Summary of Views of Some Technical Staff on the Alternate Approach to Conduct a Rulemaking Consistent with the 2015 Final Regulatory Basis

Some technical staff support the alternate approach proposed by one commenter on the draft revised regulatory basis and believe that that approach of conducting a rulemaking consistent with the 2015 final regulatory basis would minimize or eliminate the challenges discussed below. They recognize that this approach would require a significant amount of resources to perform a risk-informed rulemaking. However, the cost of such a rulemaking could be offset by savings obtained as a result of not needing to perform case-by-case analyses to determine appropriate security requirements for every individual new facility, which is costly to both the U.S. Nuclear Regulatory Commission (NRC) and licensees. Furthermore, these technical staff believe that this approach would be a transformative change to the NRC's regulatory framework that would enhance the mechanisms and methods by which NRC regulates existing and developing nuclear technology while ensuring that its mission continues to be met. It would also support virtually any new activity involving special nuclear material (SNM) (e.g., advanced reactors). This approach will align NRC regulations with international guidance; it would improve consistency and clarity of the requirements; and it uses a risk-informed and performance-based structure.

Discussion of Challenges

In SRM-COMKLS-18-0003, "Fiscal Year 2020 Budget to the Commission," dated August 22, 2018 (ADAMS Accession No. ML18268A129, non-public), the Commission directed the staff to proceed with an expedited rulemaking with the exclusive scope of codifying the requirements of the security orders issued by the NRC following the terrorist attacks of September 11, 2001. The staff outlined its planned activities in response to SRM-COMKLS-18-0003 in a Commissioners' Assistant (CA) Note, dated November 9, 2018 (ADAMS Accession No. ML18268A129, non-public). Since then, applicants have proposed new types of facilities that do not fit squarely within the NRC's existing regulatory structure. Additionally, new legislation has been passed by Congress. These events challenge the NRC's ability to implement the activities outlined in the CA Note within the bounds of SRM-COMKLS-18-0003.

The Commission recently issued SRM-SECY-18-0063, "Response to Staff Requirements Memorandum (SRM) SECY-17-0008 on Physical Protection of Nonpower Production and Utilization Facilities Intending to Produce Molybdenum-99," that approved the staff's recommendation to implement a case-by-case review of additional security measures for SNM. In SRM-SECY-18-0063, the Commission provided clear direction to staff regarding the need for additional security measures for facilities with Category II quantities of SNM. This direction enabled the staff to engage stakeholders, such as the Nuclear Energy Institute (NEI), on security for planned high-assay, low-enriched uranium (HALEU) facilities. NEI issued a white paper entitled "Addressing the Challenges with Establishing the Infrastructure for the Front-End of the Fuel Cycle for Advanced Reactors," dated January 2018 (ADAMS Accession No. ML18103A250). The white paper noted that the perceived threat has changed and that the regulatory requirements for physical security of Category II quantities of SNM that apply to HALEU fuel need to be reevaluated to address the current threat environment. NEI also formed a HALEU Task Force to lead industry efforts in identifying and resolving regulatory and policy issues for the development of the nuclear fuel supply chain for HALEU.

New and proposed legislation that could affect facilities with SNM include the Nuclear Energy Innovation and Modernization Act, the Nuclear Energy Innovation Capabilities Act, and the Nuclear Energy Leadership Act. Subsequently, the Department of Energy (DOE) is

implementing multiple activities related to advanced reactors and advanced fuel cycles using HALEU that will be licensed by the NRC.

- The Nuclear Energy Innovation Capabilities Act directed DOE to facilitate the siting of advanced reactor research demonstration facilities including small modular reactor and micro-reactor concepts within the next 5 years. In addition to NRC's long-standing support of small modular reactor licensing, staff from a number of offices has been engaged with OKLO, a micro-reactor, that expects to submit an application by the end of the calendar year.
- DOE contracted with American Centrifuge Operating to deploy a HALEU fabrication system by June 2022. The HALEU manufacturing process involves uranium enrichments of 5 percent to 19.75 percent and is intended for advanced reactors that do not require frequent refueling.
- DOE is also working with X-Energy on advanced reactor projects and fuel fabrication. X-Energy proposes to provide advanced tri-structural Isotropic particle fuel for its own reactors and for other advanced reactor designs.

These facilities will possess HALEU in solid, liquid, and gaseous forms in metric ton quantities, significantly greater than the quantities used by non-power reactors or Moly-99 facilities. As such, the risk of the proliferation or malicious use of the material at these facilities would be higher, as compared to the discussion in SECY-18-0063 and SECY-16-0032. Both these documents are classified and are not publicly available. As discussed in the November 9, 2018, CA Note, the staff will perform risk-informed analysis for these facilities (to be applied on a case-by-case basis) to determine the need for additional security measures beyond those in the current regulations. The staff has utilized the case-by-case approach to inform the physical protection of SNM in evaluating exemption requests, security orders, and new, unique license applications.

Each of these case-by-case analyses resulted in a significant expenditure of resources by both licensees and the NRC to establish an appropriate regulatory approach to address specific security concerns. Recent examples using this case-by-case process include General Electric Hitachi Vallecitos Nuclear Center, Fort St. Vrain, Shallow Land Disposal Area, and Hematite. Furthermore, the current case-by-case process does not provide predictability for applicants and has the potential to create regulatory uncertainty of case-by-case approvals. Regulatory predictability can inform prospective licensees as they develop material processes and design facilities.

Reviews to enhance security at non-power reactors were also conducted on a case-by-case basis. In 2002 and 2003, the Commission directed the staff to transmit letters to non-power reactor licensees recommending implementation of additional security measures, which focused on the mitigation of potential radiological sabotage and theft events. Most non-power reactor licensees voluntarily committed to carrying out at least some of these additional security measures. Individual site implementation of various additional security measures was inspected and confirmed through the issuance of confirmatory action letters. The confirmatory action letters are not considered orders and therefore would not be incorporated into this rulemaking effort. Codifying the requirements in orders issued to fuel cycle facilities possessing Category III quantities of SNM would make those requirements applicable to all licensees possessing Category III quantities of SNM. These potential changes to the security regulations for non-power reactors possessing Category III quantities of SNM, without making similar changes to the security regulations for non-power reactors possessing Category II quantities of SNM, would result in unbalanced protection. Moreover, a patchwork of security requirements resulting

from inconsistent implementation of the confirmatory action letter measures and potentially unbalanced regulations could create confusion for non-power reactor licensees.

The staff has also become aware that the DOE plans through the National Transportation Stakeholders Forum to facilitate licensee's shipments of large quantities of spent nuclear fuel (SNF) in the next 5 years. A portion of this fuel will be below the external dose rate considered to be self-protecting and below the dose rate threshold in the regulations for the shipment of SNF. For this lower external dose rate, the current regulations would require this material to be protected at Category I levels. The staff has been challenged with determining how best to address this potential over-protection[1] and to right-size security for such transportation shipments. This issue would also apply at consolidated storage facilities. In addition, DOE staff has initiated discussions with NRC staff regarding the pending transportation of HALEU, to include what security measures would be necessary. With the strong push by the U.S. Government to bring advanced reactors and small modular reactors on line, this is becoming an area of focus. Given the lack of regulations for the security of these shipments, it will be necessary to establish requirements on a case-by-case basis, for what could be a significant number of shipments every year, to and from, enrichment facilities, fuel fabrication facilities, reactor fabrication facilities, and reactor locations where reactors might be assembled.

Rulemaking History

Following the events of September 11, 2001, the NRC issued security orders to licensees that possessed Category I or Category III quantities of SNM. Consistent with its principles of openness and reliability, the NRC's regulatory practice is to codify in the NRC's public regulations, when possible, those provisions issued by order to a class of licensees, in order to make the requirements generally applicable and assemble them in one location. In 2006, the Commission approved the staff's schedules and resources for the initial SNM rulemaking effort in SRM-COMSECY-05-0058, "Schedules and Resources for Security Rulemakings" (ADAMS Accession No. ML060390527, non-public). In the SRM, the Commission directed the staff to incorporate the physical protection requirements contained in the security orders into regulations to make those requirements generically applicable, increase regulatory predictability and stability, and allow interested stakeholders the opportunity to provide comments on these new security requirements as part of the rulemaking process.

In 2010, the Commission amended the scope of the rulemaking (SRM-SECY-09-0123, ADAMS Accession No. ML101890711) by approving, in part, the staff's request to include material attractiveness as part of a revised categorization scheme for SNM to be used as part of the rulemaking to update SNM and fuel cycle facility security-related regulations. After developing a regulatory basis for the SNM rulemaking (ADAMS Accession No. ML14321A007), in March 2016, the staff submitted SECY-16-0032, "Material Attractiveness and Enhanced Security of Special Nuclear Material Rulemaking" (classified), to the Commission. In April 2016, the Commission directed the staff to suspend all activities on the proposed SNM rulemaking to enable the Commission to benefit from further engagement with interagency partners (SRM-M160330, ADAMS Accession No. ML16098A444 [limited access]).

Subsequently, the Commission issued SRM-COMSECY-16-0015, "Staff Requirements Memorandum – COMSECY-16-0015 – Enhanced Security of Special Nuclear Material Rulemaking Coordination with Department of Energy," dated August 26, 2016 (ADAMS

[1] The regulations would require protection greater than the level the staff believes is appropriate given the more dilute nature of SNF.

Accession No. ML16239A357, non-public). In that SRM, the Commission approved the staff's recommendation to form an interagency material attractiveness working group to obtain the DOE's perspectives on material attractiveness and security requirements for SNM. NRC staff formed a working group consisting of DOE, National Nuclear Security Administration, and Federal Bureau of Investigation staff. The classified working group report was provided to the Commission in SECY-17-0085, "Interagency Material Attractiveness Working Group," dated August 23, 2017 (Secret-Restricted Data).

The November 2018 CA Note outlined the staff activities in response to SRM-COMKLS-18-0003. The activities were: (1) resume rulemaking with the limited-scope of incorporating the requirements of the post-9/11 security orders issued to facilities with Category I and Category III quantities of SNM into the NRC's regulations; (2) continue the practice of evaluating the need for additional security requirements for Category II quantities of SNM and new facilities possessing SNM using a risk-informed analysis on a case-by-case basis; (3) ensure that licensees possessing SNM that were issued security orders prior to 9/11 continue to implement those order requirements not incorporated into the NRC's regulations based on the applicable security orders; (4) continue to oversee non-power reactor licensee implementation of the confirmatory action letters; and (5) evaluate other regulatory issues not included in the limited-scope rulemaking in future regulatory actions (e.g., licensing of advanced reactor fuel facilities) on a case-by-case basis.