



SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

1. CERTIFICATE/QUALITY ASSURANCE PROGRAM (QAP) HOLDER:

EnergySolutions
2105 S. Bascom Avenue, Suite 230
Campbell, CA. 95008

2. NRC/REGIONAL OFFICE

Headquarters
U. S. Nuclear Regulatory Commission
Mail Stop 3WFN 14C-28
Washington, DC 20555-0001

REPORT NUMBER(S) 71-0935/2016-202

3. CERTIFICATE/QAP DOCKET NUMBER(S)

71-0935

4. INSPECTION LOCATION

Ogden, UT

5. DATE(S) OF INSPECTION

August 30 -31, 2016

CERTIFICATE/QUALITY ASSURANCE PROGRAM HOLDER:

The inspection was an examination of the activities conducted under your QAP as they relate to compliance with the Nuclear Regulatory Commission (NRC) rules and regulations and the conditions of your QAP Approval and/or Certificate(s) of Compliance. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The inspection findings are as follows:

- ☒ 1. Based on the inspection findings, no violations were identified.
- ☐ 2. Previous violation(s) closed.
- ☐ 3. The violation(s), specifically described to you by the inspector as non-cited violations, are not being cited because they were self-identified, non-repetitive, and corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, to exercise discretion, were satisfied.

_____ Non-cited violation(s) was/were discussed involving the following requirement(s) and Corrective Actions(s):

- ☐ 4. During this inspection, certain of your activities, as described below and/or attached, were in violation of NRC requirements and are being cited in accordance with NRC Enforcement Policy. This form is a NOTICE OF VIOLATION, which may be subject to posting in accordance with 10 CFR 19.11.
(Violations and Corrective Actions)

Statement of Corrective Actions

I hereby state that, within 30 days, the actions described by me to the Inspector will be taken to correct the violations identified. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken, date when full compliance will be achieved). I understand that no further written response to NRC will be required, unless specifically requested.

TITLE	PRINTED NAME	SIGNATURE	DATE
CERTIFICATE/QAP REPRESENTATIVE	Richard Byars		10/6/16
NRC INSPECTOR	Marlone Davis		10/6/16
BRANCH CHIEF	Patricia Silva		10/12/16

INSPECTOR NOTES COVER SHEET

Licensee/Certificate Holder	EnergySolutions (ES) 2105 S. Bascom Avenue, Suite 230 Campbell, CA. 95008
Licensee/Certificate Holder contact and phone number	Mr. Richard L. Byars 803-758-1808 Mr. Arsalan Nathani 408-558-3525
Docket No.	71-0935
Inspection Report No.	71-0935/2016-202
Inspection Date(s)	August 30 - 31, 2016
Inspection Location(s)	Petersen Incorporated (Petersen) Ogden, UT.
Inspectors	Marlone Davis, Team Leader, Senior Safety Inspector Jeremy Tapp, Safety Inspector David Tarantino, Technical Reviewer
Summary of Findings and Actions	During the period of August 30 through 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed a team inspection of the implementation of ES's NRC-approved Quality Assurance Program for the fabrication of two new Medical Isotope Depleted Uranium Shield (MIDUS) transportation packages at Petersen, located in Ogden, UT. The team conducted the final exit meeting on August 31, 2016. The team did not identify any violations of significance related to NRC requirements. However, the team noted some fabrication deficiencies in the welding and brazing activities for the overpack shells.
Lead Inspector Signature/Date	Marlone Davis <i>Marlone F. Davis</i> / 10/6/2016
Inspector Notes Approval Branch Chief Signature/Date	Patricia Silva <i>[Signature]</i> 10/12/16

Inspector Notes

On August 30 – 31, 2016, a team of NRC inspectors conducted inspection activities at Petersen Incorporated (Petersen) to verify and assess EnergySolutions' (ES) compliance with Title 10 of the Code of Regulations (10 CFR) Part 71 requirements for the design, modification, fabrication, assembly, testing, and procurement of the Medical Isotope Depleted Uranium Shield (MIDUS) transportation package. Petersen is under contract with ES to fabricate six new MIDUS overpack shells (i.e., cask body, shield plug, and shield lid).

The limited-scope inspection focused primarily on the fabrication activities performed on the MIDUS overpack shell at Petersen and to follow-up on questions from the NRC staff associated with the current review of the application to amend the MIDUS Certificate of Compliance. The MIDUS transportation package identification, docket and certificate numbers are as follows:

Model #	Package ID#	Docket #	Certificate #
MIDUS	USA/9320/B(U)-96	71-9320	9320

The team assessed the fabrication activities in accordance with the NRC Inspection Procedure 86001, "Design, Fabrication, Testing, and Maintenance of Transportation Packagings", 10 CFR Part 71 and Part 21 requirements, ES's NRC approved Quality Assurance Program (QAP), and the applicable Certificate of Compliance (CoC). The team conducted the final exit meeting on August 31, 2016. The team did not identify any violations of significance related to NRC requirements. However, the team noted some deficiencies in the welding and brazing fabrication activities. The team also resolved outstanding request for additional information (RAI) questions related to the current application under review for the amended MIDUS CoC.

INSPECTOR NOTES: AS DESCRIBED BELOW, THE TEAM PERFORMED AND DOCUMENTED APPLICABLE PORTIONS OF 02.02 THROUGH 02.10 OF INSPECTION PROCEDURE (IP) 86001 USED FOR THIS LIMITED SCOPE INSPECTION

02.02 Verify that the CoC holder's activities related to transportation packaging are being conducted in accordance with the CoC, as well as the NRC-approved QAP, and that implementing procedures are in place and effective.

Petersen contracted with ES to fabricate new MIDUS overpack shells (i.e., cask body, shield plug, and shield lid) in accordance with the Purchase Order, Petersen's QAP, and implementing procedures. The team of inspectors reviewed how Petersen performed work under its quality program, PI-SOP-01-01, AISC Quality Management System, Revision 2 and various implementing procedures. The team verified that the quality program authorities and responsibilities were clearly defined and documented, and the quality assurance organization functioned as an independent group. The team reviewed ES graded approach for identifying MIDUS Important-to-Safety (ITS) components and how Petersen fulfilled this graded quality level requirements from the procurement documents. The team also reviewed a sample of personnel qualifications and training.

The team assessed that Petersen had programs and procedures in place and were effective to conduct fabrication activities at Petersen in accordance with the CoC of the MIDUS package under the ES's NRC approved QAP.

02.03 Verify that provisions are in place for reporting defects, which could cause a substantial safety hazard, as required by 10 CFR Part 21

The team reviewed Procedure PI-SOP-15-01, "10 CFR Part 21 Reporting," Revision 5, to determine if provisions were in place for reporting defects that could cause a substantial safety hazard. The inspectors requested a list of Part 21 evaluations and notifications associated with the fabrication of the MIDUS transportation packaging and interviewed personnel to determine if they were familiar with the implementing procedure PI-SOP-15-01. The inspectors noted that there were no defects or Part 21 noncompliance reports identified since the fabrication activities started on MIDUS overpack shells. The inspectors also reviewed other nonconformance and condition reports initiated and dispositioned at Petersen to determine if those met the criteria of reporting under Part 21. The team also verified that Petersen complied with the 10 CFR 21.6, "Posting requirements."

Based on the review, the team assessed that provisions were in place for reporting defects that could cause a substantial safety hazard, as required by 10 CFR Part 21.

02.04 Interview selected personnel and review selected design documentation to determine that adequate design controls are implemented.

The team interviewed selected Petersen and ES personnel to verify the control of all phases of the design process from the onset of the design through the fabrication activities. The team focused its review on the translation of the design specification to the fabrication drawings and the controls that were in place. Specifically, the team reviewed the licensing drawings related to the overpack and copper thermal spider, a heat transfer component, to verify that ES translated the design details of the MIDUS packaging to the associated fabrication drawings.

The team asked if any at-risk fabrication activities were taking place at Petersen since there was a current application under review for a revision to the MIDUS CoC. ES informed the team that the changes to the MIDUS packaging were not physical in nature and did not require any design changes that would affect the licensed design drawings. The team verified this by reviewing the revision submitted to the NRC. In addition to ES design processes, the team reviewed the Petersen procedure related to design control, PI-SOP-03-01, "Design Engineering Procedure," Revision 5.

Overall, the team assessed that ES was effectively implementing its design control program with respect to the fabrication activities at Petersen. The team noted that implementing procedures were in place and effective in controlling activities in accordance with the applicable regulations and approved CoC. The team noted that ES issued design documentation to Petersen for the fabrication of the MIDUS package and that Petersen does not perform any design control related activities. The team did not identify any discrepancies from the approved licensing drawings and the fabrication drawings. During the review of the fabrication drawings, the team noted that Petersen documented the ITS quality category of each component. The team found that for the components reviewed, the quality classification adequately followed NRC guidance.

02.05 Review selected drawings, procedures and records, and observe selected activities being performed to determine that design & maintenance activities meet Safety Analysis Report for Packaging (SARP) design requirements documented in the CoC

The team observed selected fabrication activities in the field. Specifically, the team reviewed the travelers associated with the torch brazing of the copper thermal spider to the overpack and welding of the overpack inner shell to inner bottom plate. The team verified that the travelers reflected the fabrication sequences. The team reviewed the travelers for completeness and accuracy. The team also verified that the drawings used for the work witnessed on the shop floor were the current revision. In regards to the brazing activities, the team witnessed brazing of the copper thermal spider to the overpack in accordance with the fabrication drawings provided to Petersen by ES. The team verified the brazing filler metal used, BAg-34 material, was the filler metal required by the approved drawings. The team also verified that the filler material met the designated approved Welding Procedure Specification (WPS) for the brazing work. Additionally, the team observed quality control for personnel measuring and confirming the gap requirements for the spider prior to the start of the brazing work.

The team witnessed welding of the overpack inner shell to inner bottom plate in accordance with the fabrication drawings provided to Petersen by ES. The team verified that Petersen used correct welding filler metal, ER308L material, and the correct diameter as required by the approved drawings as designated in the approved WPS-455, Revision 2. During welding, the team verified that Petersen followed the requirements of WPS-455. Specifically, the required amperage, current, and shielding gas for welding activity.

Overall, the team assessed that the observed selected inspected activities met SARP design commitments and requirements documented in the CoC. Although Petersen and ES performed the brazing work to the requirements in the drawings and approved traveler, personnel could not adequately braze the thermal spider to the overpack with the process in place at the time of the inspection. During the torch brazing process, the required gaps between the copper thermal spider and the overpack were not met because the copper bowed in certain areas. Petersen stopped work and wrote a Nonconformance Report (NCR) to assess the issue and determine a path forward. Work then proceeded under the approved NCR rework steps, which were ultimately unsuccessful in bringing the gap within the required tolerances.

At the end of the on-site inspection, both Petersen and ES were in the process of determining the best path forward. The team evaluated that the current approved brazing process had challenges in the production phase. The team assessed that the performance qualification may have lacked depth and understanding of the base metal thickness of the material for the brazing process. The team did not identify any major issues as Petersen followed the traveler requirements and the completed work as documented in the work instructions. The team noted two industrial safety observations during performance of the rework steps. First, Petersen personnel used a wood-handle tool to impact the hot copper spider. The team observed that the handle flamed up multiple times as it touched the hot metal. Secondly, the personnel performing work with the tool did not wear gloves while using the tool near the hot copper metal. The team discussed these observations with Petersen and ES personnel.

In general, the team assess that Petersen personnel performed welding activities adequately and in accordance with the applicable requirements of the approved drawings and WPS. The team did not identify any violations of significance related to NRC requirements.

02.07 Review selected drawings and records, and interview selected personnel, to verify that the procurement specifications for materials, equipment, and services received by the QA Program holder meet the design requirements

The team specifically reviewed the following Petersen procedures associated with the procurement, commercial grade dedication, and receipt inspection of materials for the MIDUS package to verify proper implementation. The procedures were as follows:

- PI-SOP-07-01, "Material Receipt, Storage, and Issue Procedure" Revision 8
- PI-SOP-04-01, "Procurement Document Control Procedure (Purchase Orders)," Revision 11
- PI-SOP-07-09, "Commercial Grade Dedication of Material Using EPRI Guidelines," Revision 6.

The team reviewed selected drawings and records associated with the MIDUS overpack stainless steel weld filler material. The team witnessed the use for the shell to inner bottom plate weld. The team selected this material because it constituted the only Important-to-Safety (ITS) Category 'A' material used for the work observed by the team during the on-site inspection. The team verified whether the procurement specifications and material testing report results met the design and applicable quality procedure requirements. The team also reviewed a sampling of material chemical analyses performed by ESAB and Petersen. Additionally, the team reviewed selected drawings and records associated with the MIDUS overpack stainless steel inner shell and inner bottom plate material. The team verified whether the procurement specifications and metallurgical test report results met the design and applicable quality procedure requirements. The team reviewed a sampling of metallurgical test reports performed by Ryerson. The team verified that Ryerson was on the Petersen's Approved Supplier List. The team also verified that Petersen performed the receipt inspection for the plate material as required by approved site procedures.

Overall, the team evaluated that the selected material procured by Petersen met the design requirements, as applicable. The team identified one violation of minor safety significance for the failure to follow procedures to perform an engineering review of material chemical analyses for weld wire testing performed at Petersen. The purchase order reviewed for the weld wire included the appropriate information such as material, size, and the quality requirements imposed on the supplier.

For the material test reports reviewed, all met the requirements for the ER308L material procured. During review of the material test reports, the team identified that Petersen personnel did not review the testing selected to assure it will satisfy the requirements of the applicable material specification as required by PI-SOP-07-09, Step 4.1.1.4. The team assessed that this was a violation of 10 CFR 71.111 for failure to follow procedure, but was of minor safety significance. Therefore, this violation was not subject to formal enforcement action. Petersen entered this issue into their corrective and preventive action program on a preventive/corrective action report (P/CAR) number P458, dated 8/31/2016. In addition, the purchase order reviewed for the stainless steel plates included the appropriate information such as material, size, and the quality requirements imposed on the supplier. For the metallurgical test reports reviewed, all met the physical, chemical, and mechanical property requirements for the specific 304 stainless steel material procured.

02.08 Review selected records and interview selected personnel to verify that a nonconformance control program is effectively implemented, and that corrective actions for identified deficiencies are technically sound and completed in a timely manner

The team reviewed selected records and interviewed selected personnel to verify that Petersen effectively implemented a nonconformance control program, and that Petersen completed corrective actions for identified deficiencies in a technically sound and timely manner. Specifically, the team reviewed Petersen's quality procedures PI-SOP-15-01 and PI-SOP-16-01, Nonconforming Material Procedure and Corrective and Preventive Action Procedure, respectively. The inspectors reviewed nonconformances, corrective action and preventive actions (CAPAs) from the start of the MIDUS fabrication activities. The team also discussed the nonconformance and CAPAs with the Petersen and ES staff.

Overall, the team assessed that Petersen had an adequate nonconformance and corrective action program in place to resolve deficiencies. However, the team observed that Petersen personnel proceeded with welding work when a nonconformance condition existed after the inner canister for the overpack shell felled from a fixture to the floor during the welding process. Petersen documented the condition in nonconformance report number 11867. The inner canister was pending evaluation and disposition when personnel continue to complete the weld from the fixture that collapsed. The team noted that Petersen personnel did not follow their nonconformance procedure PI-SOP-15-01, Revision 19, paragraph 5.3, which states in part, that further processing on a nonconformance condition shall be discontinued until a panel determines the significance of the nonconformance and the effect on continued production. The team assessed that this was a violation of 10 CFR 71.111 because Petersen did not follow procedure PI-SOP-15-01. The team assessed that this was of minor safety significance because it did not affect the function of the component and the use-as-is technical justification provided adequate supporting information. Therefore, this violation was not subject to formal enforcement action. Petersen captured this issue in P/CAR number P459, dated 8/31/2016.

02.09 Review selected records and procedures, interview selected personnel, and observe selected activities affecting the safety aspects of the packaging to verify that individuals performing activities affecting quality are properly trained and qualified, and to verify that management and quality assurance (QA) staff are cognizant and provide appropriate oversight

The team reviewed selected records and procedures to verify that Petersen properly trained and qualified individuals who performed activities affecting quality. Specifically, the team focused on the welding and brazing fabrication activities. The team reviewed Petersen procedure associated with nondestructive testing (NDT) personnel training/qualification PI-SOP-09-01, "NDT Qualification and Certification Procedure," Revision 18. The team reviewed the qualification and certification records for two Level II Petersen NDT inspectors working on the MIDUS project. The team verified that Petersen properly filled out the applicable quality forms for each individual.

The team did not identify issues with individuals performing activities affecting quality for the welding and brazing activities. The team assessed that Petersen completed training and qualification forms in accordance with procedures, which included proper approval signatures and start and expiration dates. The team assessed that both NDT personnel were current in their qualifications and certifications to perform visual and dye penetrant inspections.