SPEAKER / PRESENTATION INFORMATION

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Biography	Manager, Nuclear Safety and Radiation Protection *GE Hitachi Nuclear Energy* Mr. Paulson has over 20 years' practical nuclear engineering experience involving radiological engineering, reactor physics, and nuclear criticality safety. He holds a B.S. in NE from Kansas State University (1984) and an M.S. in NE from North Carolina State University (1991). Work history includes 4 years' experience at commercial LWR, 3 years' experience at a DOE site, and 15 years' experience leading nuclear safety engineering at GE Hitachi Nuclear Energy (GEH) - Wilmington site. Mr. Paulson currently provides nuclear safety technical support of diverse GEH nuclear business units including GNF-A, Global Laser Enrichment (GLE), Vallecitos Nuclear Center (VNC), and GEH Canada divisions. He has authored/co-authored numerous publications on program/technical matters pertaining to nuclear criticality safety and nuclear packaging. He holds two U.S. patents as a co-inventor. ANS member since 1984; served on NCSD Executive, Program, and Education Committees; has organized or chaired several NCS technical sessions/panel sessions; currently an active member of ANSI/ANS-8.1 and ANSI/ANS-8.26 working groups.		
Title	***An Overview of GEH NCS Fuel Cycle Activities***		
Abstract	The GEH nuclear criticality safety (NCS) function, headquartered in Wilmington, NC, remains actively engaged in advancements to the nuclear fuel cycle. In addition to BWR fuel manufacturing, recent GEH emphasis to become more vertically integrated into front-end (enrichment) and back-end (reprocessing) fuel cycle technologies has had a dramatic impact on the NCS function. Required internal research in general physics areas, required nuclear criticality safety evaluations, Monte Carlo computational methods expansion, critical benchmark validation methodology improvements, nuclear packaging re-licensing efforts, quantitative risk assessments, nuclear cross-section data set development, and domestic/international licensing needs *collectively* present significant real-world NCS staff challenges. As the landscape of the GEH nuclear business growth opportunities continues to evolve, so does the required depth of NCS knowledge and technical expertise. This presentation provides a brief "snapshot" of select NCS efforts to support the GEH nuclear fuel cycle and provides insight to potential areas in which additional nuclear criticality safety research is needed. The existing GNF-A fuel manufacturing operation (SNM-1097) recently underwent a license renewal. USNRC and industry expectations for validation of neutron transport methods used in nuclear criticality safety also evolved. As a result, the internal GEMER Monte Carlo code critical benchmark validation was updated, areas of applicability (AOAs) expanded, and a more sophisticated statistical methodology was established (to rigorously derive computational bias and associated bias uncertainty). Another area of focus has been to expand our analytic tool chest, including formal validation of MCNP5 using ENDF/B-VII cross-section library. The GEH		

	subsidiary, Global Laser Enrichment (GLE), nuclear criticality safety function assisted in the design, licensing, and commissioning of a third-generation laser enrichment process. An experimental "Test Loop" was licensed under SNM-1097; separate GLE commercial facilities (CF) design, license application (LA), and ISA summary has also been performed. The traditional uranium system's subcritical limits were expanded from 5 to 10 weight percent U-235 enrichment in support of this effort. Compound physics and chemistry associated with UF6 operations has also been internally advanced. The GEH Nuclear Energy Canada business has also entered the traditional enriched uranium fissile operation regime via planned future LEU fuel manufacture in support of advanced Candu reactor designs. The Peterborough operation was augmented with new nuclear criticality safety staff, and training was provided at GEH HQ in Wilmington, NC. Formal CNSC licensing efforts in support LVRF/ACR fuel manufacture at the Peterborough facility are underway. The NCS staff also assisted with criticality accident excursion modeling to support the planned Environmental Assessment (EA) for the facility. Finally, computational studies and subcritical limit derivations in support of advanced fuel cycles have begun as part of GEH involvement in the Global Nuclear Energy Partnership (GNEP) program. GEH NCS is evaluating a proposed nuclear fuel recycling center (NFRC) in which spent LWR or LMR nuclear fuel is recycled into a usable metal fuel for fast nuclear reactors using pyroprocessing technology. Pyroprocessing involves understanding the reactivity behavior of U-235, Pu-239, and Pu-241 metal systems to design effective controls. Collectively, these NCS fuel cycle integration activities have significantly expanded our traditional work scope, methods, and practices. This presentation provides an overview of these NCS technical support activities and identifies potential areas where additional NCS research and collaboration is needed.