRC inspection team observed that ESI’s procedure, EP-201, “Design Control,” did not remove a retired reference. The NRC inspection team identified these issues as minor because the NRC inspection team did not identify any negative impacts to the design, configuration, or testing of the ESI supplied turbine control panel based. Further, ESI created Corrective Action Report (CAR) 2021-22 to document these issues. The NRC inspection team reviewed this CAR and confirmed that it adequately captured these issues in the problem statement.

c. Conclusion

The NRC inspection team identified one issue that was not more than minor in association with ESI's failure to implement the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. This minor issue identified ESI's failure to adequately identify applicable design requirements to confirm these requirements are correctly translated into specifications, drawings, procedures, and instructions. ESI initiated CAR 2021-22 to document these issues.

3. Commercial-Grade Dedication

a. Inspection Scope

The NRC inspection team reviewed ESI's policies and implementing procedures that govern the implementation of its commercial-grade dedication (CGD) program to verify compliance with the regulatory requirements of Criterion III, and Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50.

The NRC inspection team discussed the GCD program with ESI management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

a.1 Commercial Grade Dedication

The NRC inspection team reviewed the CGD methodology for safety-related replacement diesel engine components, including the development of critical characteristics (CCs), technical evaluations, failure modes and effects analyses, acceptance criteria methods, sampling methodology, checklists, survey reports, and associated purchase orders. The NRC inspection team reviewed the CGD process for several various diesel engine components. Components reviewed included, but were not limited to piston rings, a camshaft assembly, steel shell bearings, and governor. The NRC inspection team evaluated a sample of technical evaluations and concluded that the technical evaluations in the dedication methodology appropriately identified the CCs necessary to provide reasonable assurance that the item or service would ensure the component would perform its intended safety function.

a.2 Commercial-Grade Surveys

The NRC inspection team reviewed ESI's Approved Suppliers List (ASL) and selected a sample of suppliers to review the methodology of conducting and documenting surveys. The NRC inspection team reviewed ESI's process of selecting and approving commercial suppliers and service providers. The NRC inspection team verified that ESI had prepared and approved plans that identify the scope and applicable CCs to be verified before initiation of the survey. In addition, the NRC inspection team also reviewed a sample of surveys and confirmed that the surveys were performed by qualified individuals using checklists and/or procedures, the checklists and/or procedures included an audit plan, documented objective evidence, survey results, and a review of survey results by responsible management.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that ESI is implementing its CGD program in accordance with the regulatory requirements of Criterion III and Criterion VII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team determined that ESI is implementing its policies and procedures associated with the CGD program. No findings of significance were identified.

4. Control of Measuring and Test Equipment

a. Inspection Scope

The NRC inspection team reviewed ESI's policies and implementing procedures that govern the implementation of its measuring and test equipment (M&TE) program to verify compliance with the requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspection team sampled the calibration records used for the seismic testing instruments of pressure switches for PO 1143071 and observed that the calibrations were performed in accordance with ESI's M&TE procedures and adequately documented.

The NRC inspection team also discussed the M&TE program with ESI's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that ESI is implementing its M&TE program in accordance with the regulatory requirements of Criterion XII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team determined that ESI is implementing its policies and procedures associated with the M&TE program. No findings of significance were identified.

5. Nonconforming Materials, Parts, or Components and Corrective Action

a. Inspection Scope

The NRC inspection team reviewed ESI's policies and procedures regarding identification and control of nonconformances and corrective action 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 NRC inspection team determined that ESI's processes and procedures provide for the identification, documentation, segregation, evaluation, and disposition of nonconforming items. The NRC inspection team also reviewed that ESI's nonconformance process provides guidance to evaluate nonconformances for reportability under ESI's 10 CFR Part 21 program. The nonconformance process is also linked to the corrective action program.

The NRC inspection team observed ESI's assembly floor and verified that nonconforming materials were properly identified, marked, and segregated, when practical, to ensure that they were not reintroduced into the production processes.

The NRC inspection team reviewed a sample of non-conforming reports (NCRs) and confirmed that ESI: (1) dispositioned the NCRs in accordance with the applicable procedures; (2) documented an appropriate technical justification for the dispositions; and (3) took adequate corrective action regarding the nonconforming items to prevent recurrence. The NRC inspection team also reviewed a sample of CARs and confirmed: (1) adequate documentation and description of conditions adverse to quality; (2) an appropriate analysis of the cause of these conditions and the corrective actions taken to prevent recurrence; and (3) direction for review and approval by the responsible authority to verify effective implementation of the corrective actions.

The NRC inspection team also reviewed ESI's corrective actions in response to the inspection findings identified in NRC Inspection Report IR No. 99901362//2015-201 dated July 6, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15174A019).

The NRC inspection team also discussed the nonconforming materials, parts, or components and corrective action programs with ESI's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observations and Findings

b.1 Corrective Action Associated with Nonconformance No. 99900905/2015-201-01

Following the May 2015 inspection of ESI, the NRC issued Nonconformance (NON) 99901362/2015-201-01 for ESI's failure 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 a laboratory for the testing of the critical characteristics. The testing laboratory did not perform the four ball wear test of the grease, and subcontracted performance of the four ball wear 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.

In its response dated August 4, 2015 (ADAMS Accession No. ML15231A042), ESI initiated CAR 2015-21 to address NON 99901362/2015-201-01. The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions, including the review of CAR

2015-21. The NRC inspection team reviewed the updates to the ASL including restrictions for vendors performing testing and developed a checklist for testing services dedication.

The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions. The NRC inspection team confirmed that the corrective actions were adequate to address the NON. Based on its review, the NRC inspection team closed Nonconformance 99901362/2015-201-01.

b.2 Corrective Action Associated with Nonconformance No. 99900905/2015-201-02

Following the May 2015 inspection of ESI, the NRC issued Nonconformance 99901362/2015-201-02 for ESI's failure to ensure 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 CAR #2014-04 which was identified by ESI as a Level 1 Significant Condition Adverse to Quality; nor were sufficient corrective actions taken. Consequently, 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 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.

In its response dated August 4, 2015 (ADAMS No. ML15231A042), ESI initiated CAR 2015-19, CAR 2015-20 and 2015-22 to address NON 99901362/2015-201-02. The NRC inspection team reviewed the documentation that provided the

objective evidence for the completion of the corrective actions, including the review of CARs 2015-19, 2015-21 and 2015-22.

ESI stated that it would revise its procedure and include a corrective action checklist to ensure that a problem is adequately identified, dispositioned for severity and potential Part 21. Additional review meetings were also incorporated. The NRC inspection team verified customer service personnel received training on customer requirements in purchase orders and the importance that all requirements are verified. The NRC inspection team verified the implementation of the changes to prevent re-occurrence.

Based on its review, the NRC inspection team closed Nonconformance 99901362/2015-201-02. The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions. The NRC inspection team confirmed that the corrective actions were adequate to address the NON. Based on its review, the NRC inspection team closed Nonconformance 99901362/2015-201-02.

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that ESI is implementing its nonconforming materials, parts, or components and corrective action programs in accordance with the regulatory requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that ESI is implementing its policies and procedures associated with the control of nonconforming materials, parts, or components and corrective action. No findings of significance were identified.

6. Audits

a. Inspection Scope

The NRC inspection team reviewed ESI's policies and procedures that govern the implementation of ESI's internal audits program to verify compliance with the regulatory requirements in Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed the results of ESI's internal audits for 2020 and 2021 and verified that ESI was implementing its processes for internal audits and no findings of significance were observed in this area. No findings of significance were identified.

The NRC inspection team also discussed the ESI's internal audit program with ESI management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.



c. Conclusion

The NRC inspection team concluded that ESI is implementing the internal audits program in accordance with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team determined that ESI is implementing its policies and procedures associated with the internal audits program. No findings of significance were identified.

7. Identification and Control of Materials, Parts, and Components

a. Inspection Scope

The NRC inspection team reviewed ESI's policies and procedures that govern the implementation of materials, parts, and components identification and control program to verify compliance with the regulatory requirements in Criterion VIII, "Identification and Control of Materials, Parts, and Components," of Appendix B to 10 CFR Part 50.

The NRC inspection team witnessed on-going shop activities related to product receipt and acceptance and verified the ESI staff adequately performed intake activities including, assignment of unique identification numbers to orders, and determining additional routing of materials for necessary testing and entry into inventory.

The NRC inspection team also reviewed in-process activities in accordance with shop work orders and reviewed both material staging areas and nonconforming material segregation areas to verify material identification control methods including stamping, tagging and marking. The NRC inspection team reviewed a sample of in-process and completed work order documents and confirmed material identification for each process step was adequately documented in accordance with the procedures governing these activities.

The NRC inspection team also discussed the identification and control of materials, parts, and components program with ESI's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that ESI is implementing its materials, parts, and components identification and control program in accordance with the regulatory requirements of Criterion VIII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team determined that ESI is effectively implementing its policies and procedures associated with the identification and control of materials, parts, and components. No findings of significance were identified.

## 7. Entrance and Exit Meetings

On November 1, 2021, the NRC inspection team discussed the scope of the inspection with Mr. Dan Roberts, Quality Assurance Manager, and other members of ESI's management and technical staff. On November 5, 2021, the NRC inspection team presented the inspection results and observations during an exit meeting with Mr. Mike Thiel, General Manager, and other members of ESI'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 NRC inspection team interviewed.

## ATTACHMENT

### 1. ENTRANCE/EXIT MEETING ATTENDEES

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
Dan Roberts	QA manager	ESI	X	X	X
Darryl Hartley	Customer Service Manager	ESI	X	X	
Kevin Broussard	Quality Inspection Supervisor	ESI	X	X	
John Kriesel	Engineering Manger	ESI	X	X	
Nick Kerr	Dedication Engineering Supervisor	ESI	X	X	
Greg Winstead	Materials Manager	ESI	X	X	
Chris Payne	Production Manager	ESI	X	X	X
Jack Murray	Field Service Manager	ESI	X	X	
Michael Thiel	General Manager	ESI	X	X	
Anthony Pate	Quality Engineer	ESI			X
Joni Broussard	Quality Inspector	ESI			X
Daniel Tyson	Project Engineer	ESI			X
Ryan Leyshon	Project Engineer	ESI			X
Andrea Keim	Inspection Team Leader	NRC	X	X	
Deanna Zhang	Inspector	NRC	X	X	
Laura Smith	Inspector	NRC	X	X	
Paul Prescott	Inspector	NRC	X*	X*	
Kerri Kavanagh	Branch Chief	NRC		X*	

\*Via Teleconference

## 2. INSPECTION PROCEDURES USED

Inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated May 16, 2019.

IP 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017.

IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated January 27, 2017.

## 3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Status	Type	Description
99901362/2015-201-01	CLOSED	NON	Criterion VII
99901362/2015-201-02	CLOSED	NON	Criterion XVI
99901362/2021-201-01	OPENED	NOV	10 CFR Part 21

## 4. DOCUMENTS REVIEWED

### Policies and Procedures

- Engine Systems, Inc., Quality Assurance Manual 6<sup>th</sup> Edition, Revision 0, dated February 20, 2018
- EP-201, "Design Control," Revision 3, dated March 14, 2002
- EP-203, "Design Verification," Revision 4, dated January 5, 2021
- PSP-106, "Inventory Control Procedure," Revision 6, dated March 21, 2018
- PSP-201, "Dedication of Safety Related Items," Revision 22, dated July 29, 2021
- PSP-202, "Processing Nuclear Replacement Parts Orders," Revision 24, dated December 29, 2020
- QAP-501, "Supplier Audits/Surveys and Source Verifications," dated May 18, 2021
- QAP-502, "Conducting Internal Audits," Revision 14, dated April 26, 2019
- QCP-301, "Control of Nonconforming Conditions and Corrective Actions," Revision 30, dated May 18, 2021
- QCP-600, "Measuring and Test Equipment Calibration and Control," dated April 16, 2020
- S-100, "Soldering Specifications," Revision 2, dated May 1, 2015
- QCP-250, "Cyber Security for Handling of Safety Related Digital Equipment," Revision 1, dated April 30, 2018

### Commercial-Grade Dedication Records

- Dedication Inspection Report No. 52230, "Ring Set with Chrome Backing," dated October 7, 2021
- Dedication Inspection Report No. 50926, "Camshaft Assembly," dated April 28, 2021
- Dedication Report No. D-EMD-9319334-1, "Safety Related Commercial Grade Item: Camshaft Assembly, Left Bank," dated April 8, 2021

- ESI Material Test Form for Part No. 9319320, "Cam Segment," dated April 13, 2021
- ESI Material Test Form for Part No. 8241971, "Stub Shaft," dated April 13, 2021
- ESI Material Test Form for Part No. 8241974, "Stub Shaft," dated April 13, 2021
- ESI Material Test Form for Part No. 8028638, "Camshaft Spacer," dated April 13, 2021
- ESI Material Test Form for Part No. 8034672, "Stud," dated April 13, 2021
- ESI Material Test Form for Part No. 8034673, "Stud," dated April 13, 2021
- ESI Material Test Form for Part No. 8035950, "Special Washer," dated April 13, 2021
- ESI Material Test Form for Part F-577-046, "Pressure Switch" dated February 15, 2019
- Dedication Inspection Report No. 50373, "ASME Section III Immersion Heater," dated March 1, 2021
- Dedication Report No. D-CES74046116ESI-1, "Safety Related Commercial Grade Item: Immersion Heater, 50kW, 480VAC," dated March 16, 2021
- Dedication Inspection Report No. 51622, "Lower Rod Bearing," dated July 23, 2021
- Dedication Report No. D-EMD-8136114-1, "Safety Related Commercial Grade Item: Connecting Rod Bearing Shell, Lower," dated February 22, 2019
- Dedication Inspection Report No. 51016, "Rocker Arm (Exhaust)," dated May 5, 2021
- Dedication Report No. D-CES-KSV255A2-1, "Safety Related Commercial Grade Item: Exhaust Rocker Arm Assembly," dated April 2, 2018
- Dedication Report No. D-CES-F577046-1, "Safety-Related Commercial Grade Item Pressure Switch" Revision 4, dated May 22, 2018
- Dedication Inspection Report No. 52367, "Pressure Switch," dated November 1, 2021
- Dedication Report 505-NQ-1, "Nuclear Qualification of Woodward 505 Digital Control, P/N 9903-543," Revision 2, dated January 30, 2018
- Dedication Report TCP-ESI-80033761-1, "Safety Related Commercial Grade Item for Turbine Control Panel Assembly ESI P/N 8003376-1," dated July 9, 2021
- Dedication Report EC-WOOD-9903543-1, "Safety Related Commercial Grade Item 505 Digital Governor P/N 9903-543," Revision 11, dated May 3, 2021

#### Purchase Orders (POs) and Proposals

- PO 1143071, Revision 0, dated November 1, 2021
- PO 902443, Revision 2, dated November 12, 2020
- Proposal 8003376, Letter to Curtiss-Wright, "Entergy Specification SPEC-11-00002-A, Rev. 4-EFW Turbine Controls Upgrade Arkansas," dated January 7, 2020

#### Design Documents

- Report Number ESI-STP-21-132, "ESI Seismic Test Procedure of Pressure Switch P/N F-5770946," Revision 0, dated November 1, 2021
- Supplier Deviation Notification for Pressure Switch Fitting Material for PO 1143071, dated November 1, 2021
- SPEC-11-0002, "Entergy EFW Turbine Controls Upgrade Arkansas Nuclear One Units 1 and 2," Revision 4
- 8003376-PDP, "Project Design Plan for Turbine Governor Upgrade ESI IWO 8003376 Dresser-Rand/Entergy Arkansas Nuclear ONE Unit 2," Revision 0, dated April 22, 2020
- 8003376-Config-1, "Woodward 505 & MOOG CSA SD Digital Controller Configuration Procedure for Turbine Governor Upgrade for Arkansas Nuclear One-Unit 2" for CW PO

900849, Revision 2, dated July 28, 2021

- Design Verification Form Exhibit 1 of EP-203 for “8003376-FAT-1 Factory Acceptance Test, Revision 2,” dated November 9, 2020
- Design Verification Form Exhibit 1 of EP-203 for “8003376-FAT-1 Factory Acceptance Test, Revision 1,” and “8003376-FEMA-1, “Failure Modes and Effect Analysis, Revision 1,” dated September 2, 2020
- Design Verification Form Exhibit 1 of EP-203 for “8003376-FEMA-1, “Failure Modes and Effect Analysis, Revision 0,” dated July 23, 2020
- Design Verification Form Exhibit 1 of EP-203 for “8003376-BITRP-1, Burn-in/Temp Rise Procedure, Revision 0,” “8003376-FAT-1, Factory Acceptance Test Procedure, Revision 0,” and “8003376-CONFIG-1, Woodward 505 & MOOG CSA SD Digital Controller Configuration Procedure, Revision 0,” dated July 23, 2020
- Design Verification Form Exhibit 1 of EP-203 for “8003376-PHLA-1, Power/Heat Load Analysis, Revision 1,” dated March 11, 2021
- Design Verification Form Exhibit 1 of EP-203 for “8003376-PHLA-1, Power/Heat Load Analysis, Revision 0,” dated July 28, 2020
- Design Verification Form Exhibit 1 of EP-203 for “8003376-FAT-1, Factory Acceptance Test Procedure, Revision 3,” and “8003376-CONFIG-1, Woodward 505 & MOOG CSA SD Controller Configuration Procedure, Revision1,” dated February 1, 2021
- 8003376-FAT-1, “Electronic Governor Speed Control Test Procedure for Electronic Governor Speed Control System (EGSCS) Terry Turbine Governor Upgrade Arkansas Nuclear One Unit 2 for PO 900849,” Revision 3, dated Mary 19, 2021
- 8003376-FEMA-1, “Failure Modes and Effects Analysis for Electronic Governor Speed Control System (EGSCS) Terry Turbine Governor Upgrade Arkansas Nuclear One Unit 2 for Curtiss-Wright CW PO 900849,” Revision 1, dated September 1, 2020
- 9903543-RVP-1, “Receipt Verification Procedure for 505 Digital Turbine Governor Factory Default Settings,” Revision 0, dated March 23, 2017
- Exhibit 1 of QCP-250, “Inventory Log for Sales Order 8003376, Part 9903-543, S/N 2184459”

#### Certification of Conformance

- Certificate of Conformance for PO 1143071, dated November 1, 2021

#### Surveys

- Piston rings manufacturer survey conducted by third-party contractor, dated July 19, 2021
- Piston rings forging manufacturer survey conducted by third-party contractor, dated July 21, 2021
- Crankshaft and camshaft manufacturer survey conducted by ESI, dated January 14, 2021
- Immersion heaters and components manufacturer survey conducted by ESI, dated August 11, 2021
- Forging and bonding lining to steel shell for bearings supplier survey conducted by ESI dated September 7, 2021

- Bearing supplier survey conducted by ESI, dated March 13, 2019
- Governor manufacturer survey conducted by ESI, dated May 18, 2021

Calibration and Test Records

- Certificate of Calibration for Fluke 700G07 Pressure Gage with S/N 2177014, dated March 26, 2021
- Certificate of Calibration for PCP ICP J353B01/ACS-4 Accelerometer with S/N 132761, dated July 17, 2021
- Certificate of Calibration for PCP ICP J353B01/ACS-4 Accelerometer with S/N 133668, dated July 17, 2021
- Certificate of Calibration for PCP ICP J353B01/ACS-4 Accelerometer with S/N 172416, dated July 17, 2021
- Certificate of Calibration for Vibration Research Corporation Model VR 9500 Seismic Table Control System for tri-axial vibration controller (MTE No. 4504, 4505, and 4506), dated September 24, 2021

Nonconformance Reports

11994	12064	12181
12256	12311	12382
12449	12514	12568
12617	12633	12661
12736	12761	12780
12793	12868	12951
13117	13184	13215
13236	13248	13281
13312	13362	13402
13481	13538	13609
13644		

Corrective Action Reports

2015-19	2015-20	2015-21
2015-22	2019-01	2019-02
2019-03	2019-06	2019-11
2019-14	2020-01	2020-02
2020-03	2020-04	2020-05
2020-06	2020-07	2020-08
2020-09	2020-10	2020-11
2020-12	2021-03	2021-11
2021-12	2021-13	2021-15
2021-19	2021-20	2021-21

10 CFR Part 21 Evaluations

- 10CFR21-0125
- 10CFR21-0127

- 10CFR21-0128
- 10CFR21-0129
- 10CFR21-0130
- 10CFR21-0131
- 10CFR21-0132

#### Corrective Action Requests Opened During the NRC Inspection

- 2021-22

#### Training Records

- Form S-100, Soldering for GJ, dated January 8, 2021
- Form S-100, Soldering for CP, dated January 8, 2021

#### Internal Audit Reports

- Report "Internal Audit of ESI for 2021," dated February 22, 2021
- Report "Internal Audit of ESI for 2020," dated March 20, 2020