

Executive Summary: Comprehensive Fuel Cycle Research Study

Presented to the Savannah River Site Community Reuse
Organization

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The content of this Study reflects the independent views of Dickstein Shapiro LLP, based on information available from a variety of sources. The Study is not intended to reflect the views of the Savannah River Site Community Reuse Organization.

I. Executive Summary

The purpose of this report is to provide the five-county region (“Region”) represented by the Savannah River Site Community Reuse Organization (“SRSCRO”) with the information necessary to determine how and/or what resources the Region has available to offer a national solution to the management of the back-end of the nuclear fuel cycle and what new fuel cycle facilities might be needed.

A. The Region

The Region is comprised of Aiken, Allendale and Barnwell counties in South Carolina and Richmond and Columbia counties in Georgia. The SRSCRO is a non-profit organization representing the Region. The mission of the SRSCRO is to facilitate economic development opportunities in the Region by taking advantage of the technology, capabilities and missions at the Department of Energy (“DOE”) Savannah River Site (“SRS”) and seeking to expand upon them.

President Obama’s Blue Ribbon Commission on America’s Nuclear Future (“Commission”) recommended a new strategy for siting facilities associated with the back-end of the nuclear fuel cycle that centers on a “new consent-based approach.” In June 2012, SRSCRO, on behalf of the Region, commissioned this comprehensive Study to inform the five-county region around SRS on the potential benefits of establishing new fuel cycle facilities.

B. Past Siting Efforts

There have been several successful and unsuccessful efforts to site a disposal facility for nuclear waste. These efforts were carefully considered by the Commission in the preparation of its Final Report.

In the United States, the Waste Isolation Pilot Plant (“WIPP”) located in southeast New Mexico is a success story and a potential model to be followed. WIPP benefited from an increasingly supportive host community, and a state that was willing to participate in discussions with the host community and DOE. Internationally, Sweden and Finland represent the best examples of successful siting efforts for nuclear waste facilities. Both efforts had the benefit of supportive host communities.

The Yucca Mountain project stands in stark contrast to the successful efforts of the WIPP, Finland and Sweden. While there was and still are willing and supportive host communities in Nevada for a nuclear waste repository at Yucca Mountain, key state leaders and the Nevada Congressional delegation are vehemently opposed to the repository at Yucca Mountain. In late 2009, the

Obama Administration withdrew the license application from the Nuclear Regulatory Commission (“NRC”) and terminated the project (a decision still under review in the federal courts).

Community support is vital to the success of any effort to develop and establish fuel cycle facilities. All elements in the community must be assured that they will be involved and their voices heard. Community involvement should be focused on addressing the risks, both perceived real, associated with fuel cycle activities – including the risks of transportation, radioactive material release, and possible acts of terrorism. Conversely, the community needs to fully evaluate and understand the substantial benefits that the community will realize, primarily in the form of new skilled jobs and incremental economic revenues. Some of the communities in the Region have the advantage of having engaged in prior advocacy efforts successfully.

C. Research, Development and Demonstration (“RD&D”)

The ability, and desire, of the Region to contribute to nuclear RD&D and to the advancement of the nuclear industry is undisputed.

The continued use and operation of H-Canyon at the SRS are keys to fuel cycle RD&D program. H-Canyon has a unique niche in the United States and should be maintained and utilized as a viable facility.

Post-irradiation examination of “aged” spent nuclear fuel (“SNF”)¹ is a logical component of fuel cycle RD&D. As highlighted by many, including the Commission, there is a need to research the effects of very long term storage on SNF to ensure that it can be safely stored and subsequently safely transported. This research could be done in a small hot-cell facility located at a consolidated storage site.

H-Canyon has the capability to demonstrate many different and alternative separations processes. The ability to verify/demonstrate flowsheets² for advanced separation processes is beneficial to the nuclear industry.

Additional areas of R&D are contained in the DOE’s Office of Nuclear Energy R&D Roadmap from April 2010. Of the areas identified in the Roadmap, there

¹ SNF, which is principally generated by civilian nuclear power, is sometime referred to as “used nuclear fuel”

² A flowsheet graphically represents the processes, variables and equipment used in a particular advanced separations scheme and includes material balances where appropriate.

are several that the Region has an existing workforce and infrastructure to support as part of a broader RD&D program. These areas include: 1) develop technologies and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors; (2) develop improvements in the affordability of new reactors to enable nuclear energy to help meet energy security and climate change goals; (3) develop sustainable nuclear fuel cycles; and (4) better understand and minimize the risks of nuclear proliferation and terrorism.

D. Storage

This Study assumes that bringing fuel cycle facilities and RD&D to the Region would include consolidated storage as an initial step.

Consolidated storage would start with the SNF currently in South Carolina and Georgia and, if successful, could expand to include the remainder of the 20,000 MT of SNF in the southeastern U.S. Subsequent phases – if pursued – would broaden the effort to include Virginia and the northeastern states, which together have slightly more than 20,000 MT of SNF. There could also be opportunities to work with DOE to meet its needs for dry storage of various fuels and vitrified defense high-level waste currently in storage at the SRS.

There are several potential locations for fuel cycle facilities – including RD&D facilities and consolidated storage facilities – in the Region. When selecting a site or sites for consolidated storage, the regulatory requirements associated with dry cask must be considered, as well as available infrastructure such as utilities and transportation.

E. Reprocessing

Given the SRS's long history with and involvement in reprocessing, establishing a reprocessing capability in the Region should be well accepted by the local communities. Clearly – as this Study's economic model shows – there are substantial economic benefits – jobs, tax revenues and additional compensation -- to siting a reprocessing facility in the Region.

However, there are hurdles that will need to be overcome in order to establish a SNF reprocessing facility. It is generally acknowledged that the use of the PUREX (plutonium-uranium extraction) process to reprocess spent nuclear fuel in the United States would not be acceptable. PUREX is considered by many non-proliferation proponents to be a substantial proliferation risk because it separates pure plutonium from the uranium and fission products. There are several other

separation processes that could be used that address that concern by not separating pure plutonium.

Most of the waste from reprocessing SNF would be vitrified – turned into glass logs – very similar to the glass logs currently being produced by SRS.

F. Regulatory/Licensing

The licensing and regulation of the construction and operations of fuel cycle facilities would be the responsibility of the NRC. However, it is expected that the South Carolina Department of Health and Environmental Control – representing the host state – would have considerable involvement in monitoring and oversight of the fuel cycle program.

There are three key phases in the licensing and construction timeline for any fuel cycle facility. The “Pre-license Application Phase,” the “License Application Review Phase,” and the “Construction and Pre-operations Phase.” As an example, for a consolidated storage facility, it is anticipated that from the pre-license phase to the end of the construction and operations phase would take approximately six years.

As required by law, NRC provides ongoing oversight and regulation of nuclear facilities once they are constructed and placed into service.

G. Community Support for Fuel Cycle Facilities

The development of local community support for fuel cycle facilities – like consolidated storage or reprocessing—involves several key aspects that must be carefully considered. Important to a local community consensus is access to trustworthy information regarding the risks and benefits of potential activities. The entire local community must be given the opportunity to be involved in reaching consensus regarding the establishment of fuel cycle facilities. Community support and the process of consensus building must begin with elected community officials who are well versed in the subject matter and can authoritatively and meaningfully discuss all aspects of the plan. Getting the community involved in the preliminary planning stages of any effort to establish fuel cycle facilities is important. If the local community concludes that the risk/reward ratio is acceptable, the local elected officials must capture that conclusion, and ensure that the appropriate state agencies and officials understand the local community’s decision. As noted before, some communities in the Region have demonstrated a good grasp of these advocacy skills in prior circumstances.

H. Engagement with State, Local Governments, State Regulatory Agencies and Regulatory Utility Commissions

The state government would likely make the final decision regarding siting fuel cycle facilities based not only on the recommendation of local government, but also input from the state's economic, environmental and nuclear regulatory agencies.

Involvement and participation of state, local governments and regulatory agencies is vital to the success of this consensus building effort. The proposed strategy builds on local support, working up to local elected officials and community leaders, and finally engaging the support of state elected officials in both South Carolina and Georgia.

Regulatory agencies in South Carolina and Georgia should be consulted throughout the consensus-building process. It is also important to build a consensus among state regulatory utility commissions, and the National Association of Regulatory Utility Commissioners is the ideal vehicle for that effort.

I. Federal Legislation

Comprehensive legislation is required to implement the recommendations of the Commission. This federal legislation would create an independent corporation with assured access to adequate funding (principally by redirection of the existing 1 mil/ kWh nuclear waste fee), and specify a process by which potential host communities would apply to the independent corporation to be considered to host fuel cycle facilities, consolidated storage and/or disposal facilities. The independent corporation would also have the authority to reprocess SNF if it was determined to be beneficial to managing the back-end of the fuel cycle.

J. Economic Opportunities

The economic model used in the preparation of this Study allows for the modeling of any number of scenarios. The Study looks at economic impacts for three levels of consolidated storage, each with and without reprocessing. There are economic benefits associated with consolidated storage on a standalone basis, but the economic benefits of incorporating reprocessing into the equation are dramatically more significant, and are independent of the size of the consolidated storage. The model conservatively estimates that a small reprocessing facility (800 MT/year) with a small consolidated storage facility (20,000 MT) would provide the following benefits to the local economy (after construction and commencement of operations): incremental local employment of 1,698 jobs;

incremental local economic output of \$239M; and incremental state and local tax revenue of \$12M. Direct compensation to a state or local community for hosting fuel cycle facilities would be an additional economic benefit.

K. Recommendations/Next Steps for the Region

Given the substantial projected benefits to the Region from siting, constructing, and operating fuel cycle facilities, the Region should move forward in establishing fuel cycle facilities in the Region. The Region should develop a local comprehensive proposal for managing the back-end of the fuel cycle and prepare it for submittal. Initial efforts should be focused in several areas. These areas include, but are not limited to:

- 1) Identify the roles and responsibilities of the participating organizations within the Region.
- 2) Develop a draft detailed plan and timeline to implement the Region's decision regarding fuel cycle facilities.
- 3) Begin broad community discussion and gain broad community support. Efforts in this area should begin as soon as possible to ensure sufficient time is available to discuss plans and involve the communities.
- 4) Begin engaging with State and Regional officials. Engagement of key officials in Georgia and South Carolina and local elected officials is essential to inform them of the Region's plans and, as appropriate, involved them in the planning.
- 5) Support the preparation of a comprehensive legislative proposal to implement key recommendations of the Commission, and solicit the support of state delegations for the legislation.
- 6) Establish a working group within the Region to address siting of fuel cycle facilities.
- 7) Develop relationships with strategic industrial partners.
- 8) Work with the Savannah River National Laboratory ("SRNL") to (a) identify and prioritize needed research and development activities and (b) identify workforce needs that can be part of a Region led initiative.