A New Consolidated Storage Facility for Used Nuclear Fuel in Andrews County, Texas-16418

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ASTRACT

On February 6, 2015, Waste Control Specialists LLC (WCS) announced its plan to file a license application with the U.S. Nuclear Regulatory Commission (NRC) to construct and operate a Consolidated Interim Storage Facility (CISF). Upon issuance of the license, WCS would be authorized to receive Used Nuclear Fuel (UNF) and reactor related Greater Than Class C Low Level Radioactive Waste (referred hence forth as UNF) at the CISF in late 2020.

WCS based its decision to license a CISF based on strong support from the State of Texas and the local community's willingness to host such a facility in Andrews County, Texas. WCS' decision to license a CISF in a supportive community is consistent with the consent-based licensing approach recommended by the Blue Ribbon Commission on America's Nuclear Future. WCS intends to use existing technology developed by AREVA and NAC International that have already been approved by the NRC to transport UNF from existing commercial nuclear reactors across the nation for interim storage at its 14,000 acre site in Andrew County, Texas. In the pre-application licensing meetings held with the NRC, WCS underscored that UNF would be removed first from the shutdown decommissioned reactor sites and transported to the CISF.

Approximately eighty percent of the UNF currently residing at the shutdown decommissioned reactor sites can be safely placed into the storage systems developed by AREVA and NAC International that are currently licensed by the NRC. WCS plans to store up to 40,000 Metric Tons of Heavy Metal (MTHM) at the CISF that would be constructed in eight phases over the next 20 years. WCS intends to submit its license application for the CISF to the NRC by April 2016.

The license application will request authorization to possess up to 5,000 MTHM of UNF for Phase One which can accommodate storing the fuel located at over ten shutdown decommissioned reactor sites. As discussed with the NRC, the license application will be developed following NRC regulatory guidance to comply with the technical requirements specified in Title 10 of the Code of Federal Regulations (CFR) Part 72, *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste*. In addition, to filing the license application, WCS is also seeking legislative changes to the Nuclear Waste Policy Act of 1982 requiring the U.S. Department of Energy (DOE) to take title of the UNF at the commercial nuclear reactor sites. Under such legislative changes, the DOE would also be responsible for the transport of UNF to the CISF. In

addition to preparing the CISF License Application, WCS and its partners AREVA and NAC International are prepared to work with DOE to facilitate the development of the UNF transportation infrastructure in the timeframe needed to support CISF operations.

The WCS site and technical approach give it several advantages which uniquely position it to become the first successful commercial CISF in the U.S. These advantages include: broad consent-based support at the local, state, and Congressional level; an operating waste disposal site with an existing transportation infrastructure; and the use of already licensed systems to address 80% of the UNF currently in dry storage at shutdown sites in the U.S. WCS firmly believes this initiative will provide an economically viable option for consolidated interim storage of UNF until a permanent geologic repository becomes available.

INTRODUCTION

The U.S. Department of Energy (DOE) was required to take title of Used Nuclear Fuel (UNF) generated from commercial nuclear power reactors across the country more than 15 years ago pursuant to the Nuclear Waste Policy Act of 1982 (NWPA) [1]. Currently, DOE has not fulfilled its legal responsibilities and UNF is scattered across the country at 75 operating and decommissioned reactor sites in 33 states. DOE is expected to pay over $27 billion of tax payer funds for failing to meet its legal obligations by 2021. To remedy this situation, DOE is taking a hard look at actions needed to site a permanent repository and a Consolidated Interim Storage Facility (CISF) to manage UNF generated over the past several decades following many of the recommendations from President Barak Obama's Blue Ribbon Commission on America's Nuclear Future (BRC) [2]

On February 6, 2015, Waste Control Specialists LLC (WCS) filed a "letter of intent" to submit a license application for constructing and operating a CISF in Andrews County, Texas with the U.S. Nuclear Regulatory Commission (NRC) in April 2016 [3]. WCS' decision to move forward with this important project was predicated on the strong community support provided by the leadership in unanimously passing a county commissioner's resolution for siting a CISF in Andrews County [4]. It follows on the heals of the strong support provided by the local and regional communities in the licensing and operations of WCS' Low-Level Radioactive Waste Disposal Facility—the first such disposal facility opened since Congress enacted the Low-Level Radioactive Waste Policy Act of 1980 [5], as amended in 1985.

Since the filing its letter of intent, WCS has held five pre-application meetings with the NRC to discuss the technical approach planned to prepare specific topical areas of the license application. These topical areas included the Safety Analysis Report (SAR), Aging Management Programs, receipt inspections of UNF, the Environmental Report (ER), and various topics related to physical security. These pre-application

meetings have provided insights regarding the expected technical content needed in the license application. Accordingly, the license application that will be filed will be of high quality as needed to support its issuance as scheduled in April 2019.

LEGISLATIVE CHANGES NEEDED

Pursuant to the NWPA, electric utilities have paid fees into the Nuclear Waste Fund (NWF) for the expressed purpose of constructing a geologic repository for disposal of up to 70,000 Metric Tons of UNF over the past several decades. Fees collected to date total over $30 billion. Some members of the U.S. Congress have supported changes to the NWPA, consistent with the recommendations from the BRC, which would allow theses fees to be used to construct and operate and CISF given the difficulties to open the repository that would be located at Yucca Mountain in Nye County, Nevada.

The Senate is more in favor of consolidated storage of UNF than attempting to open the Yucca Mountain repository. In May, 2015, the Senate Appropriations Committee passed legislation, as part of the 2016 Energy and Water Development Appropriations bill, for providing funds that would authorize a pilot program that would allow privately run facilities to construct and operate for the consolidated storage of used nuclear fuel [6]. However, this legislation did not include funding to support continuing the licensing review for the repository at Yucca Mountain by the NRC.

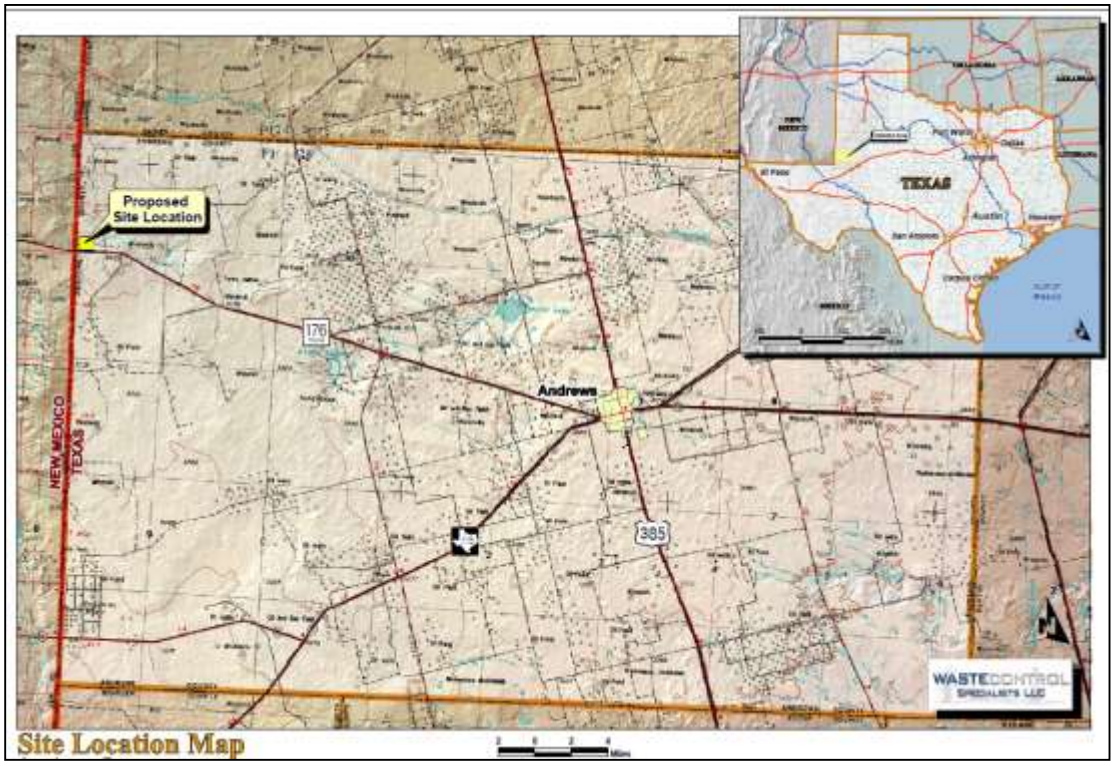
However, others in the House of Representatives believe that completing the licensing review for Yucca Mountain is the law of the land and proposed an additional $175 million that would allow the NRC to proceed with completing its review of the licensing application [7]. However, in September of last year, Congressman Mike Conaway (R-TX) filed the Interim Consolidated Storage Act of 2015 [8], which would amend the existing NWPA allowing the DOE to take title to the nuclear waste and contract with private companies to store the waste.

WCS believes that consolidated interim storage complements and does not compete with the opening of Yucca Mountain. It is widely acknowledged that the Yucca Mountain repository will not be opened until as late as 2048. As such, WCS believes that Congress should proceed with providing funds for both a pilot program for consolidated storage of UNF and opening the repository at Yucca Mountain. Such an approach makes more sense because UNF could be consolidated from the shutdown decommissioned reactors and placed into interim storage and one day be repackaged in a configuration that is suitable for disposal at a repository.

INITIAL LICENSE APPLICATION

WCS recognized the need early on to team with industry experts, AREVA and NAC International, to license the CISF. Under this teaming agreement, WCS will be capable of both transporting and placing UNF in transportation and storage systems already in service and licensed by the NRC pursuant to Title 10 of the Code of Federal Regulations (CFR) Parts 71 and 72, respectively. While these transportation casks and storage systems have already been licensed, WCS will be required to demonstrate that the site characteristics and design of its proposed CISF comply with the applicable regulatory requirements. The CISF will be located in Andrews County, Texas (Fig. 1.)

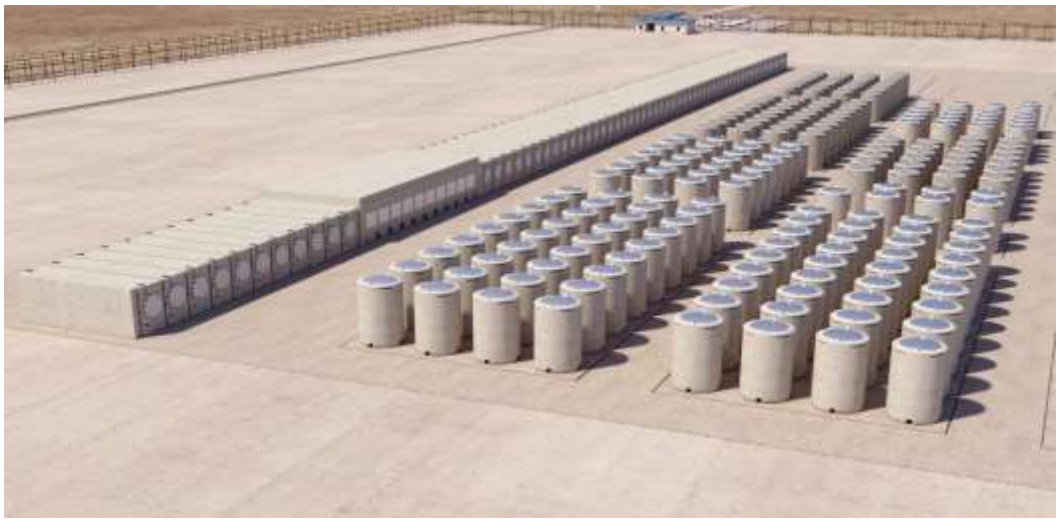
Fig. 1. Proposed Location of CISF.



WCS ultimately intends to store of to 40,000 Metric Tons of Heavy Metal (MTHM) at the CISF over the next twenty years. In the initial application, WCS intends to request storage for UNF for 40 years, with renewals of the license every 20 years. WCS believes that UNF may be stored at the CISF for up to 60 to 100 years consistent with the durations analyzed in the Generic Environmental Impact Statement (EIS)

for Continued Storage of Spent Nuclear Fuel (NUREG 2157) [6]. A graphic of CISF is provided in Fig.2.

Fig. 2. Illustration of the CISF.



WCS intends to construct and operate the CISF in up to eight phases over the next twenty years. WCS is on schedule to submit a license application for storing 5,000 MTHM in both the AREVA NUMHOMS® and NAC International storage systems in April 2016 (Fig. 3). This approach to licensing the CISF supports removal of up to 80% of the UNF currently located at the 12 of the existing shutdown decommissioned reactor sites. Once the UNF is removed from these shutdown reactor sites they may be returned to green fields for further economic or recreational development benefitting these communities. This approach to targeting removal of UNF from the shutdown decommissioned reactors is also consistent with the recommendations from the BRC.

WCS' strategy for licensing the CISF relied on work that had already been completed by the NRC and others [7]. WCS believes that including the storage systems to support the SAR for Phase One provides the safest and least costly approach to licensing the CISF. Accordingly, the initial license application will include the storage systems already licensed by the NRC as depicted in Table 1.

Table 1. Storage Systems Supporting Phase One

Cask System	NRC Docket No.	Canister	Overpack	Site
NUHOMS® MP187 Cask System	72-11 (SNM-2510)	FO-DSC	HSM (Model 80)	Rancho Seco*
		FC-DSC		
		FF-DSC		
Advanced Standardized NUHOMS® System	72-1029	NUHOMS® 24PT1	AHSM	SONGS Unit 1
Standardized NUHOMS® System	72-1004	NUHOMS® 61BT	HSM Model 102	Millstone Unit 1 Oyster Creek
		NUHOMS® 61BTH Type 1		
NAC-MPC	72-1025	Yankee Class	VCC	Yankee Rowe*
		Connecticut Yankee	VCC	Conn. Yankee*
		LACBWR	VCC	LaCrosse*
NAC-UMS®	72-1015	Classes 1 thru 5	VCC	Maine Yankee*
MAGNASTOR®	72-1031	TSC1 thru TSC4	CC1 thru CC4	Zion[1*]

WCS relied on a SAR prepared for the DOE [8] by AREVA for a generic CISF following the NRC's Standard Review Plan (NUREG 1567) [9]. WCS is using the license application from Private Fuel Storage Facility (PFSF) that has been approved by the NRC, for storing up to 40,000 MTHM as a template for much of its application. The SAR was prepared following Regulatory Guide 3.48, Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation [10]. WCS is preparing its license application in accordance with Regulatory Guide 3.50 [11].

*Indicates a "stranded" (ISFSI only) site from the BRC's 2012 Final Report

ENVIRONMENTAL REPORT

WCS prepared an ER that will be submitted concurrently with its license application pursuant to 10 CFR 72.34. Significant work was previously completed by the NRC, the State of Texas, and others that were incorporated by reference, as appropriate, into the ER. This approach was selected to help streamline the NRC work and timeline for preparing an EIS for the CISF in accordance with 10 CFR 51.23.

WCS intends to submit an ER with its license application pursuant to 10 CFR 72.34. The environmental impacts were analyzed for constructing and operating the CISF that will be located on approximately 320 acres just north of the LLRW Disposal Facilities (Fig. 3). WCS analyzed the cumulative impacts from all operations involving the storage of up to 40,000 MTHM to avoid segmentation of the environmental review required under the National Environmental Policy Act of 1969 [12]

Fig. 3. Aerial Depiction of the CISF.

WCS prepared the ER following guidance provided in NUREG-1748, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs [13]. WCS relied on previous studies conducted by the State of Texas and the NRC supporting the licensing reviews for its Low-Level Radioactive Waste Disposal Facilities and the National Enrichment Facility (NEF). These two facilities are located within a mile of each other and share a common property boundary. As such, WCS incorporated by reference many of the many the environmental impacts previously analyzed by the State of Texas and the NRC in the ER [14, 15]. This approach was used to focus on

areas that had not been previously analyzed by the agency in a manner consistent with NEPA. Such areas included a closer examination of the historic and cultural resources, the socioeconomic impacts, environmental justice, endangered species, meteorology, transportation, and occupational and public health impacts.

Conclusions from these analyses indicated that socioeconomic impacts benefits exceeded any detrimental impacts to the environment. There were no significant environmental impacts identified nor were any minority populations adversely affected. WCS evaluated the impacts from transporting 200 canisters of UNF each year from both the east and west coast to WCS, as well as from WCS to the proposed repository at Yucca Mountain, under both normal and accident conditions. The results from this analysis were bounded by those cited in previous studies that have been conducted by the NRC for the PFSF and the Generic EIS for the Continued Storage Rule [16, 17]. The overall conclusions demonstrated that transport of UNF by rail in support of the CISF license application is safe and consistent with previous studies conducted by the NRC [6, 18].

WCS also conducted a NEPA-compliant siting process to ensure no other site was superior to the location where the CISF is planned to be located. This process was consistent with the site selection process used to support licensing the NEF [18]. WCS initially screened candidate sites located in the arid and semi-arid regions of the U.S. Further screening was performed to select a site in a community that voiced its support to host such a CISF consistent with the recommendations of the BRC. This screening process eliminated states other than the Texas and New Mexico. The counties within Texas and New Mexico that have expressed support for siting such a facilities in their communities included Loving and Andrews County, Texas, as well as Lea and Eddy County, New Mexico. WCS relied on analysis of potential candidate sites in Lea and Eddy County conducted in support of the licensing of the NEF [19]. Additional information for the proposed location for siting a similar facility by the Eddy Lea Energy Alliance was also used in the site selection process [20].

A second tier screening process was also conducted to numerically rank each of the four potential sites in Texas and New Mexico. These criteria included weighted scores for siting characteristics, as well as environmental and operational criteria. The proposed location of the CISF on property owned by WCS was scored superior in most, but not all criteria.

The most distinct advantage for the WCS site was an abundance of existing site characterization and environmental data, in addition to existing infrastructure such as an existing rail loop that would support direct shipments of UNF to the CISF. Of particular importance were the reanalysis of the site's geotechnical and seismic studies at the CISF. WCS conducted additional characterization of the geotechnical parameters at the CISF site because the soils were somewhat different than had been

collected to support operations at the Low-Level Radioactive Disposal Facilities. Results from this study were needed to support the engineering design-basis for vertical storage systems that will used at the CISF. WCS also reanalyzed the seismic profile at the site using updated seismic methodology to a depth of 183 m (600 ft) below grade.

Additional Work

WCS was not able to rely on previous environmental reports or analysis on certain topical areas that had been previously conducted in support of preparing its license application for Low-Level Radioactive Waste Facilities, or from work previously conducted by the NRC for other facilities, such as the NEF or PFSF. For example, extensive work had previously been conducted to examine whether or not Native American artifacts were present in the areas nearby the CISF. It is widely understood that various Native American tribes widely inhabited the regions surrounding west Texas and southeastern New Mexico. Additionally, the last studies conducted by the TCEQ and the NRC near the location where the CISF will be constructed occurred in 1994 and 2001, respectively. As such, WCS conducted additional archeological surveys in the location where the CISF will be located in Andrews County, Texas [21].

Both the TCEQ and NRC had previously evaluated the environmental and safety impact associated with seismic activities near the WCS Low-Level Radioactive Waste Disposal Facilities and the NEF, respectively. According to Wong, the previous seismic hazard evaluation and development of seismic design ground motions for the Low-Level Radioactive Waste Disposal Facilities was completed in July 2004 [22]. The regulatory guidance used in the 2004 study generally followed the U.S. Department of Energy (DOE) guidance in lieu of the fact that the Texas Administrative Code did not contain any regulatory criteria on approaches for evaluating the seismic hazard at a low-level radioactive waste disposal site. In the current evaluation for the WCS centralized interim storage facility, the seismic hazard evaluation and development of seismic design ground motions are being performed in accordance with NRC requirements for a high-level waste facility.

Since 2004, there has been considerable advancement in both the characterization of sources of earthquakes in the U.S. and in the development of ground motion prediction models. Both seismic source characterization and ground motion prediction models are the fundamental inputs into seismic hazard analysis. The NRC co-sponsored with the Electric Power Research Institute and DOE a project to develop a seismic source model for the central and eastern U.S. EPRI also sponsored a project to develop new ground motion prediction models for the central and eastern U.S.

The WCS site is considered to be within the central and eastern U.S. Due in large part to the Fukushima, Japan, nuclear power plant disaster, the NRC is requiring all nuclear power plants in the U.S. to re-evaluate their seismic design. Although NRC requirements for nuclear power plants have no bearing on the WCS site, the NRC's renewed emphasis on having state-of-the-art seismic hazard assessments of all the facilities they regulate does impact the WCS site. Hence it was prudent to perform an updated seismic hazard evaluation of the WCS site that would be in accordance with NRC requirements and that would also be a state-of-the-art study that would be based on the most current information and data on seismic sources and ground motion models.

CONCLUSIONS

Over the past year, WCS has made significant strides in preparing its license application to construct and operate a CISF in Andrews County, Texas. WCS has discussed the technical approach it intends t take to prepare the license application regarding the SAR, ER, and Physical Security. These pre-application meetings have been instructive to ensure that a high quality license application will be submitted as scheduled in April 2016.

In the initial license application, WCS will request authorization to receive and store up to 5,000 MTHM as part of Phase one of this project in the AREVA NUHOMS ® and storage systems licensed by NAC International. Once license, WCS will be authorized to store up 80 percent of the UNF currently stranded at the shutdown decommissioned reactor sites located across the U.S.

WCS supports the continued effort by the NRC to complete the licensing review for Yucca Mountain. Construction and operations of a CISF in Andrews County, Texas, will not complete against the efforts to site a repository required for the disposal of UNF in accordance with the NWPA—in fact, it will complement the efforts to better manage the UNF generated over the past several decades, some of which is stranded the shutdown decommissioned reactor sites. Nonetheless, a political solution is needed by Congress that will require DOE to take title of the UNF at the commercial reactor sites prior to receipt at a CISF. Additional changes to the NWPA are also needed to authorize DOE to pay for the operations at the CISF that would be constructed and licensed by the private sector. Without such changes, this project will not move forward.

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