

**SECTION A. Project Title: LWR Integrated Energy Systems Interface Technology Development & Demonstration****SECTION B. Project Description**

Northern States Power Company, in collaboration with Xcel Energy and the Idaho National Laboratory (INL) proposes to perform a High-Temperature Steam Electrolysis (HTSE) demonstration at the Prairie Island Nuclear Generating Plant (PINGP) operated by Xcel Energy.

INL will provide a reference engineering design for a 150 kWe system. During the first 18 months of the project, Xcel Energy will work with an architectural/engineering firm to prepare the site at the PINGB for a demonstration, including installing connections to extract thermal and electrical energy from the nuclear plant. Xcel Energy plans to contract with a U.S. company to build solid oxide electrolysis cell (SOEC) stacks that will be needed for the HTSE demonstration. INL will fabricate a portable system, except for the SOEC stacks, which will be installed into the system as soon as available. INL will commission the HTSE system and use it in hardware-in-the-loop tests to characterize its performance in a simulated electric system at a nuclear power plant. From these tests, INL will build an electric model of the HTSE system and scale the model to 200 MWe. Additional simulations at INL will predict the performance of a 200 MWe HTSE system connected to an Xcel Energy nuclear plant. The portable HTSE system will be set up and operated at PINGP to collect data, monitor performance of the high temperature steam electrolysis system, and assess interactions with the nuclear power plant and electricity distribution systems.

**SECTION C. Environmental Aspects / Potential Sources of Impact**

**Radioactive Material Use:** It is recognized that steam generated at PINGP may contain trace amounts of tritium. Tritium is monitored and sampled in all effluent pathways and in some plant systems, including the secondary side plant, which is representative of the steam. The detailed design phase of the project will develop the required process controls, sample points, and procedural changes to ensure tritium is controlled consistent with site and regulatory requirements. Specific to the Hydrogen Generation Skid, the expected tritium concentration in the electrolysis feed water is expected to contain tritium at a concentration consistent with normal background tritium concentrations.

**Chemical Use/Storage:** Storage of hydrogen gas is a potential habitability or fire protection concern. The proposed location of the hydrogen gas storage is adjacent to existing hydrogen gas storage and infrastructure. The project's detailed design phase will identify and study the affects of the use/storage of the hydrogen or any other chemical(s) used to support the project.

**Water/Well Usage:** The scope of the project will require water use. The current water appropriations permit at PINGP has available margin for the estimated increase in water usage that will be required to support the hydrogen skid. Current water consumption at site is approximately 30 to 60 million gallons per year. The increased water use is expected to be less than 4 million gallons per year. The current water appropriations limit is 100 million gallons per year.

**Discharge of Wastewater:** Discharge water is monitored via routine pump timer readings, National Pollutant Discharge Elimination System (NPDES) samples, and offsite dose calculation samples. Liquid effluent from the hydrogen skid is expected to be routed to the monitored pathway of Unit 1 Turbine Building Sump. This pathway is monitored for both chemical and radioactive considerations per NPDES Permit and site procedure. The project's detailed design phase and study and finalize this pathway.

**Soil Disturbance:** Soil disturbance may occur during the installation of underground cable, piping, or other utilities needed to support the new system. If soil is disturbed as part of the project, the excavation plan will be evaluated and controlled for storm-water consideration per internal procedural guidance.

**Cultural/Historical Resources:** The project will follow established procedures when performing excavation activities, defining the requirements to ensure archaeological, cultural, and historic resources are protected and is applicable to all ground-disturbing activities around PINGP.

**SECTION D. Determine the Level of Environmental Review (or Documentation) and Reference(s):** Identify the applicable categorical exclusion from 10 CFR 1021, Appendix B, give the appropriate justification, and the approval date.

Note: For Categorical Exclusions (CXs) the proposed action must not: 1) threaten a violation of applicable statutory, regulatory, or permit requirements for environmental, safety, and health, including requirements of DOE orders; 2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities; 3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; 4) adversely affect environmentally sensitive resources. In addition, no extraordinary circumstances related to the proposal exist which would affect the significance of

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the action, and the action is not “connected” nor “related” (40 CFR 1508.25(a)(1) and (2), respectively) to other actions with potentially or cumulatively significant impacts.

References: B3.6 Siting, construction, modification, operation, and decommissioning of facilities for small-scale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial development.

Justification: The activity consists of research activities to develop and perform a High-Temperature Steam Electrolysis (HTSE) demonstration a nuclear power plant.

Is the project funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act)  Yes  No

Approved by Jason Sturm, DOE-ID NEPA Compliance Officer on 1/27/2021