

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

September 13, 14, and 15, 2021

Virtual Meeting

PUBLIC AGENDA

Draft: August 24, 2021

Day 1: Monday, September 13, 2021 (All times are ET.)

PUBLIC SESSION 1

WEBEX connection details for September 13, 14, and 15:

<https://nas-sec.webex.com/nas-sec/j.php?MTID=m2266cad2da338c6a04a35290bf0be7be>

Meeting number: 199 312 5710

Password: XFjbBJYi333 (93522594 from phones and video systems)

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|---------------------|--|
| 11:00 am – 11:10 am | Call Open PUBLIC SESSION 1 to Order and Welcome
Janice Dunn Lee, Committee Chair, and Charles Ferguson, Study Director |
| 11:10 am – 11:30 am | Advanced Research Project Agency – Energy (ARPA-E) Efforts
Supporting Advanced Nuclear
Jenifer Shafer , Ph.D., Program Director, Advanced Research Projects
Agency-Energy (ARPA-E) (<i>confirmed</i>) |
| 11:30 am – 11:50 am | Q&A for Academies committee and staff |
| 11:50 am – 12:00 pm | Public Comment Period |
| 12:00 pm | Adjourn PUBLIC SESSION – Day 1 |

Day 2: Tuesday, September 14, 2021 (All times are ET.)

PUBLIC SESSION 2

WEBEX connection details for September 14:

[Same connection info for ALL 3 days. \(See September 13.\)](#)

Theme: Proliferation Resistance and Safeguards

11:00 am – 11:10 am	Call Open PUBLIC SESSION 2 to Order and Welcome Janice Dunn Lee, Committee Chair, and Charles Ferguson, Study Director
11:10 am – 11:40 am	Proliferation Resistance Using Methodology of the International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) Brian D. Boyer , Ph.D., Section Head, International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) Section, Division of Nuclear Power, Department of Nuclear Energy, International Atomic Energy Agency (IAEA) (<i>confirmed</i>)
11:40 am – 12:10 pm	Q&A for Academies committee and staff
12:10 pm – 12:45 pm	Break
12:45 pm – 1:15 pm	Implementation of IAEA Safeguards within the United States David H. Hanks , Senior International Nuclear Safeguards Analyst, U.S. Nuclear Regulatory Commission (<i>confirmed</i>)
1:15 pm – 1:45 pm	Q&A for Academies committee and staff
1:45 pm – 2:00 pm	Public Comment Period
2:00 pm	Adjourn PUBLIC SESSION – Day 2

Day 3: Wednesday, September 15, 2021 (All times are ET.)

PUBLIC SESSION 3

LINK for WEBEX connection details:

[Same connection info for ALL 3 days. \(See September 13.\)](#)

Theme: Fuel Cycles and Advanced Nuclear Energy Systems

12:30 pm – 12:40 pm	Call Open PUBLIC SESSION 2 to Order and Welcome Janice Dunn Lee, Committee Chair, and Charles Ferguson, Study Director
12:40 pm – 1:25 pm	Front-End of the Nuclear Fuel Cycle Amir Vexler , President and Chief Executive Officer, Orano USA (<i>confirmed</i>)
1:25 am – 2:00 pm	Q&A for Academies committee and staff
2:00 pm – 2:05 pm	Brief Break
2:05 pm – 2:50 pm	Back-End of the Nuclear Fuel Cycle

[Arnaud Gay](#), Executive VP Technical Department and International Operations, Orano, and [Sven Bader](#), Ph.D., Technical Consultant, Orano Federal Services (*confirmed*)

Q&A for Academies committee and staff

2:50 pm – 3:35 pm

Break

3:35 pm – 3:50 pm

Russia's Efforts to Develop Advanced Nuclear Fuel Cycles

3:50 pm – 4:20 pm
[Pavel Podvig](#), Ph.D., Independent Analyst, Geneva, Switzerland
(*confirmed*)

Q&A for Academies committee and staff

4:20 pm – 4:45 pm

Public Comment Period

4:45 pm – 5:00 pm

Adjourn PUBLIC SESSION – Day 3

5:00 pm

Reading Materials

Information from Orano's website on its "International Industrial Group," including services throughout the nuclear fuel cycle, <https://www.orano.group/en/group/international-industrial-group>

Presenter Biographies

[Sven O. Bader](#), Ph.D., Technical Consultant, Orano Federal Services

Dr. Bader provides technical support for Orano Federal Services' contract with the Department of Energy's Office of Nuclear Energy. The contract activities relate to various topics such as fuel supply to the versatile test reactor, recycling/reprocessing of used nuclear fuel, transportation of high assay low enriched uranium, and activities associated with consolidated interim storage of spent/used nuclear fuel. Dr. Bader earned his Ph.D., master's, and bachelor's in nuclear engineering from North Carolina State University.

[Brian D. Boyer](#), Ph.D., Section Head (INPRO), International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) Section, Division of Nuclear Power, Department of Nuclear Energy, International Atomic Energy Agency

Dr. Boyer returned to the IAEA in 2015 as a P-4 Nuclear Safeguards Analyst looking to enhance the effectiveness and efficiency of IAEA safeguards. He was promoted to Section Head of International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO) in September 2019 transferring from Safeguards to Nuclear Energy's Division of Nuclear Power. Dr. Boyer worked at Los Alamos National Laboratory from 2006 to 2015 working in the field of nuclear nonproliferation and safeguards, specializing in training and education in nuclear safeguards, evaluation of design and analysis of nuclear safeguards concepts, and the creation of safeguard approaches for various nuclear facilities including gas centrifuge enrichment plants, light water reactors, uranium conversion plants, and plutonium reprocessing facilities. From 2002 to 2006, Dr. Boyer worked at Brookhaven National Laboratory as a nonproliferation and safeguards

specialist. From 1997 to 2002, he worked at the IAEA as a nuclear safeguards inspector doing inspections in the European Union, former Eastern Bloc States, and the former Soviet Union and as a nuclear safeguards analyst in the Section for System Studies. Dr. Boyer is a member of the American Nuclear Society and served as president and vice-president of the Long Island American Nuclear Society Chapter. He is also a senior member of the Institute of Nuclear Material Management (INMM). In 2013 to 2015 he was a member at large on the INMM Board. He is a winner of the INMM's Edway R. Johnson Meritorious Service Award in 2013. He holds a Ph.D. in nuclear engineering from the Pennsylvania State University.

Arnaud Gay, Executive VP Technical Department and International Operations, Orano

Mr. Gay earned a *Diplôme d'études approfondies* or DEA (Degree of in-Depth Studies) in energy economics from *École Nationale Supérieure du Pétrole et des Moteurs*, a graduate engineering school located in Rueil-Malmaison, France, and a degree in chemical engineering from *École Nationale Supérieure des Industries Chimiques (ENSIC)*, an Engineering School dedicated to chemical engineering in Nancy, France.

David H. Hanks, Senior International Nuclear Safeguards Analyst, U.S. Nuclear Regulatory Commission (NRC)

Mr. Hanks has a distinguished career as a senior reactor operator, manager, inspector, and analyst. Before joining the NRC, Mr. Hanks worked as the international safeguards initiatives program manager at the Savannah River National Laboratory (SRNL). Previous to his position at SRNL, Mr. Hanks was appointed to an International Atomic Energy Agency (IAEA) nuclear safeguards inspector post in Vienna, Austria, serving as country officer, site officer and inspector at various fuel cycle facilities from 2002 until 2009. Working in nuclear reactor operations for 25 years prior to his time at the IAEA, Mr. Hanks held a senior reactor operator license at a nuclear facility operated by Entergy Operations, Inc from 1993 until 2002. Mr. Hanks also served in the U.S. Navy nuclear propulsion program, stationed aboard the aircraft carrier USS Nimitz (CVN68). Mr. Hanks is among the recipients of the Nobel Peace Prize awarded to the IAEA in 2005 and has four published novels, *The Disappearance* (based on a true crime), *Black Waters* (book 1 nuclear thriller series), *Power and Ore* (book 2) and *Euphrates Yield* (book 3). www.davidhhanks.com

Pavel Podvig, Ph.D., Independent Analyst, Geneva, Switzerland

Dr. Pavel Podvig is an independent analyst based in Geneva, where he runs his research project, "Russian Nuclear Forces." He is also a Senior Research Fellow at the UN Institute for Disarmament Research and a researcher with the Program on Science and Global Security at Princeton University. Pavel Podvig started his work on arms control at the Center for Arms Control Studies at the Moscow Institute of Physics and Technology (MIPT), which was the first independent research organization in Russia dedicated to analysis of technical issues of disarmament and nonproliferation. Pavel Podvig led the Center for Arms Control Studies project that produced the book, *Russian Strategic Nuclear Forces* (MIT Press, 2001). In recognition of his work in Russia, the American Physical Society awarded Podvig the Leo Szilard Lectureship Award of 2008 (with Anatoli Diakov). Podvig worked with the Program on Science and Global Security at Princeton University, the Security Studies Program at MIT, and the Center for International Security and Cooperation at Stanford University. His current research focuses on the Russian strategic forces and nuclear weapons complex, as well as technical and political aspects of nuclear nonproliferation, disarmament, missile defense, and U.S.-Russian arms control process. Pavel Podvig is a member of the International Panel on Fissile Materials. He

has a physics degree from MIPT and PhD in political science from the Moscow Institute of World Economy and International Relations.

Jenifer Shafer, Ph.D., Program Director, Advanced Research Projects Agency-Energy (ARPA-E)

Dr. Jenifer Shafer currently serves as a Program Director at the Advanced Research Projects Agency-Energy (ARPA-E). Her focus at ARPA-E is developing innovative and proliferation resistant technologies to manage nuclear waste and used nuclear fuel. Before joining ARPA-E, Shafer served on the faculty at Colorado School of Mines as an Associate Professor in the Chemistry Department and Nuclear Science and Engineering Program. Prior to that, she worked for two years at Pacific Northwest National Laboratory. Dr. Shafer received a Ph.D. from Washington State University in 2010, and a B.S. from Colorado State University in 2005. She was the 2019 Chair of the American Chemical Society's (ACS) Division of Nuclear Science and Technology, a member of the 2017 ACS Industrial and Engineering Chemistry Research's Class of Influential Researchers, and a 2014 Department of Energy (DOE) Early Career awardee. Dr. Shafer currently serves on the ACS Committee on Science. She is the co-author of several book chapters, nearly 50 technical manuscripts and has lead or collaborated on a number of projects for the Departments of Energy, Homeland Security, and Defense.

Amir Vexler, President and Chief Executive Officer, Orano USA

Amir Vexler is the President and Chief Executive Officer of Orano USA—Orano's operations in the United States providing commercial and federal customers with global expertise in nuclear materials management. Amir is also President of TN Americas, an Orano USA subsidiary. Mr. Vexler oversees all five of Orano's business units in the U.S., including MCE for sales of uranium fuel, conversion and enrichment services; Orano Decommissioning Services for decommissioning nuclear energy facilities through its joint venture with NorthStar, named Accelerated Decommissioning Partners; TN Americas offering the full breadth of used nuclear fuel management (pool to pad, storage, transportation, and ISFSI management); Orano Med for the development of medical isotopes for targeted immunotherapy for fighting cancer; and Orano Federal Services offering the full complement of engineering and technology to solve some of the more complex nuclear material processing, conditioning and packaging for the U.S. Department of Energy. With extensive international experience in the electric power industry, Amir's career includes manufacturing, engineering services, commercial operations, and business development. Prior to joining Orano in 2019, Amir's leadership roles at Global Nuclear Fuel included chief executive officer, chairman of the board, chief operating officer, and vice president of Manufacturing/Supply Chain. Amir also held senior leadership positions with GE-Hitachi and the former GE Canada Nuclear Products. Amir earned a Bachelor of Applied Science degree in Mechanical Engineering from the University of Toronto and an MBA from the Wilfrid Laurier University.