Nuclear Science and Engineering Energy Seminar Series – Fall 2016

Analysis of the Nuclear Weapons Latency of the Islamic Republic of Iran

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Abstract: The historic Joint Comprehensive Plan of Action (JCPOA) was implemented on January 16, 2016 between the Islamic Republic of Iran, the U.S. and other nations. The JCPOA is intended to ensure that the nuclear program in Iran will exist solely for peaceful purposes. This agreement includes reductions to the Iranian centrifuge enrichment program and assurances of the absence of efforts to develop, build, or acquire a nuclear weapon. Given Iran's past actions of nuclear hedging and pushing the boundaries of agreements, policymakers need a reliable method to judge the effectiveness of this agreement and how it should influence future policy. One method that can help inform policy decisions is with estimates of a state's Nuclear Weapons Latency. Nuclear Weapons Latency is defined as the time needed for a non-nuclear weapon state to develop a deliverable nuclear weapon. The Nuclear Weapon Latency for Iran was quantified with and without the JCPOA using the Nuclear Weapon Latency Computational Tool developed by Sweeney and Charlton. This MATLAB based software focuses on the use of time-dependent proliferation pathways modeled using Petri Nets. The Petri Nets simulation provides an estimate of the distribution of likely time durations of a nuclear program until the first deliverable weapon is produced. The analysis performed here shows that the large reduction in the stockpile of nuclear material and enrichment capability caused a sizable increase in the Iranian Nuclear Weapons Latency. Maintaining this latency impact on nuclear proliferation in the region will require significant surveillance and analysis efforts as we move into the future.

Biography. Dr. Charlton serves as the Research Director for the National Strategic Research Institute (NSRI) at the University of Nebraska which is a University Affiliated Research Center (UARC) for US Strategic Command focused on Combatting Weapons of Mass Destruction. He also serves as the Associate Vice Chancellor for Research and as a Professor in the Mechanical and Materials Engineering Department at the University of Nebraska at Lincoln. NSRI. Dr. Charlton is an expert in the area of nuclear security research and education and has taught courses on nuclear nonproliferation, nuclear security system design and analysis, nuclear forensics, and nuclear detection. His research group developed techniques for remote detection and characterization of proliferation activities, some of the first methods for measuring plutonium in spent nuclear fuel, and a risk analysis approach for managing threats from nuclear terrorism. From 2003-2015, he was a faculty member in the Nuclear Engineering Department at Texas A&M University and served as the founding Director of the Nuclear Security Science & Policy Institute at TAMU from 2006-2015. He previously served as an Assistant Professor at the University of Texas at Austin from 2000-2003 and as a Technical Staff Member in the Nonproliferation and International Security Division at Los Alamos National Laboratory (LANL) from 1998-2000. He earned his Ph.D. in Nuclear Engineering from Texas A&M University. Among his many awards, Dr. Charlton earned the Special Service Award from the Institute of Nuclear Materials Management in 2010 and was named the Barbara and Ralph Cox '53 Faculty Fellow for TAMU in 2013. He has over 200 technical publications in referred journals and conference proceedings.