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SRNL-STI-2010-00326

DOE-EM-45 Packaging Operations and Maintenance Course

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Abstract

Savannah River National Laboratory - Savannah River Packaging Technology (SRNL-SRPT) delivered the inaugural offering of the Packaging Operations and Maintenance Course for DOE-EM-45's Packaging Certification Program (PCP) at the University of South Carolina Aiken on September 1 and 2, 2009. Twenty-nine students registered, attended, and completed this training.

The DOE-EM-45 Packaging Certification Program (PCP) sponsored the presentation of a new training course, *Packaging Maintenance and Operations*, on September 1-2, 2009 at the University of South Carolina Aiken (USC-Aiken) campus in Aiken, SC. The premier offering of the course was developed and presented by the Savannah River National Laboratory, and attended by twenty-nine students across the DOE, NNSA and private industry. This training informed package users of the requirements associated with handling shipping containers at a facility (user) level and provided a basic overview of the requirements typically outlined in Safety Analysis Report for Packaging (SARP) Chapters 1, 7, and 8. The course taught packaging personnel about the regulatory nature of SARPs to help reduce associated and often costly packaging errors. Some of the topics covered were package contents, loading, unloading, storage, torque requirements, maintaining records, how to handle abnormal conditions, lessons learned, leakage testing (including demonstration), and replacement parts. The target audience for this course was facility operations personnel, facility maintenance personnel, and field quality assurance personnel who are directly involved in the handling of shipping containers. The training also aimed at writers of SARP Chapters 1, 7, and 8, package designers, and anyone else involved in radioactive material packaging and transportation safety. Student feedback and critiques of the training were very positive. SRNL will offer the course again at USC Aiken in September 2010.

Introduction

The DOE Packaging Certification Program (PCP) offers a variety of courses which are primarily intended for Safety Analysis Report for Packaging (SARP) writers, SARP reviewers, and package designers. Prior to 2009 the following courses were offered by the PCP:

- Methods Course for Reviewing Safety Analysis Reports for Packaging
- Management of SARP Preparation
- Quality Assurance of Radioactive Materials Packaging
- Application of the ASME Code to Radioactive Material Transportation Packaging

- Welding Criteria for Shipping Containers

Although the PCP courses are recognized to be informative among the packaging community, no class was focused solely on assisting a SARP user. The addition of the Packaging Operation and Maintenance course in 2009 filled a void in the PCP training arsenal.

This training informed package users of the requirements associated with handling shipping containers at a facility (user) level and provided a basic overview of the requirements typically outlined in Safety Analysis Report for Packaging (SARP) Chapters 1 (General Information), 7 (Package Operations), and 8 (Acceptance Tests & Maintenance Programs). The course taught packaging personnel about the regulatory nature of SARPs to help reduce associated and often costly packaging errors. The target audience for this course was facility operations personnel, facility maintenance personnel, and field quality assurance personnel who are directly involved in the handling of shipping containers. The training also aimed at writers of SARP Chapters 1, 7, and 8, package designers, and anyone else involved in radioactive material packaging and transportation safety.

The Packaging Operation and Maintenance course content primarily draws from the experience of Savannah River Site (SRS) production facility personnel who were directly involved with radioactive material processing, storage, shipping, and receiving operations. The topics covered during the inaugural 2009 course were:

- Package Operation & Maintenance Requirements
- Package Contents
- Package Operations
- Packaging Equipment, Tools, & Purge Gases
- Package Maintenance & Leak Testing
- Abnormal Conditions
- Lessons Learned from Package Operations

The course also included a hands on packaging demonstration that involved opening, inspecting, leak testing, and closing an actual shipping container per the SARP instructions. The courses duration was 2 days with an exam given at the end of the second day.

Discussion

The courses first session - Package Operation & Maintenance Requirements - provided basic information that most package users are not aware of concerning Type B radioactive material packaging. The session started off explaining that radioactive material (RAM) packaging must ensure containment of radioactive material, maintain sub-criticality during normal and accident conditions, and provide shielding to workers and public. Next students learned that safe radioactive material packaging is documented in a Safety Analysis Report for Packaging (SARP) for Department of Energy (DOE) package applications and in a Safety Analysis Report (SAR) for Nuclear Regulatory

Commission (NRC) package applications. It was explained that a SARP or a SAR provides a comprehensive technical evaluation of the packaging that covers design, testing, operational and maintenance procedures, and quality assurance program and upon approval of a SARP by DOE or SAR by NRC a Certificate of Compliance (CoC) is issued which allows the package to be used to ship radioactive material. The differences between a SARP and facility safety basis was covered too.

Since the course is primarily targeted to DOE users it focused on the use of SARPs to ship radioactive material. As such this session summarized the purpose and contents of a SARP and identifies the SARP chapters important to package operation & maintenance which are Chapter 1 - General Information, Chapter 7 - Package Operations, and Chapter 8 - Acceptance Tests & Maintenance Program.

The second session of the course – Package Contents – highlighted the importance of proper identification and characterization of the radioactive material contents that will be shipped in an approved radioactive material package. Students were presented with a variety of questions to consider when evaluating contents for SARP compliance. The various units used in content tables were covered along with explaining the potential consequences of mixing units or not recognizing the given units. Examples of both SARP and SAR approved content tables were presented and discussed showing the similarities and differences. Students learned the importance of accounting for measurement uncertainties when certifying SARP contents with specific examples presented. This session also outlined the process for adding new contents to a SARP.

The third session of the course – Package Operations – covered in detail the following elements of package operations and associated SARP requirements: package loading, package receipt, package unloading, preparation of empty package for transport, package storage, reporting incidents, and records maintenance. The purpose of SARP warnings, cautions, and notes was discussed. Information and advice concerning required alpha, beta, and gamma radiological contamination surveys along with radiological dose rate measurements was presented. This session also addressed topics that need to be considered during package operations such as: Do site specific procedures need to match the SARP verbatim?, What level of verification to SARP requirements do site specific procedures need?, Should site specific procedures address unexpected conditions?, Should the package sealing surfaces be protected and how?, What qualifications are needed to perform a post load leak test?, and How much time should be allowed for adequate loading?

The fourth session of the course – Packaging Equipment, Tools, & Purge Gases – educated students on the types of equipment needed to support packaging operation and maintenance. Because most packages have torque requirements, a significant portion of this session dealt with torque wrenches in terms of explaining the need for achieving torque compliance, discussing the different types of torque wrenches, and presenting examples of methodologies used to ensure SARP compliance with torque requirements. Examples of hoisting and rigging equipment typically used in package operations were also discussed and the importance of the equipment to be in good working condition in

order to protect personnel safety and package compliance was addressed. Since some packages require purging with specified type and grade of gases, students were given examples of different purging requirements, explained why purge gases are needed for SARP compliance, shown how to ensure the SARP specified gas is procured, given suggestions on what to do if the SARP specified gas cannot be procured, and taught how to verify the SARP purge requirements are archived. This session stressed the importance of maintaining calibrated and controlled equipment that is often used during package operations to guard against reportable situations.

The fifth session of the course - Package Maintenance & Leak Testing – identified SARP required package inspections and the criteria to satisfy the inspections. The course explained how to handle the replacement of expendable parts, the need for part traceability, and the need for documentation of maintenance. Annual and post load (pre-shipment) leak test as defined by ANSI 14.5 were discussed. Post load (pre-shipment) leak test for two different packages with different type sealing surfaces was demonstrated to the students. This session included a package demonstration that followed SARP requirements for: package disassembly, loading of contents, package closure including bolt torque, post load (pre-shipment) leak test, radiation dose surveys and radiological contamination measurements.

The sixth session of the course - Abnormal Conditions – provided package users with information concerning how to handle abnormal conditions that are typically encountered during operations, such as damaged packages, noncompliant content, and procedure issues. The session discussed the requirements for notification, how to report an abnormal condition, how to document the condition, and how to document the resolution.

The final session of the course - Lessons Learned from Package Operations - explained lessons learned from examples of package operational issues. Most of the examples were related to the 9975 shipping container, but the lessons are applicable to any package. Topics covered during the lesson learned session were: content compliance, package closure, package inspections, records handling, and operational impacts from package fabrication. There was also an open student forum to discuss and capture lessons learned from course attendees.

Conclusion

The DOE-EM-45 Packaging Certification Program sponsored the presentation of a new training course, Packaging Maintenance and Operations, on September 1-2, 2009 at the University of South Carolina Aiken campus in Aiken, SC. The course was developed and presented by the Savannah River National Laboratory, and attended by twenty-nine students across the DOE, NNSA and private industry. Student feedback and critiques of the training were very positive

Like the 2009 course the 2010 course will be held at USC-Aiken on August 31 and September 1 and will be similar in format and content. Based on student feedback and instructor observations the following adjustments will be added to the 2010 course:

- Added a student activity on SARP content compliance

- Rearranged the package operation demonstration to encourage more student participation
- Added a formal section to discuss the DOE RAMPAC website (a RAMPAC overview was given as part of the 2009 course, but was not a formal section)
- Incorporated lessons learned examples from the 2009 course participants into the lessons learned section.