U.S. Senate Committee on Energy and Natural Resources
March 17, 2022 Hearing: *The Huff Nomination*
Questions for the Record Submitted to Dr. Kathryn Huff

Questions from Ranking Member John Barrasso

Question 1: The United States has 93 operating commercial nuclear reactors. Our commercial reactors are almost completely reliant on imports of uranium and import nearly half of all uranium from Russia and its allies, Kazakhstan and Uzbekistan. Do you believe uranium produced here in the United States – whether on private, state, or federal lands – can play a critical role in weaning our commercial reactors off Russian uranium? Please answer "yes" or "no."

Answer: Yes. Uranium produced in the United States can play a critical role in supplying our 93 operating reactors.

Question 2: In December of 2021, Chairman Manchin and I introduced S. 3428, the Fission for the Future Act. This bill would establish a program to support states and other entities, which are interested in pursuing advanced nuclear technologies. Advanced nuclear reactors will be key to reducing or avoiding future greenhouse gas emissions. Do you agree that the Department of Energy should make it a priority to provide financial and technical assistance to states pursuing advanced nuclear reactors?

Answer: Technical assistance to states pursuing advanced nuclear technologies is essential for successful deployment. Interactions between DOE and states like Wyoming that are actively exploring advanced reactor demonstration are key examples of such assistance. Additionally, the Office of Nuclear Energy's National Reactor Innovation Center (NRIC) developed an integrated siting tool to help states identify and compare possible locations for advanced nuclear facilities based on factors related to socioeconomics, proximity, and safety. NRIC will provide support to states in using this siting tool and to develop nuclear energy roadmaps. If confirmed, I look forward to continuing to seek out opportunities for the Office of Nuclear Energy to assist states as they consider implementing advanced nuclear technologies.

Question 3: Under the Department's recent reorganization, the Assistant Secretary for Nuclear Energy will no longer oversee the Advanced Reactor Demonstration Program or the Civil Nuclear Credit Program. Instead, the Undersecretary for Infrastructure will oversee these programs. I'm concerned that this reorganization will disrupt these programs. I believe that these programs should remain the responsibility of the Office of Nuclear Energy. What is your view?

Answer: The Department's realignment will ensure that it has the structure needed to effectively implement clean energy investments in the Bipartisan Infrastructure Law and the Energy Act of 2020, through both a continued focus on fundamental science and clean energy innovation and an expanded focus on deploying clean infrastructure. While this change will position the Department to most effectively implement major infrastructure activities such as the Advanced Reactor Demonstration Program (ARDP) demonstration projects and the Civil Nuclear Credit (CNC) Program, the Department is also committed to ensuring there is no disruption or delays in program execution as it transitions to the new structure. With the Bipartisan Infrastructure Law (BIL) providing the majority of the funding for the Advanced Reactor Demonstration Program (ARDP) demonstration projects and all funding for the Civil Nuclear Credit Program (CNC), I believe it makes sense to align the program responsibilities with the primary funding source and with other programs focused on deployment and demonstration. The

Office of Clean Energy Demonstrations (OCED) portfolio of projects provides increased visibility and focus on nuclear technologies as a clean power source for the United States and the world.

I expect that unnecessary disruption of project management can be avoided by transferring the same management and oversight staff from the Office of Nuclear Energy (NE) to OCED and maintaining similar project management and oversight philosophies on these projects. The projects moving to OCED will benefit from the ability of OCED to improve program management and oversight capability by increasing staff with its increased program direction budget. In a broader sense, NE intends to stay actively engaged with OCED on the execution of both programs and provide technology development and policy support. For example, NE will provide specific expertise and value by working to assure an inventory of high-assay low-enriched uranium (HALEU) for ARDP fuel requirements and by providing support for review of CNC applications. NE will also contribute $60 million appropriated in the FY2022 Omnibus Bill to ARDP projects. The CNC is a new program that is being established in the context of the BIL-aligned organization. If confirmed, I will make the successful transition of these projects a top priority to ensure they continue proceeding predictably along the project path that was initiated in NE.

Question 4: Nuclear energy policy in Europe varies from country to country. About a decade ago, Germany decided to shutter its nuclear power plants. After Russia's invasion of Ukraine, Germany is reconsidering that decision. France was also considering reducing its fleet of nuclear reactors, but just announced plans to build more. Nuclear power can play a critical role in helping Europe reduce its dependence on Russian gas. What can the United States do to encourage European nations to make additional investments in nuclear energy?

Answer: The United States can and should lead by example through domestic investments that keep our existing nuclear power plants open and deploy new nuclear reactor technologies as well as fuel cycle facilities. A strong domestic nuclear industry underpins our credibility globally and can enable the United States to engage effectively in international energy fora to communicate and reiterate the important role of U.S. nuclear energy technologies in meeting global energy demand.

Even before Russia's invasion of Ukraine, we were engaging heavily in central and eastern Europe, where multiple countries are interested in deploying both small and large U.S. reactor designs. The Office of Nuclear Energy has invested in a range of technical support to six countries in that region (these include Bulgaria, Czech Republic, Poland, Romania, Slovenia, and Ukraine). These activities have helped to develop relationships and advance strategic cooperation in the region, which have served as a foundation for commercial opportunities. Russia's invasion has underscored the importance of energy security and bolstered support for nuclear energy, not only in central and eastern Europe, but in a myriad other EU countries. Since the invasion, we have expanded our outreach to respond to a growing list of countries that are looking at nuclear energy to reduce their energy dependency on Russia and meet their domestic emission goals. Russia's reckless behavior has left a door open, and we have begun discussions with industry on how to present a comprehensive U.S. solution. If confirmed, I look forward to continuing to advance U.S. nuclear technologies in international markets in support of energy security for the U.S. and our allies. Doing so is critical to the U.S. nuclear industry and our shared national security.

Question 5: Our nation's commercial nuclear reactors were initially licensed to operate for 40 years. The Office of Nuclear Energy developed the technical basis to support extending these licenses from 40 years to 60 years. The Office has also supported efforts to extend these licenses from 60 years to 80 years. Do you believe there is a technical basis to support extending these licenses to 80 years?

> **Answer:** Yes. Through coordination with the Electric Power Research Institute and the Nuclear Regulatory Commission, the Department's Light Water Reactor Sustainability (LWRS) program demonstrated there are no technical limitations for the existing fleet of nuclear reactors to operate at least to 80 years. The technical results from the LWRS Program provide data, methods, and technologies that are used to make informed decisions and take actions needed to ensure the continued safe operation of the existing U.S. LWR fleet.

Question 6: On March 16, 2022, the *Washington Free Beacon* published a story titled, "New Iran Agreement Would Let Russia Cash in on $10 Billion Contract To Build Nuclear Sites." The article explains that "Russia's top state-controlled energy company, Rosatom, is set to cash in on a $10 billion contract to build out one of Iran's most contested nuclear sites as part of concessions granted in the soon-to-be-announced nuclear agreement that will guarantee sanctions on both countries are lifted." How is such a concession to Rosatom consistent with our nation's goal to limit Russia's financial resources and its ability to fund its war on Ukraine?

> **Answer:** I agree with the President that we must explore all tools to limit the ability for Russia's President Putin to continue funding his invasion of Ukraine. I do not have specific insight into this project, as this is outside the scope of the Office of Nuclear Energy. However, if confirmed, I would engage with my colleagues in the National Nuclear Security Administration and the Department of State on the matter, as appropriate.

Question 7: Without a fast neutron testing capability in the U.S., nuclear technology developers have had to rely on the Russian BOR-60 reactor for testing. Even before Russia's brutal assault on Ukraine, reliance on Russia for this important fuel and materials testing complicated our domestic nuclear technology development efforts. The Department's Versatile Test Reactor (VTR) project was intended to fill this gap, but has been zeroed out in the fiscal year 2022 appropriation. Is the VTR still a priority for the Office of Nuclear Energy?

> **Answer**: Yes. Consistent with VTR authorization language in the *Energy Act of 2020*, I believe that establishing this critical nuclear energy research and development infrastructure is needed for long-term innovation and global U.S. leadership of advanced nuclear energy technology. If confirmed, I look forward to working with Congress to ensure adequate funding for this important program.

Question 8: During the hearing, you stated that you favored restarting a consent-based siting process for a permanent nuclear waste repository. You also cited international examples where a consent-based siting process has worked successfully. In contrast to most, if not all, European nations, the United States has a robust form of federalism, where power is divided between the federal government and state governments.

a) Why do you believe that a governor or legislature of a state will allow a local government to reach an agreement with the federal government to host a permanent repository within the state's borders?

Answer: I believe that any governor or legislature will ensure that a sustainable spent nuclear fuel project is safe, secure, and beneficial to their constituents. DOE's consent-based siting process will allow interested groups, communities, and governments at the state, tribal, and local levels to establish what benefits and compensations might be necessary to enable informed consent at all levels.
. Any federal interim storage facility licensed by the Nuclear Regulatory Commission (NRC) will be a safe and secure source of jobs for any host state. The transportation of spent nuclear fuel, overseen by NRC and the Department of Transportation, will also be both safe and secure. A federal interim storage facility may also bring significant infrastructure improvements, educational opportunities, and other benefits to a state. If confirmed, I look forward to working with Congress to ensure adequate funding for this ongoing consent-based siting process.

b) Nye County supports the permanent repository at Yucca Mountain. Doesn't opposition at the state level to Yucca Mountain in Nevada and interim storage facilities in Texas and New Mexico indicate that a consent-based siting process is unlikely to succeed?

Answer: These examples indicate that a siting process without broad and informed consent from local, regional, state, and tribal levels is unlikely to succeed. This is especially the case if the public benefits of a facility are not commensurate with the burdens of the host state.

DOE's consent-based siting approach for a federal interim storage facility is different from these examples in important ways. DOE's process recognizes that U.S. states may be willing to take on responsibilities for national needs if those responsibilities are coupled with informed consent at all levels and if the public benefits of such a facility are commensurate with the costs. The success of this process will rely on leaders from all states and communities interested in a solution to the challenge. By serving as partners in this important national mission, leaders at the state and local levels will be contributing to the sustainability of clean energy technologies, helping to tackle climate change, and serving as important environmental stewards for the United States. Potential host communities and states will benefit from support, cooperation, and recognition by all other legislators and state leaders.

Question 9: In addition to our foreign adversaries, like Russia, DOE has also dumped uranium into the U.S. uranium market as a mean to offset the costs for environmental cleanup. For years, this practice of "uranium bartering" undercut the price of uranium and resulted in the cancellation of uranium projects and the loss of jobs in my home state of Wyoming and other states. The Government Accountability Office repeatedly found that DOE's actions violated federal law. Thankfully, Secretary Perry ended this practice. Can I have your assurance that, if confirmed, you will not support efforts to restart this practice of uranium bartering to offset the Office of Environmental Management's budget request? Please answer "yes" or "no."

Answer: Yes. If confirmed, I will not support efforts to restart uranium bartering to offset the Office of Environmental Management's budget request.

Question 10: Officials from the Office of Nuclear Energy have publicly stated that they plan to conduct a programmatic environmental impact statement (EIS) associated with the high-assay, low-enriched uranium (HALEU) program. These same officials have suggested a programmatic EIS could delay the execution of the

HALEU program by a number of years. Many experts have questioned the need for the Department to conduct a programmatic EIS. These experts explain that it is the responsibility of the Nuclear Regulatory Commission to conduct an environmental assessment or an EIS as part of the licensing process for uranium production facilities. If confirmed, will you ensure that the Department does not conduct any unnecessary environmental assessments or EISs and thereby delay the availability of HALEU for America's advanced nuclear reactor developers?

Answer: As part of our approach to establishing the HALEU Availability Program, we are conducting a thorough analysis of existing licenses and environmental reviews related to different components of the program. Facilities related to nuclear activities such as mines, conversion facilities, transportation and storage facilities, enrichment plants, and fuel fabrication facilities all undergo rigorous licensing processes including completion of all required environmental analyses as required. The Department is reviewing existing coverage under the National Environmental Policy Act (NEPA) for planned activities under the HALEU Availability Program and plans to use this information to make a determination on the appropriate level of NEPA analysis required for the program. The review of existing coverage will be completed in the summer of 2022, and a DOE decision regarding the need for any additional NEPA analysis will be made promptly thereafter, in coordination with the Nuclear Regulatory Commission. If confirmed, I will work to ensure we are advancing HALEU supply needs as expeditiously as possible while fully complying with all regulatory requirements.

Questions from Senator James E. Risch

Question 1: As we look across the world, more reactors are being built overseas than in the United States, and the Russians and Chinese are actively working to grow their nuclear exports capabilities for a variety of geopolitical motives. If confirmed, you will be the administration's chief advisor for civilian nuclear energy and owner of the Idaho National Lab, the DOE's lead lab for civilian nuclear energy.

a. How will you use your resources, including INL, to compete against Russia's aggressive nuclear export agenda and help the U.S. re-establish itself as a world leader on nuclear energy?

Answer: Most importantly, we must continue investing in our U.S. advanced reactor developers so they can develop and deploy new advanced reactor technologies for nations to leverage in both electric and non-electric applications. To underpin our credibility, we must lead by example through new builds domestically, which can be encouraged by directed investments, including leveraging the purchasing power of the federal government as an energy consumer. We will continue to leverage INL resources and other national labs to foster innovation, deploy new technologies, share testing capabilities, provide training for international partners, and support technical assistance programs. We must leverage U.S. funding of, and influence in, international organizations and multilateral fora, including the International Atomic Energy Agency, the Nuclear Energy Agency, and others, so that we can demonstrate our global leadership in advanced nuclear technologies. With leadership, we can shape the agenda to ensure the responsible deployment of nuclear power around the world and supplement our bilateral engagement with embarking countries. If confirmed, continuing to advance U.S. nuclear technologies abroad will be

one of my highest priorities given the benefits it provides to U.S. industry, economic activity, and our geopolitical influence and national security.

b. What does the United States need to do to regain global leadership in nuclear energy and how would you define "global leadership"?

Answer: Global leadership in nuclear energy is demonstrated by a strong international presence through exports of nuclear technologies, fuel cycle services, and norms. Ceding our global nuclear energy leadership narrows foreign policy options and erodes American international influence to set stringent nonproliferation, safety, and security standards globally. The United States must aim to be the most attractive partner for nations seeking to build or expand their nuclear energy sectors while maintaining our commitment to nuclear nonproliferation and security goals. To compete, the United States must leverage new and existing financial and policy mechanisms to support the deployment of U.S. nuclear energy technology in international markets, including early-stage financing and equity investments. If successful in this endeavor, the United States will once again be the clear global leader in nuclear energy.

Nuclear energy cooperation involves projects that can result in decadal partnerships and billions of dollars in economic activity. So, while U.S. technology is generally recognized as cutting edge, we must also enable the cooperative conditions conducive for export to partner nations. Team USA, a focused collaboration of DOE and partner U.S. government agencies with the goal to foster the export of U.S. nuclear technology, has made great strides, but these efforts have also demonstrated that much work remains. As we create new opportunities for U.S. exports, we must develop more financing options, funding, flexibilities, and capabilities to allow us to quickly provide the type of comprehensive support that our global customers seek. U.S. government and industry must work together to develop a strategy, which aligns strategic partnerships with market priorities. This targeted approach would maximize the use of our resources to expand U.S. nuclear energy technology's global footprint.

If confirmed, I look forward to advancing policy solutions that will leverage this critical moment for the United States to regain its global leadership position in the global nuclear energy market.

Question 2: What more can we do to compete globally and export U.S. nuclear energy technologies to displace Russian efforts to use energy as a means of control? I would think that this would include us increasing our efforts on global deployment of SMRs, advanced reactors, and nuclear fuels.

Answer: Recent events have demonstrated that Russia does not respect the obligations to nuclear safety, security, and safeguards corresponding with being a supplier of peaceful nuclear energy technologies. We have an important opportunity to promote the United States and our industry as a trusted, reliable, and responsible partner for reactor technologies, fuels, and operations and maintenance. We must expand our work with embarking countries to help them develop the indigenous capabilities required to pursue and support a responsible nuclear power program, so they can grow their energy independence. This includes providing, both bilaterally and through multilateral institutions like the International Atomic Energy Agency, nuclear infrastructure development support to develop the necessary legal,

regulatory frameworks, technical, and human resources. In the area of advanced reactors, including SMRs, we will continue to work with our partners to provide the best range of technology options to suit the needs of individual markets, be it electricity generation, distributed power, and/or decarbonization of their transportation and industrial sectors.

Question 3: Given the Russian aggression in Ukraine, it's clear we need to re-evaluate our foreign energy dependence, including our energy supply chains. For example, we need to be producing uranium here in America to support our current fleet and ensure we achieve our goals in demonstrating and deploying advanced reactors.

a. What other resources and capabilities have we been dependent upon Russian for, and should we be establishing these capabilities here in the U.S., like building a Versatile Test Reactor (VTR)?

Answer: Russia hosts the only commercially available fast test reactor in the world, which American companies have used for the testing of fuels and materials with fast neutrons. Russia is currently constructing its next fast test reactor. The United States lost this capability when EBR-II was shut down more than 25 years ago. We need a fast-spectrum testing infrastructure that is independent of Russia and China to support the deployment of U.S. advanced reactors. This capability was planned to be addressed by the Versatile Test Reactor (VTR) project for which Congress did not provide funding in fiscal year 2022. If confirmed, I look forward to working with Congress to ensure adequate funding for this important program.

Question 4: DOE has failed to meet its commitments as part of the Idaho Settlement Agreement. This has affected the enduring advanced nuclear energy mission envisioned for INL. What do you plan to do to decrease the liability related to legacy activities conducted by DOE?

Answer: The Department of Energy was compliant with the Idaho Settlement Agreement (ISA) until the end of 2012, when the Department was unable to treat the liquid sodium-bearing waste, and empty, clean, and close the tanks. The Department also fell out of compliance in 2018 by not meeting the milestone to have all transuranic waste removed from the State by the end of that year. Both of these non-compliance events were addressed in the November 2019 adjustment between the Department and the State of Idaho.

Looking ahead, the Department remains on track to complete the transfer of spent nuclear fuel from wet-to-dry storage by the December 31, 2023, ISA deadline, having completed the Advanced Test Reactor portion of this milestone in February 2022. The Department and our contractors at Idaho have been collaborating to support spent nuclear fuel disposition and calcined high-level waste.

If confirmed, I look forward to advancing this important work and working closely with officials in the State of Idaho and the Idaho Congressional Delegation to meet the Department's obligations under the 1995 Settlement Agreement.

Question 5: The U.S. nuclear industry is at a tipping point. We've seen premature closures at some reactors and we haven't built a new reactor in decades. However, there's been a lot of bipartisan support for nuclear energy in recent years and a renewed focus on building advanced reactors. The U.S. must show the world that we can develop and deploy new reactor technologies to achieve national goals.

a. Do you think ongoing efforts to develop advanced reactors is progressing at an appropriate speed, or do we need to be acting with more urgency?

Answer: The U.S. advanced reactor industry is making great progress in developing and demonstrating advanced reactor technologies to achieve our national goals. Through the Advanced Reactor Demonstration Program (ARDP), DOE is supporting two advanced reactor demonstrations that are on schedule to be licensed, built, and operated in the 2028 timeframe to meet goals established by Congress. Also, the Carbon Free Power Project (CFPP) is enabling the demonstration of light water small modular reactor (SMR) technology by 2029. In addition, several microreactor vendors are targeting demonstration of their technologies within this decade. Further, the ARDP Risk Reduction projects and the Advanced Reactor Concepts – 20 (ARC-20) projects are supporting activities to resolve technical, operational, and regulatory challenges to enable potential future demonstration of a diverse set of advanced reactor designs. Through the combination of these projects, the U.S. is well poised to demonstrate advanced reactors on a timeline that maximizes the impact of our domestic designs on future energy markets. If confirmed, I look forward to continuing to advance progress of the development, licensing, and construction of these important reactor technologies so they can help meet our climate change goals and advance U.S. geopolitical influence.

b. Is there more Congress or the administration should be doing to get these reactors built?

Answer: We are grateful for continued congressional support for advanced reactors in the form of funding for our advanced reactor programs and legislative actions that are supportive of advanced reactor development and demonstration. Critically, we must work together to eliminate dependence on foreign supplies of low enriched uranium (LEU), including high assay low enriched uranium (HALEU), to meet fuel requirements by accelerating the development of a domestic commercial supply chain.

In addition, future appropriations to support the clean energy transition through domestic nuclear reactor deployments could enable replacement of carbon intensive energy sources such as unabated fossil power applications. Supportive activities could include funding to communities for site assessments, consortium building, licensing, and construction.

Question 6: What is the DOE doing to address the Low Enriched Uranium and High Assay Low Enriched Uranium supply that is needed? Is that effort sufficient to meet our needs considering we desire to eliminate our dependency on Russian supplies?

Answer: DOE recognizes the critical need for high-assay low-enriched uranium (HALEU) for advanced reactors and advanced nuclear fuels. This was well documented in the DOE's supply chain reports (*America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition* and *Nuclear Energy – Supply Chain Deep Dive Assessment)* that were issued in February 2022. DOE

continues to advance the demonstration of new enrichment technology and recently completed a Request for Information for a HALEU Availability program. DOE is working with industry and stakeholders to assess low-enriched uranium fuel needs with the goal to eliminate the risks of dependency on Russian fuel services. If confirmed, I look forward to working with Congress as we address these critical issues as they are of critical importance to our current fleet of light water reactors as well as advanced reactor technologies in our pipeline.

Question 7: The DOE focus on commercialization of nuclear technologies has resulted in the erosion of the basic R&D efforts conducted at the national laboratories. INL is the DOE lead nuclear laboratory. What is the laboratory's role in maintaining core capabilities needed to support a robust R&D portfolio?

Answer: Idaho National Laboratory (INL) uses its world-leading facilities and expert teams to support DOE missions across 15 core capabilities. INL leverages these capabilities to deliver science and technology outcomes through five initiatives: nuclear reactor sustainment and deployment, integrated fuel cycle solutions, integrated energy systems, advanced design and manufacturing, and secure and resilient cyber-physical systems. INL has enhanced its existing and emerging core capabilities to expand INL's leadership and impact.

INL augmented its advanced computer science, visualization, and data; applied materials science and engineering; mechanical design and engineering, power systems and electrical engineering, and systems engineering and integration; and advancing nuclear engineering core capabilities. The Cybercore Integration Center (CIC) recently became fully operational to strengthen the cyber and information sciences core capability.

If confirmed, I look forward to working with INL, our congressional stakeholders, and other important stakeholders to ensure that INL continues to have the resources available to be a world class institution with a robust R&D portfolio.

Question 8: If confirmed, you will oversee the Department of Energy's Small Modular Reactor (SMR) which is a critically important program and will advance the deployment of the nation's first advanced nuclear reactor. As you know, this program has supported the development of the NuScale/UAMPS reactor which today is the only advanced reactor to have received NRC approval.

a. If confirmed, how do you envision advancing the objectives of this program to develop and demonstrate commercial scale SMRs, and how will you ensure that the success of the program continues?

Answer: Building on the efforts initiated through the Advanced Small Modular Reactor (SMR) Research, Development, and Demonstration (RD&D) program and the recent Advanced Reactor Demonstration (ARD) Funding Opportunity Announcement (FOA), the Department of Energy is enabling the United States nuclear energy industry to demonstrate these very important technologies by the end of the decade. However, significant risk remains in developing advanced SMR designs. If confirmed, I would use the Advanced SMR RD&D program to continue leveraging the Department's notable R&D expertise to facilitate the demonstration of a NuScale Power SMR by the late 2020s. This is expected to benefit other domestic reactor developers by resolving technical and licensing issues

generic to SMR technologies. These efforts, along with those performed through the ARD FOA, will work to promote the acceleration of SMR technologies into the domestic and international markets, and are essential to meeting our climate targets.

Question 9: Siting a Small Modular Reactor (SMR) at a retiring coal plant can help equitably transition and repower coal communities. For example, NuScale Power has projected the construction of its SMR would support 1,200 construction jobs over three years, 270 operation jobs for 60 years, and 677 induced/indirect permanent jobs for 60 years.

a. In your view, what opportunities do advanced nuclear technologies like SMRs offer to states that have coal plants?

Answer: SMRs offer electric generation outputs that match fossil plant outputs quite closely. The existing infrastructure at fossil-fueled plant sites such as switch yards, connections to the grid, rail access, and available water are assets that may make these sites economically attractive for new nuclear plants, especially advanced reactor designs with smaller footprints and modular construction flexibility. Additionally, the skill base of current coal plants may be readily transferable to the workforce needed to support these new reactors, particularly since several designs have distinct nuclear island and conventional island layouts and are evaluating new operations structures. The ability to utilize these transferable skills from the local workforce could significantly lessen the impact of job losses in a local community. Maximizing the use of existing assets and workforce skills could provide a significant financial and economic benefit to the success of repurposing a site and provide states reliant on fossil fuel-based plants with affordable electricity and/or process heat to the surrounding area. If confirmed, assisting states with siting SMRs and other advanced nuclear technologies will be one of my highest priorities for the benefits they will provide to our communities and the nation's clean energy goals.

b. What role does the nuclear sector, and particularly SMRs, have in the broader effort to transition to clean energy sources?

Answer: The U.S. nuclear fleet already contributes significantly to U.S. clean electricity generation in that the current fleet accounts for over 50% of the clean energy generated in the United States. Advanced nuclear technologies, including SMRs, can further assist the clean energy transition by providing transitional opportunities from coal generating facilities as these plants reach retirement and can support alternative uses beyond electricity including process heat for industrial applications, hydrogen generation, and water desalination further reaching our clean energy targets.

c. If confirmed, what steps would you take to speed the deployment of this technology?

Answer: The Department of Energy is working aggressively to accelerate the timeline for the domestic demonstration of SMR technologies and has three active SMR demonstration projects underway in partnership with NuScale/UAMPS, Terrapower, and X-Energy. Additionally, the Office of Nuclear Energy can speed deployment by continuing to support research and development with universities, national laboratories, and industrial partners toward additional innovation across myriad reactor classes. If confirmed, I will work closely with the Office of Clean Energy Demonstrations and the Nuclear

Regulatory Commission to place a continued priority on these projects. In addition, I will work closely with my colleagues in the Department of Energy and in the interagency to advance U.S. nuclear technologies globally to further bolster our domestic energy security and advance our national clean energy objectives.

Question 10: Was your office consulted on the decision to remove uranium from the USGS Critical Minerals List? If so, what input did you offer?

Answer: I understand this was a legal decision, and not a technical or policy decision, made independently from the Office of Nuclear Energy. *America's Strategy to Secure the Supply Chain for a Robust Clean Energy Transition* (February 2022) notes that DOE will "Consult with stakeholders to create a process under which DOE can specifically recommend or establish critical materials that are vital for DOE's mission areas." The report includes uranium as an example of a potential material of concern. If confirmed, I will advocate for the importance of uranium for energy production, medical isotope production, space applications, and defense purposes, including military armor.

Questions from Senator John Hoeven

Question 1: Considering the recent extreme weather events that placed stress on the grid, what role do you believe our existing nuclear fleet plays in maintaining access to reliable, always-available baseload power?

Answer: Our existing nuclear fleet, which provides about 20% of U.S. electricity and operates with 92% availability, higher than any other generation source, is an essential component of our nation's firm, baseload power. When extreme weather events challenge the stability of the electric grid and broad access to electricity, nuclear reactors are frequently the most robust clean energy technology available that contribute to grid reliability under the most challenging conditions.

Question 2: What improvements to the licensing process do you believe could appropriately expedite the deployment of advanced reactor technologies?

Answer: I believe that implementation of the *Nuclear Energy Innovation and Modernization Act* (Public Law 115-439) and the *Nuclear Energy Innovation Capabilities Act of 2017* (Public Law 115-248) provides the foundation towards achieving a risk-informed licensing pathway to support the deployment of advanced reactors by the end of the decade. If confirmed, I will support DOE's efforts to constructively engage with reactor license applicants and the Nuclear Regulatory Commission toward relevant research and development, process improvements, clear communications, and timely resolution of safety issues.

Question 3: According to the Energy Information Administration, in 2019, the vast majority of nuclear fuel was imported into the United States, including 91 percent of fuel assemblies and 88 percent of tri-uranium octoxide (U3O8). If confirmed, will you work with us to strengthen our domestic fuel supply capabilities and ensure we have the materials we need well into the future?

Answer: U3O8, also known as yellowcake, is the result of the first two steps of the nuclear fuel cycle: mining and milling. U_3O_8 is produced in the United States by existing mining and milling operations. For improved energy security, we should bolster the supply of our nuclear fuel and fuel services in general. To reduce our dependence on imports, domestic mining and milling operations, conversion facilities, and enrichment services may need incentives to expand their capacity. If confirmed, I commit to working with you, this Committee, and other critical stakeholders to strengthen the security of this supply and increase our domestic capabilities to support the front end of the nuclear fuel cycle.

Question 4: As Russia and China continue significant investments in new nuclear projects, if confirmed, what steps would you take to ensure the U.S. reasserts its global influence in the nuclear sector?

Answer: Immediate investments in domestic research, development, demonstration, and deployment are necessary for the United States to regain its global leadership. At the same time, we must continue and increase our efforts to expand our bilateral and global partnerships to advocate for U.S. nuclear technologies. To advocate for U.S. companies in global markets, these efforts will require expanded international cooperation activities and broader options for international project financing.

If confirmed, I will prioritize our international engagement to build relationships with countries embarking on a nuclear power project or expanding an existing nuclear power program so U.S. innovators will have growing opportunities for exports of their technologies. This includes making sure that DOE maintains a leading role in providing U.S. technical assistance, expertise, and infrastructure development support to partner countries to help them prepare to deploy nuclear technologies. This type of outreach is critical to compete against similar efforts by Russia and China to build partnerships with countries embarking on a nuclear power program.

I will also work to accelerate our advocacy for additional financing support for international nuclear projects, including expanded authorities for U.S. export credit institutions and agencies, including DOE, which provide a range of support for project development and execution. A competitive and comprehensive financing package can be the deciding factor for a nation that is deciding on competing nuclear technologies. If confirmed, I will continue to advocate for appropriate budget support for the Office of Nuclear Energy's International Nuclear Policy and Cooperation activities which help build critical relationships with countries that are seeking to implement U.S. nuclear technology. In addition, I will work with interagency partners to encourage that additional funding options be made available to support the expansion of U.S. nuclear technologies globally. To that end, I would like to encourage the interagency to expand the United States Trade and Development Agency's greater involvement in supporting U.S. nuclear energy technology abroad and to advance additional opportunities for the Export-Import Bank of the United States and the U.S. International Development Finance Corporation, among other entities, to engage and support nations seeking to implement U.S. nuclear technologies.

In addition, I will also deepen our relationships with like-minded partner countries, who can bring equity investment and technical expertise to projects to create more opportunities for bilateral and multilateral cooperation in third country markets. Finally, with our interagency partners, I will advocate for policies that facilitate fair trade and transparency in procurement processes in potential markets.

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Questions for the Record Submitted to Dr. Kathryn Huff

Question from Senator Angus S. King, Jr.

Question: Dr. Huff, I applaud the Department's efforts to reinvigorate a consent-based strategy for the development of consolidated interim storage (CIS) facilities. As you know, my own state is host to a plant that has been permanently shut down since 1996. The site has been completely decommissioned but for an Independent Spent Fuel Storage Installation which currently holds 64 dual purpose storage and transportation canisters with spent nuclear fuel and greater-than-class-c waste. But for the government's partial breach of contract the site would have been made available for alternative use by 2008.

While supportive of CIS efforts, I note that this is but one of several recommendations for changes to the Nation's approach to the management of this material that have been made by a number of well-respected organizations, including the Blue Ribbon Commission on America's Nuclear Future (BRC). In addition to its recommendation for the development of a consent-based process for CIS facilities, the report strongly urged changes that go to fundamental questions of governance and funding, citing the challenges of maintaining consistency of approach for a multi-generational program. I would appreciate your general thoughts on these and other BRC recommendations and am curious as to whether the Department is looking at them with a view to developing comprehensive amendments to the Nuclear Waste Policy Act for Congressional consideration?

Answer: The Blue Ribbon Commission on America's Nuclear Future (BRC) recommended several strategies for breaking the stalemate on management of the nation's spent nuclear fuel and high-level radioactive waste. DOE is committed to using a consent-based siting process, as recommended by the BRC and previously supported by the Department's work in this area and demonstrated to be successful in other countries. We are currently focused on using a consent-based siting process specifically for federal interim storage facilities, as appropriated and directed by Congress. We expect this work will inform and support future work on one or more permanent disposal facilities. DOE also continues its efforts to prepare for the large-scale transport of spent nuclear fuel and high-level radioactive waste and performs R&D in support of continued innovation in nuclear energy technology.

As you note, to fully implement a sustainable waste management system, the *Nuclear Waste Policy Act* will need to be amended. While DOE can support some activities on federal interim storage under current authority, new legislation would be required to build and operate a federal interim storage facility. New legislation would also be required to build and operate a permanent geologic repository other than Yucca Mountain.

DOE is currently focused on activities we can pursue under existing authority. The Department is prepared to engage in constructive conversations with this committee, and others, on specific changes that will be required to advance other waste solutions not supported under current law. If confirmed, I look forward to working with you and this committee to develop policy suggestions that will enable the Office of Nuclear Energy to advance this important work.

Question from Senator John W. Hickenlooper

Question: In addition to nuclear being a source of emissions-free energy, it also has the potential to provide power for non-electric applications. As part of the Energy Act of 2020, the Nuclear Integrated Energy Systems

Research, Development, Demonstration, and Commercial Application Program was authorized to this end. How will you coordinate with the Department of Energy to implement this program and promote all possible uses of nuclear energy?

Answer: The goals of the Nuclear Integrated Energy Systems Research, Development, Demonstration, and Commercial Application Program are being achieved through NE's coordination on crosscutting R&D initiatives with the Office of Energy Efficiency and Renewable Energy (EERE), Office of Fossil Energy and Carbon Management (FECM), Office of Clean Energy Demonstration (OCED), and the Advanced Research Projects Agency-Energy (ARPA-E). Coordination with these Offices will support expanding the use of clean, reliable nuclear energy for non-electric applications such as the production of hydrogen, fuels, chemicals and materials, and thermal energy storage and ensure it is a solution for our clean energy future.

Questions from Senator Roger Marshall

Questions: Can you please provide a list of the problems that you believe has gotten us to where we are as a nation in terms of our diminishing nuclear capabilities? What rules, regulations, or laws have gotten us to this point?

Answer: Most nuclear power plants that retired prematurely were economically uncompetitive in electricity markets where nuclear energy was not valued for the zero-emission, baseload energy it provides. On the international front, many countries are looking at nuclear energy to meet their growing energy needs and are interested in technologies developed in the United States. However, U.S. private sector companies compete against state-owned enterprises (SOEs) that are able to provide products and services that our companies cannot provide. For example, these SOEs can offer equity financing that the United States does not, diminishing market opportunities overseas. In addition, some SOE's offer to take back spent fuel produced in the reactors they sell. Together, these economic and competitive challenges that stem from policies external to the U.S. industry contributed to declining markets at home and overseas that do not support our capabilities.

If confirmed, I will support a whole-of-government approach, working with my colleagues across relevant agencies and with Congress, to empower the U.S. nuclear industry to develop, demonstrate, deploy, and export American-made nuclear technology.

Questions from Senator Steve Daines

Question 1: Dr. Huff, how can DOE better work with local communities and interested parties to develop new nuclear energy opportunities?

Answer: Technical assistance to states and local communities pursuing advanced nuclear technologies is essential for successful deployment. For example, the Office of Nuclear Energy's National Reactor Innovation Center (NRIC) developed an integrated siting tool to help states identify and compare possible locations for advanced nuclear facilities based on factors related to socioeconomics, proximity, and safety.

NRIC will provide support to states in using this siting tool and to develop nuclear energy roadmaps. In addition, future appropriations to support the clean energy transition through domestic nuclear reactor deployments could enable replacement of carbon intensive energy sources such as unabated fossil power applications. Supportive activities could include funding to communities for site assessments, consortium building, licensing, and construction. If confirmed, I look forward to continuing to seek out opportunities for the Office of Nuclear Energy to assist states as they consider nuclear energy opportunities.

Question 2: Dr. Huff, if confirmed, will you commit to working with local communities and interested parties in Montana to facilitate the development of nuclear energy?

Answer: Yes, I believe community and stakeholder engagement is critical to nuclear energy's success, and I look forward to that work.

Question 3: Dr. Huff, how can DOE better utilize recycling to both reduce spent fuel storage and increase supply for domestic reactors?

Answer: Commercial deployment of recycling technologies are currently challenging economically, but recycling would reduce the need for new fresh fuel to be mined and enriched, reduce the volume of waste that must be placed in a geologic repository, and reduce the length of time that the repository remains a radiological hazard. Additionally, DOE is the owner of a variety of different used or irradiated fuels in storage that require recycle or processing to render them chemically stable and therefore acceptable for disposal in a long-term waste repository. In their current form, these fuels may not be acceptable for long term storage. DOE should continue to support nuclear fuel cycle research, development, and demonstration (RD&D) to assess options as technologies and economics evolve. That RD&D focuses on developing advanced fuel cycle technologies and addressing fuel fabrication and materials separation and recovery challenges that present technical risks and uncertainties. Resolving the technical challenges and technical risks improves the economics of recycling.

Question 4: Dr. Huff, are there currently any roadblocks or challenges that prevent DOE from working with the private sector to recycle and reuse nuclear fuel?

Answer: Because of the challenging economics of recycling technologies, continued RD&D is necessary to reduce the technical risks and uncertainties that contribute to those economic challenges. Additionally, institutional measures to counter proliferation and security threats are required by the U.S. Nuclear Regulatory Commission regardless of the nuclear fuel cycle technology chosen. Nonproliferation analyses and international experience have demonstrated that existing safeguard regimes and advanced safeguards-by-design approaches can be applied effectively to a nuclear fuel recycling facility, but such measures may be cost-prohibitive.

Question 5: Dr. Huff, what do you believe is the biggest hurdle to the wide spread commercialization of small reactor or advanced nuclear power?

Answer: First-of-a-kind technical, financial, and licensing risks must be overcome to enable broad commercial deployment of advanced nuclear reactors, including small modular reactors. Building on the

efforts initiated through the Advanced Small Modular Reactor (SMR) Research, Development, and Demonstration (RD&D) program and the recent Advanced Reactor Demonstration (ARD) Funding Opportunity Announcement (FOA), the Department of Energy is enabling the United States nuclear energy industry to demonstrate these very important technologies by the end of the decade. However, significant risk remains in developing advanced SMR designs. If confirmed, I would use the Advanced SMR RD&D program to continue leveraging the Department's notable R&D expertise to facilitate the demonstration of a NuScale Power SMR by the late 2020s. This is expected to benefit other domestic reactor developers by resolving technical and licensing issues generic to SMR technologies. These efforts, along with those performed through the ARD FOA, will work to promote the acceleration of SMR technologies into the domestic and international markets, and are essential to meeting our climate targets.

Question 6: Dr. Huff, the development of traditional nuclear energy facilities can take well over a decade. What are actions the administration and Congress can take to expedite the development of traditional nuclear energy?

Answer: The administration and Congress can support the clean energy transition by enabling domestic nuclear reactor deployments that replace carbon-intensive energy sources such as unabated fossil power applications. Supportive activities could include funding to communities for site assessments, consortium building, licensing, and construction. Such future nuclear reactor construction projects can benefit from lessons learned in recent builds. For example, to build more traditional nuclear power plants, it will be necessary to grow our nation's skilled workforce. The United States can and should lead by example through domestic investments that deploy nuclear reactors both domestically and abroad. A strong domestic nuclear industry underpins our credibility globally and can enable the United States to engage effectively with countries that are interested in deploying both advanced and traditional U.S. reactor designs for both electric and non-electric applications. These domestic and international deployments can be encouraged by directed investments, including leveraging the purchasing power of the federal government as an energy consumer. Additionally, the Office of Nuclear Energy can speed deployment by continuing to support research and development with universities, national laboratories, and industrial partners toward additional innovation across myriad reactor classes. If confirmed, I will work closely with the Office of Clean Energy Demonstrations and the Nuclear Regulatory Commission to place a continued priority on such projects. In addition, I will work closely with my colleagues in the Department of Energy and in the interagency to advance U.S. nuclear technologies in both domestic and international markets in support of energy security for the U.S. and our allies. Doing so is critical to the U.S. nuclear industry and our shared national security.

Question 7: Dr. Huff, if confirmed, what actions will you take to advance the mission of the Office of Nuclear Energy?

Answer: If confirmed, I will take many direct actions to advance the Office of Nuclear Energy mission. My highest priorities will be to keep our 93 existing U.S. nuclear reactors operating, to build advanced reactors both domestically and abroad, and to make progress on responsible management of our nation's spent nuclear fuel. To support these endeavors, it will additionally be necessary to our domestic supply chains, develop a robust workforce, and maximize opportunities to leverage clean, firm power in both

electric and non-electric applications. Critically, I will commit to working together with Congress to eliminate dependence on foreign supplies of low enriched uranium (LEU), including high assay low enriched uranium (HALEU), to meet fuel requirements by accelerating the development of a domestic commercial supply chain. Additionally, if confirmed, I will prioritize our international engagement to build relationships with countries embarking on nuclear power projects or expanding existing nuclear power programs so U.S. innovators will have growing opportunities for exports of their technologies. This includes making sure that DOE maintains a leading role in providing U.S. technical assistance, expertise, and infrastructure development support to partner countries to help them prepare to deploy nuclear technologies.

Question 8: Dr. Huff, over the last couple decades we have seen countries like Germany, and even states like California, systematically eliminate nuclear energy from their electricity portfolio. This is despite the fact that nuclear energy provides safe, reliable, carbon free, and importantly, baseload electricity. How can the Office of Nuclear Energy better work to reverse this trend and promote the development of more nuclear energy in the United States?

Answer: There is no question that nuclear energy can and should play a key role in meeting our nation's clean energy goals. The U.S. nuclear fleet already contributes significantly to U.S. clean electricity generation, accounting for over 50% of the clean energy generated in the United States. By providing clean, firm power with the ability to provide heat as well as electricity, nuclear reactors are particularly well suited to replace retiring unabated fossil plants and to contribute to combined heat and power applications. Accordingly, an expansion of nuclear energy both at home and abroad can assist our global clean energy transition by complementing other clean energy sources. The Office of Nuclear Energy can work with communities interested in transitioning to nuclear energy as coal generating facilities in their regions reach retirement. Through continued research, development, demonstration, and deployment initiatives, the Office of Nuclear Energy can also support alternative uses beyond electricity including process heat for industrial applications, hydrogen generation, and water desalination further reaching our clean energy targets.

Question 9: Dr. Huff, uranium production in the United States has dramatically decreased in recent years and imports from foreign countries, including Russia and Kazakhstan, have increased. What do you think needs to be done to increase domestic production of uranium to ensure a stable supply chain for nuclear energy?

Answer: For improved energy security, we should bolster the supply of our nuclear fuel and fuel services in general. To reduce our dependence on imports, domestic mining and milling operations, conversion facilities, and enrichment services may need incentives to expand their capacity.

Question 10: Dr. Huff, if confirmed, will you commit to working with other federal agencies to facilitate and promote the development of domestic mining and production of nuclear fuel?

Answer: I commit to working with you, this Committee, and other critical stakeholders to strengthen the security of this supply and increase our domestic capabilities to support the front end of the nuclear fuel cycle.