Consortium for Reactor Safety Training (CRεST)

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ABSTRACT:

The Consortium for Reactor Safety Training (CRεST) brings together a transformational team comprising educational institutions, training centers, reactor vendors, power utilities, national laboratories, research and non-profit organizations, labor organizations, and community representatives for developing a highly qualified and committed workforce to support the current and next-generation nuclear reactors. Focusing on the Southeastern region of the U.S., home to 30 of the 94 operational nuclear reactors generating approximately 30% of nuclear power, the CRεST team proposes an ambitious plan to unify a vast network of institutions with the common goal of addressing the current and projected shortfall of workers in the nuclear power industry with support from the U.S. Department of Energy (DOE). The integration is planned to be implemented through a state-of-the-art virtual ecospace that will serve as an online portal for a large number of industry-recognized courses and training programs, as well as a physical CRεST Center at NC State University, which will be the hub of our consortium.

CRεST will pursue six challenge pathways to meet the expected shortfall in workforce. They are ***i***) Educational, Skills and Economic Assessment, ***ii***) K-12 Outreach, ***iii***) Two-Year College Integration, ***iv***) University Innovations, ***v***) Reactor Safety Training, and ***vi***) Labor, Community Building and Policy.

CRεST is built on the sturdy foundation of well-established partner training programs and will institute new ones with industry certifications, as appropriate, with the overarching guidance of advisory councils. This team-oriented relationship model will focus on generating positive momentum around nuclear energy initiatives where stakeholders from academia to industry are motivated to work toward the shared goal of developing and growing a skilled nuclear energy workforce. Embedded in the plan is a continual evaluation program that provides quantitative metrics and an unstinting commitment from the partners to sustain the consortium well past the project period of five years. CRεST aspires to be a leading national authority offering transparent templates for education, training, and outreach activities, providing regional and national strategies for developing a world-class workforce for the 21st century.

Trade skills are essential to the construction and operation of new reactors anticipated over the next 25 years to meet power demand and carbon neutrality goals. Two-year community and technical colleges are the primary conduit for the nuclear industry to induct qualified trade workers. CRεST will initiate an ambitious pathway for integrating resources that are fragmented across the region. Existing relationships will be strengthened and several new programs will be initiated to cover a plethora of areas critical to the nuclear industry, such as nuclear fuel cycle and advanced manufacturing. CRεST will develop and deliver standardized nuclear curriculum packages, including lectures, classes, print resources, and advanced technology modules, to ensure consistent, high-quality training across all partner programs. This commitment to standardization extends to the creation of the Nuclear Unified Curriculum Program

(NUCP), a portable industry-recognized credential developed in collaboration with the National Energy Institute (NEI) and the Institute of Nuclear Power Operations (INPO).

As a consortia led and partnered by premier engineering universities in the Southeast, university innovations will be integrated with the workforce development activities in three ways. First, a series of digital simulators that have been developed at partner universities but currently isolated from each other will be integrated in the CRεST virtual ecospace and made available to the stakeholders. The simulators are capable of simulating a comprehensive range of reactor conditions, from standard operational scenarios to complex emergency situations. CRεST has a unique and vast collection of simulators that include several types of current and next generation reactors including small modular reactors. Second, a number of new university certificates on advanced areas that are currently not available such as construction management and nuclear cybersecurity will be designed and offered through the CRεST network. Finally, NC State University will institute a four-year nuclear engineering management and technology (NEMT) bachelor's degree program for enabling career advancement for those who enter the workforce as skilled trade employees.

Community building is at the heart of our program; CRεST will develop strategies to involve local communities in discussions about nuclear energy, addressing concerns, and highlighting the economic and environmental benefits. This will include the formation of three advisory councils from industry, educational and training institutes and community leaders in CRεST. These councils will facilitate various avenues of engagement including town hall meetings and relationships with local organizations to ensure community voices are heard and incorporated into workforce development initiatives. Designing community public education platforms, particularly targeting economically disadvantaged areas, native American tribal locations and underrepresented groups will be a cornerstone of our efforts.

As a union, CRεST is envisioned to be more than the sum of its parts. It constitutes a new ecospace that merges the existing programs of our partners with new programs, leveraging technological advancements to reach potential students and stakeholders over the wide geographical area comprised of 7 states – North Carolina, Virginia, South Carolina, Tennessee, Georgia, Florida and Texas. Covering 121 congressional districts, CRεST activities are planned in a tiered way, with a special focus on disadvantaged areas and underrepresented groups. The educational and training templates from CRεST are designed to be scalable, which is necessary for creating awareness and making adherent contact with communities that are not currently tied to nuclear-based educational institutions or the connected industry.

The management team, which is made up of experienced members from different organizations, is constituted explicitly with an eye on growth and sustainability. A division into focus areas (FAs) allows the activities of CRεST to be organized into projects that span different levels, each with clearly delineated milestones. Most projects, such as the constitution of a new certificate program or an outreach activity, are locally managed, and are mapped to broader focus areas. The FA leads manage smaller sets of projects, such as the analysis of gaps in training programs for high school counselors, which are designed to cover all the member states and communities; these projects are central to our mission of demonstrating the scalability of our approach. At the CRεST level, the primary responsibilities are on developing and sustaining the CRεST virtual ecospace, the physical CRεST Center at NC State University, and providing the necessary industry-accepted certifications such as NUCP or instituting new certifications, as appropriate, to all educational and training programs offered through CRεST.