Merits and Viability of Different Nuclear Fuel Cycles and Technology Options and the Waste Aspects of Advanced Nuclear Reactors

July 20, 2021
Virtual Meeting

PUBLIC AGENDA
Draft: June 23, 2021

Tuesday, July 20, 2021 (All times are US Eastern.)

PUBLIC SESSION

WEBEX connection details for July 20:
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2:00 pm – 2:05 pm	**Call Open PUBLIC SESSION to Order and Welcome** Janice Dunn Lee, Committee Chair, and Charles Ferguson, Study Director
2:05 pm – 2:35 pm	**Attractiveness of Materials in Advanced Nuclear Fuel Cycles** Charles (Chuck) G. Bathke, Ph.D., Los Alamos National Laboratory (*confirmed*)
2:35 pm – 3:00 pm	**Q&A for Academies committee and staff**
3:00 pm	**Adjourn PUBLIC SESSION – Day 1**

Reading Materials

C.G. Bathke et al., "An Assessment of the Attractiveness of Material Associated with Thorium/Uranium and Uranium Closed Fuel Cycles from a Safeguards Perspective," LA-UR-10-03899, INMM 51st Annual Meeting, Baltimore, MD, July 11 - 15, 2010.

Charles G. Bathke, "Commonly Overlooked Material Attractiveness Issues," LA-UR-21-23091, March 31, 2021.

Presenter Biography

Charles (Chuck) G. Bathke, Ph.D., Los Alamos National Laboratory

Dr. Charles G. Bathke retired from NEN-5 Systems Design and Analysis Group at Los Alamos National Laboratory (LANL) October 31, 2018. He began his career at LANL in the CTR division working on fusion reactor concepts. After CTR division was disbanded, he became extremely knowledgeable of the nuclear fuel cycle from his work on the Accelerator Transmutation of Waste (ATW) and its successor the Advanced Fuel Cycle Initiative (AFCI), where he developed the Nuclear Fuel Cycle Simulation (NFCSim) code, which simulates the civilian nuclear fuel cycle from cradle (mine) to grave (waste repository). In the course of his career, he has performed systems analyses of reactors based upon various magnetic fusion confinement schemes, proton accelerators used to generate tritium, electron accelerators used for x-ray radiography, and terrorist-induced biological events.

For the past 12 years, his research interests have gravitated to the nonproliferation arena, where he has been a co-developer of metrics for quantifying material attractiveness. Material attractiveness is the relative utility of nuclear material for an adversary in assembling a nuclear explosive device (NED), taking into account the time and potential difficulties associated with the three distinct phases to producing an NED: acquisition, processing (purification and/or conversion), and utilization. He has used these metrics to analyze the attractiveness of an extensive list of nuclear materials found in thorium and uranium fuel cycles. He has also analyzed many reprocessing schemes (e.g., PUREX, UREX, COEX, THOREX, and pyroprocessing) that proponents had claimed to be proliferation resistant and proved them to be wrong.

Chuck has also had many international interactions as a result of his work. He was a member of a small international team that prepared a “gift basket” for one of President Obama’s Nuclear Security Summits. He was one of two US National laboratory participants in the 2011-12 Nuclear Security Working Group (NSWG) Goal 9 study. The NSWG is a government-to-government framework for scientific exchanges between US and Japanese scientist on topics relevant to nuclear security. In 2017 he attended consultancy meetings that resulted in a revision of the IAEA’s Physical Model of a Nuclear Fuel Cycle: Volume 9 – Spent Fuel Management. In that same year a second NSWG Goal 9 study of greater scope and depth was initiated, and Chuck has played and continues to play a major role in this study. He was a co-host of the February meeting of the NSWG Goal 9 study that was held a Los Alamos National Laboratory.

He received his Ph.D. in Nuclear Engineering from the University of Illinois in May of 1976, followed by a Post Doc at the Princeton Plasma Physics Laboratory. He has been at LANL since 1978. He has received several awards including the American Nuclear Society, Isotopes and Radiation Division, Best Student Contributed Paper Award in 1974, the American Nuclear Society, Fusion Energy Division, Outstanding Technical Accomplishment Award in 1994, and LANL’s Distinguished Performance Award in 2009 for his work on material attractiveness and the Figure of Merit, commonly referred to as the FOM.