

DOE Training Courses for Packaging, Transportation, and Storage of Radioactive Material - 17607

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ABSTRACT

The U.S. Department of Energy (DOE) Packaging Certification Program (PCP), Office of Packaging and Transportation has sponsored a suite of training courses that have been conducted since the early 1990s. More recently, PCP has developed an online tutorial - RAM Packaging Safety Tutorial, as well as several courses developed and taught by several U.S national laboratories. The courses developed and taught by the national laboratories are referred to as the DOE Packaging University. Since 2013 as part of the Packaging University, the DOE PCP has worked with the University of Nevada, Reno (UNR) Mechanical Engineering Department to develop an accredited graduate-level certificate in Nuclear Packaging. This paper provides an overview of the currently offered PCP courses, as well as the UNR graduate certificate in Nuclear Packaging.

INTRODUCTION

Annually, about 400 million hazardous materials shipments occur in the United States by rail, air, sea, and land. Of these shipments, about three million are radiological shipments. DOE successfully completes thousands of shipments each year¹. The DOE Environmental Management (EM) shipments generally have included a variety of waste types (e.g., transuranic waste, waste, low-level waste, mixed low-level waste, used nuclear fuel), while the National Nuclear Security Administration (NNSA) securely transports nuclear weapons, weapons components, and special nuclear material to meet projected NNSA, Department of Defense, and other customer requirements. Since Fiscal Year (FY) 2004, DOE Environmental Management (EM) has completed over 150,000 shipments of radioactive material/waste¹. Under DOE, the National Nuclear Security Administration (NNSA) safely and securely transports nuclear weapons, weapons components, and special nuclear material to meet projected NNSA, Department of Defense, and other customer requirements [1].

The U.S. Department of Transportation, in 49 CFR 173.7(d) grants the U.S. Department of Energy (DOE) the power to use 'packagings made by or under the direction of the U.S. Department of Energy for the transportation of Class 7 materials when evaluated, approved and certified by the Department of Energy against packaging standards equivalent to those specified in 10 CFR part 71'. Via DOE Order 460.1, DOE has established the DOE Packaging Certification Program (PCP) within the Department of Environmental Management for purposes including the certification of radioactive materials packages for DOE use [2].

PCP Training Courses

The U.S. Department of Energy's (DOE) PCP packaging and transportation mission is to: 1) develop the systems and technologies to ensure packaging and transportation activities are safe, economical, efficient, secure, and meet applicable regulatory requirements; 2) resolve packaging and transportation issues safely, economically, and promptly; and, 3) develop, manage and coordinate policies and procedures for packaging and transportation activities for DOE materials, including hazardous materials (particularly radioactive), substances and wastes [2]. The PCP sponsors many training courses to ensure that the DOE staff and users of PCP services are knowledgeable and competent in performing their activities.

The following courses six are sponsored by the DOE Packaging Certification Program (PCP)[3].

- ARG-US is an integrated radio frequency identification (RFID) system for Management of Nuclear and Radioactive Materials
- SARP Generalist: Radioactive Material (RAM) Package Shielding Evaluation and Nuclear Criticality Safety Evaluation
- SARP Analyst: RAM Package Shielding Evaluation and Nuclear Criticality Safety Evaluation
- Structural Analysis and Acceptance Criteria
- Thermal Modeling and Testing of RAM Packages
- Welding/NDE Criteria for Radioactive Material Packages, Pressure Vessels, Piping & Other Applications

Graduate Credit Courses and Packaging Certificate

The PCP has been working with the University of Nevada, Reno (UNR) Mechanical Engineering Department since 2013 and developed an accredited graduate-level nuclear packaging certificate⁴. The Graduate Certificate in Nuclear Packaging (GCNP) provides a curriculum in packaging for nuclear and other radioactive materials that complements graduate programs in Mechanical Engineering and Materials Engineering and is more applied-knowledge-based than research-based [5].

The admission requirements to obtain graduate credit and enroll in the certificate program is an earned baccalaureate degree in mechanical, materials, nuclear or a closely-related engineering field, or a baccalaureate degree and background in project management related to packaging of nuclear and other radioactive materials. The Certificate and its courses have been approved by the Northwest Commission on Colleges and Universities (NWCCU), Redmond, WA. Others may take the courses through PCP, but can not enroll at UNR for graduate credit [5].

The purposes of developing the Certificate are to: a) to encourage students to complete a curriculum in packaging safety and security of nuclear and other radioactive materials that has both depth and breadth; and, b) provide a graduate-level curriculum designed to give students an advantage when seeking employment or advancement in the area of packaging of nuclear and other radioactive materials, or related fields [5].

The following six courses were developed and offered on a regular basis by the Argonne (ANL), Lawrence Livermore (LLNL), and Savannah River (SRNL) National Laboratories, and are part of the UNR program [3]:

1. ME 691 - ASME Pressure Vessel Code for Nuclear Transport and Storage, 1 credit (developed and taught by ANL)
2. ME 692 - QA for Radioactive Material Packaging, 1 credit (developed and taught by ANL)
3. ME 694 - Nuclear and Other Radioactive Materials Transport Security, 2 credits (developed and taught by ANL)
4. ME 695 - SARP Review and Confirmatory Analysis, 2 credits (developed and taught by LLNL)
5. ME 696 - Management of SARP Preparation, 1 credit (developed and taught by SRNL)
6. ME 697 - Radioactive Material Package Operations and Leak Testing, 1 credit (developed and taught by SRNL)

Students who enroll in these will receive UNR graduate credit if they: 1) Register through PCP; 2) Gain special graduate admission to UNR; 3) Enroll in the UNR course and pay tuition; and, 4) Pass the course. These credits may be applied toward graduate degrees at UNR or any other university that accepts that credit [2,5].

If students receive a C grade or better in a class, then the student will be able to use the credits toward UNR's nine credit GCNP. To earn the Certificate, students must complete ME 691, ME 692 and ME 695, which are required. They must take five additional elective credits from the above list (while this list currently only contains four additional credits, new courses are being developed and planned to be available within the next two years). Finally, to earn the GCNP, students must earn least a B average in the courses [2,5].

Overall PCP Course Schedule

Listed below in Table I are the Packaging Certification Program (PCP) courses planned in FY 2017. Courses with ME 6xx prefixes are available for graduate credit at University of Nevada, Reno.

Table I. Planned DOE PCP Courses for 2017 [3]

Date	Course Title	Location
February 6 - 10	ME 696 - Management of SARP Preparation	Aiken, SC
March 20 - 24	ME 692 - QA for Radioactive Material Packaging	Argonne, IL
April 19 - 21	Welding Criteria for Shipping Containers	Livermore, CA
June 5-9	Generalist Training Radiation Shielding and Nuclear Criticality Safety	Oak Ridge, TN
June 19-23	ME 691 - ASME Pressure Vessel Code for Nuclear Transport and Storage	Argonne, IL
July 10-14	ME 697 Radioactive Material Package Operations and Leak Testing	Aiken, SC
August 14-18 and 21- 24	ME 695 - SARP Review and Confirmatory Analysis	Pleasanton, CA
September 11-15	ME 694 Nuclear and Other Radioactive Materials Transport Security	Argonne, IL
September 18-22	Specialist Training - Radiation Shielding and Nuclear Criticality Safety	Oak Ridge, TN

CONCLUSION

The DOE PCP, Office of Packaging and Transportation has sponsored a suite of training courses that have been conducted since the early 1990s. More recently, PCP has developed several courses taught by several U.S national laboratories, referred to as the DOE Packaging University. Since 2013, as part of the Packaging University, the DOE PCP has worked with the UNR and developed an accredited graduate-level certificate in Nuclear Packaging. Overviews of the currently offered PCP courses, as well as the requirements to obtain the UNR graduate certificate in Nuclear Packaging were provided.

REFERENCES

1. ENERGY.GOV, Office of Environmental Management, PACKAGING AND TRANSPORTATION, at <https://energy.gov/em/services/waste-management/packaging-and-transportation> (Accessed on 01/11/2017).
2. M. R. Feldman, M. E. Bennett, and J. M. Shuler, *Overview of the DOE-EM Packaging Certification Program — 9417*, WM2009 Conference, March 1–5, 2009, Phoenix, AZ.
3. RAMPAC, Radioactive Material Packaging at <https://rampac.energy.gov> (Accessed on 01/08/2017).
4. EM, University of Nevada, Reno Team on “Packaging University” at <https://energy.gov/em/articles/em-university-nevada-reno-team-packaging-university> (Accessed on 01/10/2017).
5. University Home, Degrees and Programs, Nuclear Packaging, Graduate Certificate in Nuclear Packaging at <https://www.unr.edu/degrees/nuclear-packaging/certificate> (Accessed on 01/06/2017).