LLNL-AR-857041

Lawrence Livermore National Laboratory
7000 East Avenue, L-198, Livermore, California, 94550

SUBJECT: Report on Foreign Travel to Juan-Les-Pin, France

DATE: July 19, 2023

TO: Dr. James Shuler, US DOE Packaging Certifications Program Manager, U.S. Department of Energy
Dr. Angela Chambers, Nuclear Criticality Safety Program Manager, National Nuclear Security Administration, NA-ESH-21

FROM: Samuel T. Varghese, Nuclear Criticality Safety Division, Lawrence Livermore National Laboratory

MEETING TITLE:

International Symposium on the Packaging and Transportation of Radioactive Materials (PATRAM)

MEETING LOCATION:

Juan-Les-Pin, Antibes, French Riviera

MEETING DATES:

June 11-15, 2023

ATTENDEES ON BEHALF OF PCP:

Samuel Varghese

ATTENDEES ON BEHALF OF WCI:

Shauntay Coleman

MEETING BENEFITS TO THE NCSP:

The PATRAM 22 Symposium is, currently, the only international conference which is dedicated to the open exchange of information pertaining to the packaging and transportation of radioactive materials. With that being said, the Nuclear Criticality Safety Division, in addition to proposing benchmark evaluations which validate radiation shielding and criticality safety calculations presented in the various Safety Analysis Reports for Packaging (SARP), has recently assumed a greater role in regard to the two-week SARP training course held at Lawrence Livermore National Laboratory as part of the DOE Packaging University Courses. On its surface, PATRAM provides NCSP the express opportunity to observe and discuss recent developments and ongoing work within the packaging and transportation space which may directly influence our benchmark development going forward. Moreover, as instructors for the two-week SARP course, we benefit from having the opportunity to not only convey our ideas on how to improve upon the current course content and objectives, but we also are able to interface with instructors of similar courses across other Laboratories. All in all, we are able to learn, observe, and generate valuable discussions which inform how we choose to develop our benchmarks and courses moving forward.

Additionally, PATRAM provides an opportunity to showcase how NCSP benchmarks can be of great use to the DOE Radioactive Material Packaging Program. An example of a benchmark is Low-Temperature TEX that is evaluating highly enriched uranium at temperatures down to -40°C. There were multiple presentations that discussed the use of radiation transport codes by criticality safety practitioners with no way to validate their nuclear data at the low temperatures desired.

MEETING PURPOSE:

The PATRAM 22 Symposium was organized by the World Nuclear Transport Institute (WNTI) in partnership with the Institute of Nuclear Materials Management (INMM) and supported by the French Nuclear Society (Sfen), the Institut de Radioprotection et de Sûreté Nucléaire (IRSN), Orano Nuclear Packages and Services, and Bureau Veritas in cooperation with the International Atomic Energy Agency (IAEA). Specifically, this conference was held in order to gather industry experts, representatives of competent authorities, governments, and research organizations for the purpose of facilitating the exchange of scientific and technical information. The four main technical areas covered across the course of the conference included Package Design, Package Performance and Safety, and Security Analysis, Regulatory and Institutional Environment, Operational Matters, and Training and Education. A detailed description of each track can be found below:

Package Design, Package Performance and Safety, and Security Analysis
Track Leader: Dr. Frank Wille (BAM, Germany)
Track Co-Leader: Dr. Edward Ketusky (SRNL/INMM, USA)
Track Description: This track covers materials and testing as well as structural, thermal, shielding, criticality, and security assessment.

Regulatory and Institutional Environment
Track Leader: Mr. Eric Reber (IAEA)
Track Co-Leader: Dr. Takuji Fukuda (NRA, Japan)
Track Description: This track covers regulations, codes, and standards as well as the activities of relevant institutions.

Operational Matters
Track Leader: Ms. Lisa Nallet (ORANO NPS)
Track Co-Leader: Mr. Rick Boyle (US DOT)
Track Description: This track covers the implementation of, compliance with, and application of the safety and security transport regulations. It encompasses tracking, routing, emergency preparedness, radiation protection, delays, and denials of shipments.

Training and Education
Track Leader: Dr. James Shuler (US DOE)
Track Co-Leader: Mr. Tony Grange (UK RAMTUC)
Track Description: This track covers education and training for technical, safety and security, and management issues in the nuclear packaging and transportation industry.

PURPOSE OF TRAVEL

The purpose of travel was to present the posters titled "Designing Radiation Shielding and Criticality Experiments for Students" and "Radiation Shielding Benchmark for a 9977 Shipping Package" presented by Samuel Varghese and Shauntay Coleman, respectively.

Persons Contacted at PATRAM (Juan-Les-Pin, Antibes, French Riviera)

Dr. James Shuler (US DOE)
Shauntay Coleman (LLNL)
Jennifer Burch (LLNL)
Brian Jackson (LLNL)
Ethan Grossman (LLNL)
Alexios Doukas (Sellafield)
Samuel Abraham (Sellafield)
Bradley Loftin (ORNL)
Matthew Howard (SRNL)

Presentations, Chair Responsibilities, Etc.:

Samuel Varghese presented the poster titled "Designing Radiation Shielding and Criticality Experiments for Students" during the poster session held on Wednesday June 14 from 11:00 AM to 12:20 PM. During this time, a fair degree of discussion was cultivated surrounding the two-week SARP course and the active work the Nuclear Criticality Safety Division is conducting in order to validate calculations presented in the SARP documents. This poster generated a noticeable amount of interest from parties wondering how they may be able to take part in the two-week course held at LLNL. Finally, this poster was also awarded the "Best Poster Award" for the under 35 age group.

Shauntay Coleman presented the poster titled "Radiation Shielding Benchmark for a 9977 Shipping Package" during the poster session held on Wednesday June 14 from 11:00 AM to 12:20 PM. This presentation discussed the efforts by Lawrence Livermore National Laboratory to perform experiments with radioactive material representative of the content envelope of a 9977-shipping container to validate the shielding calculations presented in the 9977 SARP. This poster peaked interest from Savannah River National Laboratory, Matthew Howard, who is the design authority for the 9977. Matthew is the R&D Manger, Packaging Technologies.

PROGRAMME AT A GLANCE

SUNDAY 11 JUNE 2023

	EVENING		
	PATRAM 22 Exhibition Opening	6:00 pm	Exhibition Hall
	PATRAM 22 Welcome Reception Sponsored by NTS	7:00 pm - 9:00 pm	Exhibition Hall and Espace Méditerranée

MONDAY 12 JUNE 2023

	MORNING		
001a	PATRAM 22 Introduction / Opening Plenary	9:00 am	Auditorium
001b	PATRAM 22 Opening Plenary	11:00 am	Auditorium
	AFTERNOON		
002	International Security and Safeguards - The Big Picture	2:00 pm	Auditorium
003	Operational Experience	2:00 pm	Room Ella Fitzgerald
004	Criteria for Modelling of Material Failure	2:00 pm	Room Miles Davis
005	Risk Assessment for Transport Planning	2:00 pm	Room Sidney Bechet
006	Content Specific Aspects	2:00 pm	Room Louis Armstrong
007	HALEU Fuel and LEU+	4:00 pm	Auditorium
008	Research and Development on New Materials	4:00 pm	Room Ella Fitzgerald
009	Security at a National Level	4:00 pm	Room Miles Davis
010	Design Beyond and Beside IAEA SSR-6 Requirements	4:00 pm	Room Sidney Bechet
011	Transportation of Targets and Sources	4:00 pm	Room Louis Armstrong

TUESDAY 13 JUNE 2023

	MORNING		
012	Anticipating the Regulatory Landscape for TNPPs, FNPPs and SMRs	8:00 am	Auditorium
013	New package designs for Samples and Waste	8:00 am	Room Ella Fitzgerald
014	Criticality	8:00 am	Room Miles Davis
015	Thermal Analysis Codes and Modelling of Test	8:00 am	Room Sidney Bechet
016	U.S. DOE Packaging Certification Program-Nuclear Packaging Graduate Program with The University of Nevada-Reno	8:00 am	Room Louis Armstrong
017	Keynote - Topic: Challenges (SMRs, TNPPs…)	9:50 am	Auditorium
018	A1 and A2 Values and Exemption Values	11:00 am	Auditorium
019	Regulatory Requirements/Approvals	11:00 am	Room Ella Fitzgerald
020	Shielding Analysis	11:00 am	Room Miles Davis
021	Normal Conditions of Transport / Shock and Vibration	11:00 am	Room Sidney Bechet
022	Digital Solutions	11:00 am	Room Louis Armstrong
	AFTERNOON		
023	IAEA Activities to Support Member States	1:40 pm	Auditorium
024	Material Aspects / Corrosion	1:40 pm	Room Ella Fitzgerald
025	Spent Nuclear Fuel	1:40 pm	Room Miles Davis
026	Structural Analysis of Impact Limiters	1:40 pm	Room Sidney Bechet
027	U.S. DOE Packaging Certification Program-Nuclear Packaging Graduate Program-Course Development	1:40 pm	Room Louis Armstrong

	TUESDAY AFTERNOON CONTINUED		
028	Keynote - Topic: Regulatory Changes	3:10 pm	Auditorium
029	Regulatory Infrastructure	4:20 pm	Auditorium
030	Advanced Technologies in Packaging and Transportation Safety and Security	4:20 pm	Room Ella Fitzgerald
031	Ageing Management of Casks	4:20 pm	Room Miles Davis
032	Transport Dose Assessments	4:20 pm	Room Sidney Bechet
033	Welding Qualification and Inspection	4:20 pm	Room Louis Armstrong

WEDNESDAY 14 JUNE 2023

	MORNING		
034	Drop Testing	8:00 am	Auditorium
035	Thermal Analysis Codes and Modelling	8:00 am	Room Ella Fitzgerald
036	Radioactive Waste Management	8:00 am	Room Miles Davis
037	Transport Safety Security Interface	8:00 am	Room Sidney Bechet
038	IAEA Transport Regulation Concepts	8:00 am	Room Louis Armstrong
039	Keynote - Topic: Denial of Shipments	9:50 am	Auditorium
040	Poster Session	11:00 am	Poster Area
	AFTERNOON		
041	Structural Analysis 1	1:40 pm	Auditorium
042	Leak Testing / Containment 1	1:40 pm	Room Ella Fitzgerald
043	Auxiliary Equipment for Handling Packages	1:40 pm	Room Miles Davis
044	New Solutions for the Transport of Radioactive Waste	1:40 pm	Room Sidney Bechet
045	Spent Fuel Transportation Programs	1:40 pm	Room Louis Armstrong
046	Keynote - Topic: Attractiveness of Transport Industry & Young Generation	3:10 pm	Auditorium
047	History/Future of IAEA Transport Regulations	4:20 pm	Auditorium
048	Thermal Analysis of Casks	4:20 pm	Room Ella Fitzgerald
049	Ageing Evaluation of Gaskets	4:20 pm	Room Miles Davis
050	Spent Nuclear Fuel Assessment	4:20 pm	Room Sidney Bechet
051	Dual Purpose Casks	4:20 pm	Room Louis Armstrong

THURSDAY 15 JUNE 2023

	MORNING		
052	Structural Analysis 2	8:00 am	Auditorium
053	Safety Demonstration Strategies 1	8:00 am	Room Ella Fitzgerald
054	Spent Nuclear Fuel and Waste Transport	8:00 am	Room Miles Davis
055	Security	8:00 am	Room Sidney Bechet
056	Leak Testing / Containment 2	8:00 am	Room Louis Armstrong
057	Keynote - Topic: Security of the future (cyber, war...)	9:50 am	Auditorium
058	Testing – Facilities and Experiences	11:00 am	Auditorium
059	Ageing Management Guidance	11:00 am	Room Ella Fitzgerald
060	General Packaging and Transportation Training and Education	11:00 am	Room Miles Davis
061	Transport Security Challenges	11:00 am	Room Sidney Bechet
062	Management Systems	11:00 am	Room Louis Armstrong
	AFTERNOON		
063	Implementation of Ageing Management Provisions	1:40 pm	Auditorium
064	Spent Nuclear Fuel Transport Planning	1:40 pm	Room Ella Fitzgerald
065	Transport Incident Analysis	1:40 pm	Room Miles Davis
066	Manufacturing Inspection	1:40 pm	Room Sidney Bechet
067	Safety Demonstration Strategies 2	1:40 pm	Room Louis Armstrong
068	Keynote - Topic: Openness to Society	2:50 pm	Auditorium

	THURSDAY AFTERNOON CONTINUED		
069	SCO-III	4:00 pm	Auditorium
070	Spent Nuclear Fuel Canister Ageing	4:00 pm	Room Ella Fitzgerald
071	Operations and Maintenance Issues	4:00 pm	Room Miles Davis
072	National & International Standards	4:00 pm	Room Sidney Bechet
073	Boronated material for criticality-safety	4:00 pm	Room Louis Armstrong
074	Award Ceremony	5:20 pm	Auditorium
075	Gala Celebration sponsored by NAC International	7:30 pm	Belles Rives Hotel Beach

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