Consent-Based Siting

From: Benjamin Abbott [mailto:benjamin.abbott@gmail.com]
Sent: Sunday, July 31, 2016 11:33 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

Date July 31, 2016

U.S. Department of Energy
Office of Nuclear Energy, Response to IPC
1000 Independence Ave SW
Washington, DC 20585

RE: Response to IPC

To Whom It May Concern:

We are writing in response to your “Consent-Based Siting” of Radioactive Waste Dumps, with special concern to our communities in New Mexico.

By virtue of the end result, this process is inherently unfair to the community that will receive the nuclear waste, and the communities that will be at risk along the transportation routes.

Being a state that already has one failed nuclear waste site (the Waste Isolation Pilot Project or “WIPP”), we know that such facilities cannot be safe into perpetuity and any community who receives nuclear waste will forever be at risk of accidents, explosions, and resulting health-related issues.

We understand that WIPP near Carlsbad, NM and the Waste Control Specialists (WCS) in Andrews, TX are sites that may be considered for interim and long-term storage. Because WCS has invited DOE to bring waste to its facility, this invitation by WCS cannot be considered an invitation by a community. We as residents of New Mexico do not invite DOE to bring waste to New Mexico. We DO NOT CONSENT to the storage of high level nuclear waste in our state now or ever!

DOE has not done sufficient outreach to the general population of American citizens on this proposal, and has not heard from all the communities who will be impacted by transport through their areas. We request DOE to continue to do educational presentations and to hold additional meetings in New Mexico regarding your Consent Based Siting process, in Albuquerque, Carlsbad, Las Cruces, Gallup, and to the various Tribal Nations including Navajo, Mescalero, and any of the 19 Pueblos along possible transportation routes.

These are our recommendations:
Stop all nuclear waste production that generates irradiated nuclear fuel in the first place, including weapons-related and reactor operations. Work toward clean, non-nuclear, and carbon free forms of energy production—such as energy efficiency, wind, and solar.

Continue to work toward safe, reliable and permanent methods of storing nuclear waste, such as Hardened On-Site Storage (HOSS), as has been suggested in the past by several organizations, including the Institute for Energy and Environmental Research, Nuclear Information Resource Services and Beyond Nuclear.

The cost of storage and transport of nuclear waste must not the financial burden of rate-payers or tax-payers. Total liability and all expenses should remain with owning utilities. These companies should also never be permitted to build nuclear plants without demonstrating financial capacity to cover all costs of safe permanent storage of wastes in perpetuity.

Question 1:
How can the Department of Energy ensure that the process for selecting a site is fair?

More public meetings are needed, especially ones in Albuquerque, Gallup, and Carlsbad. The DOE needs to include outreach to Environmental Justice organizations, Communities of Color, Low-Income communities, professors in ethics, health professionals, and emergency responders and other interested parties. DOE should postpone any decision on this “consent-based siting” proposal until all these communities have been informed and until DOE has considered the report by NRC on “pool storage safety” due out later this year.

Question 2:
What models and experience should the Department of Energy use in designing the process?

We support the storage of nuclear waste and spent fuel using HOSS techniques, in “hardened dry casks” built to prevent leakage and explosions, instead of cooling pools. There will be less risk storing waste at the places where it was created instead of moving it, storing it on-site or as close to the point of origin as possible. Casks must not be stored or transported through tribal lands or high-population centers.

Storage pool structures must not be dismantled during plant decommissioning and must be maintained at utilities’ expense as emergency sites for failed cask-to-replacement-cask transfers.

Question 3:
Who should be involved in the process for selecting a site, and what is their role?

In order to ensure adequate research and consideration for safety for the environment and communities, several focused teams should be created to oversee the following:

A) Safety Teams, including professionals and experts in these fields: Transportation Safety, Emergency Responders and First Responders, Health Professionals, Hazmat, etc.

B) Human Rights, experts and professionals who specialize in the protection of the rights of: the Child, Women, the Poor, and Indigenous Peoples Rights.
C) Health, all communities likely to be affected by proposed transportation routes and storage

sites must be apprised of the risks by experts who can ensure the safety of: our air, waters, soil, plants, animals, and human health.

Question 4:
What information and resources do you think would facilitate your participation?

The public must be provided with information and have adequate time to consider the risks and options of site proposals. We must be provided with:
-Site geology and hydrology
-Nature of irradiated nuclear fuel
-Status of hardened cask technologies
-Nearest Emergency facilities
-Worst-case scenario of possible explosions and releases of radioactivity

This information must be provided in a plain English format, understandable by the common layperson.

Question 5:
What else should be considered?

The process should center on the ongoing history of radioactive environmental contamination and its effects on communities. Corporations and nuclear industry or similar businesses should not be considered “the public” or as “the community” in terms of consent.

New Mexico is a state with several indigenous nations and various traditional cultures. Each tribal nation and traditional Chicano or Hispanic community must be contacted and informed of the process and provided with materials translated in the appropriate language. DOE must follow its Federal Trust Responsibility when addressing Tribal Nations. DOE must also abide by all international conventions, including the United Nations Declaration on the Rights of Indigenous Peoples which states that “free, informed, and prior consent” is necessary before proceeding with federal actions such as transport and storage of dangerous and hazardous materials in areas that may affect tribal nations, tribal members, and indigenous peoples.

Sincerely,

Benjamin Abbott
2101 Silver Ave SE
Albuquerque, NM 87106

Consent-Based Siting

From: Humberto Acosta [mailto:westexmex@aol.com]
Sent: Friday, July 29, 2016 7:37 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Comment Opposing DOE's Consent-Based Siting Process for Nuclear Waste

Dear Secretary Moniz,

WHEN HAROLD SIMMONS (WCS) FIRST CAME TO ANDREWS, HE PROMISED THE RESIDENTS THAT HIS DUMP GROUND WOULD REMAIN "LOW LEVEL".
WE CANNOT TRUST HIS COMPANY ANYMORE BECAUSE THEY DID NOT KEEP THEIR WORD. WCS, AS YOU WELL KNOW, HAS FILED WITH THE NRC FOR A LICENSE TO DISPOSE OR STORE HIGH LEVEL RADIATION WASTE IN ANDREWS COUNTY. THEY EXPECT TO GET THE LICENSE BY 2020.

I DO NOT BELIEVE THAT 4 COMMISSIONERS HAVE THE RIGHT TO MAKE THE MONUMENTAL DECISION ON THEIR OWN. THEY HAVE "VOLUNTEERED" ANDREWS COUNTY FOR THE DISPOSAL OF THE NATION'S HIGH LEVEL WASTE MATERIALS.

I HAVE PERSONALLY GONE AROUND TOWN AND ASKED RESIDENTS IF THEY ARE FOR OR AGAINST WCS BRINGING IN HIGH LEVEL RADIATION MATERIAL WASTE TO ANDREWS COUNTY AND WELL OVER 90% ARE APPALLED AT THE IDEA. I AM COLLECTING SIGNATURES "AS WE SPEAK".

WHAT IS HAPPENING HERE IS THAT THE DOE HAS RUN OUT OF TIME, AND ANDREWS COUNTY IS THEIR WAY OUT.

TRUE, THIS IS A DESOLATE PLACE WITH AROUND 65%
HISPANIC POPULATION, BUT THIS IS OUR HOME.

WE, THE RESIDENTS OF ANDREWS, TX DO NOT CONSENT TO THE TRANSPORTING, STORING, OR DUMPING HIGH LEVEL RADIATION WASTE IN OUR COUNTY.

ANDREWS COUNTY, TEXAS IS NOT THE UNITED STATES OF AMERICA DUMP GROUND FOR HIGH LEVEL RADIATION WASTE.

Humberto Acosta
1010 SW 5th ST
Andrews, TX 79714

April 26, 2016

Mr. John Kotek
Acting Assistant Secretary for Nuclear Energy
U. S. Department of Energy (DOE)
1000 Independence Ave SW, Washington, DC 20585

Re: Consent-Based Siting Public Meeting

Dear Mr. Kotek:

It is my understanding that DOE's goal is to develop solutions for the long-term, sustainable management of our nation's spent nuclear fuel and high level radioactive waste. This involves an integrated waste management system to transport, store, and dispose these materials from commercial electricity generation, as well as national defense activities. To achieve this goal, DOE is developing a process to site facilities collaboratively with the public, communities, stakeholders, and governments at the state, tribal, and local levels by seeking the help of all Americans in developing a consent-based approach to siting that is fair and reflective of public input. DOE is committed to finding a solution that protects our nation's citizens, communities, and the environment (DOE 2016). The meeting tonight is part of this process and is an important opportunity for members of the public to raise issues related to managing spent nuclear fuel and high-level radioactive waste (SNF/HLW).

As one who has been concerned about spent fuel storage and disposal at nuclear reactors in California for over 35 years, I want to offer a suggestion about a potentially important solution to this vexing problem.

It was recognized early in the 1950s when nuclear power generation was initiated that waste products would require isolation from people and the environment for thousands of years. After years of studying alternatives, the DOE recommended pursuing the development of a SNL/HLW disposal facility within Yucca Mountain in the desert of Nevada (McAllister 2013 – Attachment A). Congress passed the Nuclear Waste Policy Act in 1982 which focused on land-based disposal options like Yucca Mountain. That option has been abandoned for scientific and political reasons and it is time to renew research on an alternative option: sub-seabed disposal within the U.S. Exclusive Economic Zone (EEZ) which extends out to 200 nautical miles (nm) from the U.S. coast and/or islands.

Sub-seabed refers to vast mudflats under abyssal plains in the middle of tectonic plates underneath the Earth's oceans. These neglected sub-oceanic formations, hundreds of meters thick, are composed of clays and mud that might provide a permanent resting place for high-level radioactive wastes and a burial ground for the radioactive materials removed from nuclear bombs (Hollister and Nadis 1998 - Attachment B). Deep burial of

these materials could be advantageous because the clays have low permeability to water, high adsorption capacity for [radioactive waste] and a natural plasticity that enables the ooze to seal up any cracks or rifts that might develop around a waste container (Bala 2014 – Attachment 3). As Bala noted, "The United States has not seriously considered sub-seabed disposal of SNF since 1986, when it ceased funding an international team of scientists known as the Seabed Working Group. The group concluded its work with a call for further research after preliminary testing from 1976 to 1986 at about six sites in the Atlantic and Pacific oceans showed promise for sub-seabed burial of SNF in ocean floor sediment. If the United States were to reconsider sub-seabed disposal as a potential option for disposal of the nation's collective SNF, America would need to restart the research that was previously abandoned." (Ibid. pg. 477)

McAllister notes the "Potential burial sites meeting all of the relevant criteria (out of the habitable biosphere, able to contain the waste for the foreseeable future, geologically stable without seismic or tectonic activity, avoiding areas with potential of petroleum reserves, avoiding areas subject to landslides, unreachable of persons who would use the waste to menace other, etc.) exist within a number of the island possessions of the U.S. located in the Pacific Ocean. These islands are isolated, have no indigenous populations, and are under the control of the U.S. federal government. Within the 200 nm EEZ around these islands are deposits of geologically stable pelagic clays in deep ocean water that are hundreds of meters thick." (Ibid. pg. 3)

Considerable experience with drilling in sub-seabed areas was obtained with the Ocean Drilling Program (ODP) from 1983 to 2007. With funding from the National Science Foundation and international partners, 1,197 holes were drilled at 696 sites to explore the Earth's history and structure as recorded in the ocean basins in the Pacific and Atlantic. ODP provided sediment and rock samples (cores), downhole geophysical and geochemical measurements (logging), opportunities for special experiments to determine in situ conditions beneath the seafloor. ODP studies led to a better understanding of plate tectonic processes and Earth's crustal structure and composition (ODP 2007). All of this information would be useful when renewing research on sub-seabed disposal of SNF.

This alternative option has several advantages over land based disposal of SNF disposal for California nuclear power plants. The three nuclear plants, Humboldt Bay Unit 3, Diablo Canyon Units 1 and 2, and San Onofre Units 1, 2 and 3 are located on the California coast of the Pacific Ocean. All three plants, owned/operated by Pacific Gas and Electric (PG& E), Southern California Edison (SEC) and San Diego Gas and Electric (SDG&E) respectively, are located near active earthquake fault lines many of which were unknown at the time the facilities were built. There is a legitimate concern that earthquakes could occur that would damage the plants and lead to radioactive releases that could significantly impact the surrounding environment. Another concern is the extended period of time that SNF could remain onsite before removal. PG&E recently filed an application with the California Public Utilities Commission in the 2015 Nuclear Decommissioning Costs Triennial Proceeding that noted the SNF could remain

in dry cask storage until 2061. Finally, there has been some discussion about an interim solution involving constructing one or more monitored retrieval storage (MRS) facilities to store SNF temporarily until a final solution is in place. This would involve moving hundreds of thousands of metric tons of SNF on the roads and highways throughout the U.S. to the MRS site, and move the SNF again to the permanent location.

The sub-seabed option would take advantage of the nuclear plants location on the coast by using a dynamically positioned drillship similar to that used by the ODP to drill a large bore re-entry cone into the seabed. SNF could be loaded onto the ship and placed into the hole hundreds of meters deep. The ship then relocates and repeats the process, creating a field of sequestration holes in a grid pattern. The ability to drill into the clays of the abyssal plain and re-enter the boreholes have been demonstrated repeatedly by the ODP (McAllister 2013). Removal of the SNF from the power plant site in a timely manner reduces the potential damage from earthquakes and radioactive releases in the local environment. It is likely that the time needed to secure the SNF in deep sub-seabed boreholes would be much less than forty or more years needed for removal to a land-based location. Since the sub-seabed option would be a permanent solution there would be no need for an MRS site/s. This option could be supported by local residents, elected officials, and interested parties as a safe, reliable, and more timely solution to the problem of SNF disposal.

In conclusion, renewing research on the sub-seabed option is an opportunity to permanently solve the U.S. radioactive waste disposal dilemma. A full scale pilot project is needed which will develop and implement a prototype sub-seabed disposal area within the U.S. EEZ as a way to demonstrate the process, work out the details and procedures, and collect data on a small SNF/HLW disposal installation. Such a pilot project could be implemented in a few years and give the U.S. a credible alternative to mined geological repositories (Ibid. pg.9). If further scientific research could show that sub-seabed burial of nuclear waste works properly and would seal the waste beneath the ocean floor, the U.S. could probably engage in some form of the disposal method without violating international and domestic laws (Abal 2014). The DOE should work with utilities who own and/or operate nuclear power plants to include them in the applicable research regarding, among other things, moving SNF from dry casks or other cylinders to a drillship for transportation to selected burial sites.

Sincerely,

James Adams

Attachments

References

DOE 2016 - U.S. Department of Energy, Office of Nuclear Energy, Consent-Based Siting of Nuclear Waste, About Us, 2016.

ODP 2007 - Ocean Drilling Program, Final Technical Report, 1983 – 2007, Consortium for Ocean Leadership, et. al, 2008.

ATTACHMENT A

Sub-Seabed Repository for Nuclear Waste – A Strategic Alternative

Keith R. McAllister

WM2013 Conference, February 24 – 28, 2013, Phoenix, Arizona, USA

Sub-Seabed Repository for Nuclear Waste - a Strategic Alternative – 13102

Keith R. McAllister
Department of the Navy; 15 Turkey Foot Court, Darnestown, MD 20878;
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ABSTRACT

It was recognized at the outset of nuclear power generation in the 1950's that the waste products would require isolation away from humans for periods in excess of 10,000 years. After years studying alternatives, the DOE recommended pursuing the development of a SNF/HLW disposal facility within Yucca Mountain in the desert of Nevada. That recommendation became law with passage of the NWPAA, effectively stopping development of other approaches to the waste problem. In the face of political resistance from the state of Nevada, the 2010 decision to withdraw the license application for the geologic repository at Yucca Mountain has delayed further the most mature option for safe, long-term disposal of SNF and HLW. It is time to revisit an alternative option, sub-seabed disposal within the US Exclusive Economic Zone (EEZ), which would permanently sequester waste out of the biosphere, and out of the reach of saboteurs or terrorists.

A proposal is made for a full scale pilot project to demonstrate burying radioactive waste in stable, deep ocean sediments. While much of the scientific work on pelagic clays has been done to develop a sub-seabed waste sequestration capability, this proposal introduces technology from non-traditional sources such as riser-less ocean drilling and the Navy's Sound Surveillance System. The political decisions affecting the issue will come down to site selection and a thorough understanding of comparative risks. The sub-seabed sequestration of nuclear waste has the potential to provide a robust solution to a critical problem for this clean and reliable energy source.

INTRODUCTION

As an electricity generating source, nuclear power is very attractive as it can generate large amounts of base load electricity without emitting air or water pollution. Between the continuing pressure to reduce greenhouse gas emissions and potential for added demand from plug-in electrically powered vehicles, the market demand for clean electric power is estimated to grow 22% between 2011 and 2035, with 4% of that being nuclear power [1]. Uranium fuel sources are available domestically and from sources in Australia, Canada, Africa, and South America [2]. This clean source of power, with reliable sources of fuel from friendly countries has a worrisome problem – the safe reduction, and disposal of the waste products generated by the nuclear power plants. A larger proportion of the national base load might be generated by nuclear energy except for the risk and cost of waste management.

It was recognized at the outset of nuclear power generation in the 1950's that the waste products would require isolation away from humans for periods in excess of 10,000 years because of the long half-lives of some radionuclides. Many ideas were studied with consensus moving toward options of sequestering waste in deep geological storage away from human habitation, and out of the reach of saboteurs or terrorists. In a 1981 Record of Decision by the DOE Program of Research and Development for Management and Disposal of Commercially Generated

Radioactive Wastes, the Department decided that their most promising approach would be to develop a strategy for mined geological repositories. To keep options open, DOE planned to continue study of two other options: sub-seabed waste disposal, the emplacement of radioactive waste into the deep ocean sediments; and very deep hole disposal, burying waste vertically miles into the earth instead of horizontally, as is done for the mined geological repository. The governing considerations for this decision were radiological effects during the operational period, non-radiological effects, compliance with existing national and international law, independence from future development of the nuclear industry, and the potential for corrective or mitigating actions [3]. The mined geological alternative appeared to be the low risk approach, one which could be moved forward most expeditiously. The following year in 1982, the Congress passed the NWPA establishing policy for radioactive waste disposal under the DOE. Research was done on all options culminating in DOE's recommendation in 1986 to sequester the waste in a mined geological repository under Yucca Mountain in the desert of Nevada. The DOE believed the cost and risk were lowest for the land based option using a location on federal land, adjacent to the Nevada Test Site, where hundreds of nuclear weapons tests had been conducted, and which was surrounded on three sides by Nellis Air Force Base with established rapid response security forces, and an existing restricted air space [4]. The DOE recommendation was decided with passage of the NWPAA. With that decision, funding was cut-off for the backup options, effectively leaving the nation with only one approach for disposal of high level nuclear waste. The Geologic Repository for the Disposal of SNF and HLW at Yucca Mountain in Nye County, Nevada was planned to be online receiving waste in January 1998, twelve years later, per the NWPA. There have been many obstacles and delays since that ill-fated decision, including a misunderstanding of the level of resistance DOE would face from the State of Nevada. What appeared to be the most desirable alternative with the least technical risk, had in fact substantial political risk. In June 2008, DOE applied to the NRC for a license to receive nuclear materials at the Yucca Mountain repository. The DOE motioned for withdrawal of its licensing application to NRC in March 2010 on the basis that Yucca Mountain was not a workable option, though NRC did not accept the withdrawal on the grounds that the NWPA required it to evaluate the proposal. DOE did not request funding for the Yucca Mountain repository in its FY11, FY12, or FY13 budget requests and so progress has halted on the development of a disposal solution for SNF and HLW [5].

DISCUSSION

When the first deadline to open the Nation's first SNF repository passed in 1998, many commercial nuclear operators sued the DOE for costs incurred when it did not accept their waste, as agreed upon in the Standard Contracts. Between settlements and US Federal Court judgments, DOE owes the nuclear plant operators close to $1 billion, with $290 million having been paid from the Judgment Fund as of October 2007. These funds were not permitted to be taken from the fees collected for waste storage and were required to be sourced from the Treasury. DOE estimates the government's liability (opportunity cost) to be $7 billion if the repository opens in 2017, and as much as $11 billion if it is delayed to 2020 [6].

As of January 2012, about 65,000 metric tons of SNF and approximately 22,000 separate canisters of defense-related radioactive waste fuel [7] were being stored at more than 125 sites in 39 states [8]. When the NWPA was amended in 1987 to select the Yucca Mountain facility as the repository, it specified waste disposal of up to 70,000 metric tons. Projections by DOE estimated that up to 130,000 metric tons of waste will be required by 2017 from existing nuclear power

plants [6], and between 150,000 and 200,000 metric tons by 2050 [7]. Though Yucca Mountain's environmental impact statement indicates that up to 120,000 metric tons of waste could be safely disposed of in the repository, it appears this site will be at capacity shortly after opening and that another site may be required.

An alternative waste disposal site is required, one that meets all the criteria for safe and secure disposal, and one which is achievable in the foreseeable future. Such an alternative site exists today within the deep water, geologically stable, sub-seabed of the US EEZ.

History of the Sub-seabed Disposal Concept

The concept of burying radioactive waste in deep ocean sediments, also referred to as sub-seabed disposal, is frequently attributed to Dr. Charles D. Hollister, a marine geologist with Woods Hole Oceanographic Institution, though many others have contributed to the concept and the research on which it is based [9, 10, 11]. Because the half-lives of some radionuclides are tens of thousands of years or more, any disposal system will need to render them safely isolated from humans for that duration. Hollister and others reasoned that by burying the waste in the depositional pelagic clays of the deep seabed which have been stable for millions of years, the materials would be effectively sequestered from interaction with the biosphere. The deep seabed is the abyssal plain located at nominally 4,000 to 5,000 meters of ocean depth. The clays are the result of eons of windblown particles from land, insoluble biogenic debris, and general precipitants [9]. The clays tend to be relatively impermeable to migration of either heat or radioactive elements from mechanisms of diffusion, convection, advection, or some combination of these mechanisms [9]. The deep water isolates the waste from mankind and the geologically stable clays isolate the waste from the oceanic biosphere.

Site Selection

The selection of a site for waste sequestration requires a number of criteria, many in common with those for a deep geologic repository. The site must be out of the habitable biosphere – human and other living creatures. The site must be able to contain the waste for the foreseeable future without inadvertently allowing it to re-enter the biosphere. To that end, the site must be geologically stable without seismic or tectonic margin activity, avoiding areas with the potential of petroleum resources, such as alluvial fans (depositional sediments found in river deltas); and avoiding areas subject to landslides and turbidity currents, such as at the base of the continental slope. It must be out of reach of persons who would use the waste to menace others. The site must allow deliberate placement and recovery of the waste in the near term. It must be expansible to accommodate growth in volume of SNF and HLW. For purposes of this discussion, the site must be located within the control of the US or its possessions' EEZ of 200 nautical miles from the coast or islands, figure 1. It should be established within the framework of international agreements. Overall, the site should allow a cost effective sequestration method. The site should not be in anyone's backyard.

Sites meeting all the selection criteria exist within a number of the island possessions of the US located in the Pacific Ocean. These islands are isolated, have no indigenous populations, and are under the control of the US federal government. Within the 200 nm EEZ around these islands are deposits of geologically stable pelagic clays in deep ocean water that are hundreds of meters thick.

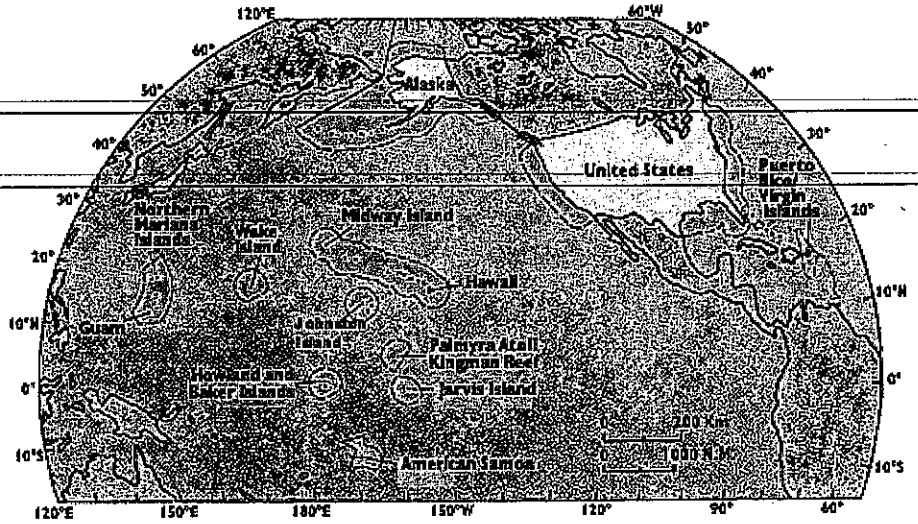

Fig. 1. US EEZ Boundaries (in yellow) [12].

APPROACH TO SUB-SEABED WASTE DISPOSAL IN 2012

The proposed approach to sub-seabed radioactive waste disposal is similar to that proposed by Hollister [11], though there are some differences based upon the maturation of technology since 1986 that are required to fully implement a sub-seabed waste disposal system. While this approach has not yet been integrated and demonstrated as a system, all of the steps have been separately demonstrated, are in use today, or are fully extensible form today's technology. The process must receive and sequester both HLW from defense weapons programs and SNF from commercial and naval reactors. Once the site is prepared, the waste must be packaged and transported, emplaced, and then protected.

Site Preparation

A dynamically positioned drillship similar to that used by the scientific Ocean Drilling Program (ODP) jets a large bore re-entry cone and surface conductor casing into the seabed, figures 2, 3, and 4. The sequestration hole is then bored out and tubing set to line the hole and prevent sidewall collapse, similar to figure 5. A packer (plug) is set in the bottom of the hole sealing it at the bottom. What remains on the seabed is a re-entry cone with an acoustic beacon over a tubing-lined cylindrical hole that is hundreds of meters deep. The volume of the hole is based upon the depth of the pelagic clay and optimal diameter of tubing. The ship then relocates and repeats the process, creating a field of sequestration holes in a grid pattern. The separation between holes in the disposal area will be a multiple of the radius of the heat-affected zone around the hole for a predicted steady state condition. The location of the re-entry cone is charted. The ability to drill into the clays of the abyssal plain and re-enter the boreholes have been demonstrated repeatedly by the ODP using deep water dynamically positioned drillships.

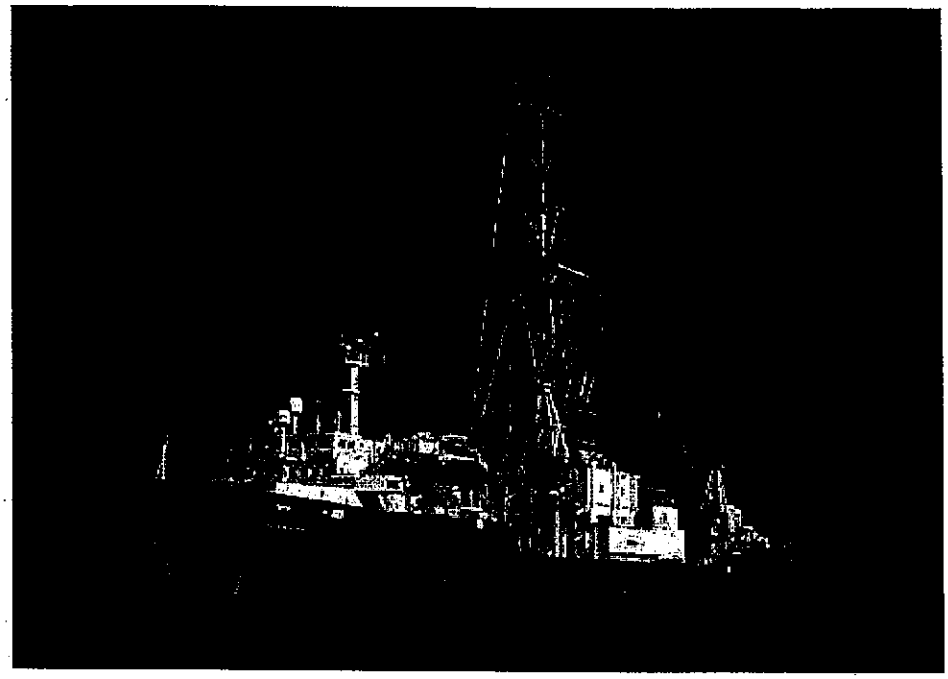

Fig. 2. Deepwater Drillship D/V JOIDES Resolution [13].

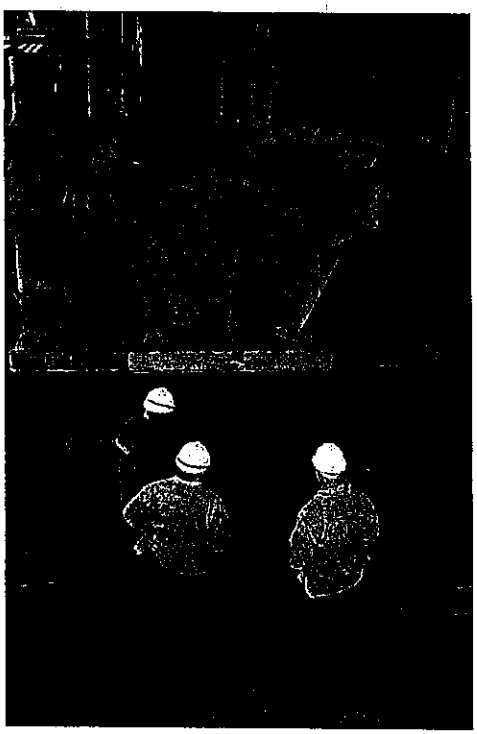

Fig. 3. Re-entry Cone Assembly Staging in Moonpool [13].

Fig. 4. Large Bore Casing in Rotary Table on Drill Floor [13].

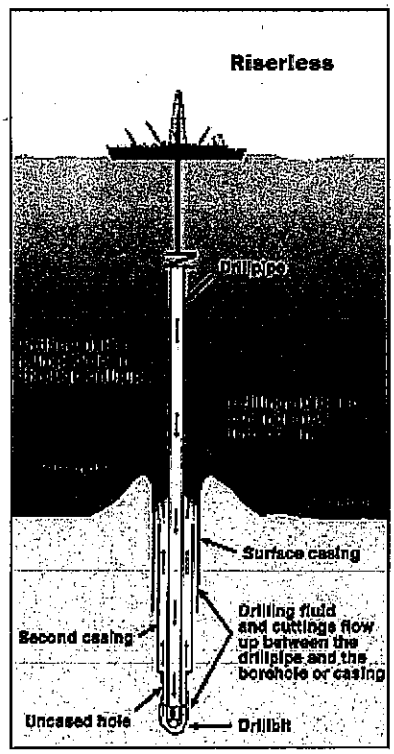

Fig. 5. Deep Sea Drilling Illustration [13].

Waste Packaging and Transportation

The preparation of waste for storage and shipping relies extensively on the work done by DOE and

its contractors. Of particular interest is the vitrification process employed for incorporating the waste into a glass matrix. The radioactive waste is vitrified by mixing it with glass powders, heating it to a molten state, and pouring it into metal containers, likely made of titanium or stainless steel for durability, where it solidifies for safer handling. This process lends itself to the cylindrical configuration required for the waste to be placed and stacked into a sequestration hole. Vitrification technology is already in use at the DOE national laboratories and in Europe for entraining HLW in an impermeable glass matrix. Whether vitrified or not, all waste planned for sequestration will need to be packaged into cylinders which can be lowered into the pre-drilled holes and stacked on top of each other.

DOE waste sites are connected to the national railroad system, which could safely transport waste containers to a port of embarkation, and shipped to the sequestration site. Much work has been done to ensure safe transport of nuclear waste within the US, and this process would rely upon that work.

Upon arrival at the port, a self-loading transport and emplacement ship would bring the waste aboard into purpose-designed holds and sail to the sequestration location. This element of the process has not been demonstrated previously, but is well within the state of the art, as partially demonstrated by SKB with their transport vessel M/S Sigyn [14]. The ship must be able to store and transport the waste and once onsite, dynamically position itself on location, and lower the waste cylinders into the prepared holes. That requirement could optimally be met by either purpose-built vessels or converted deep water drilling rigs.

Emplacement and Recovery

The waste cylinders are lowered into the hole and stacked to approximately 30 meters below the level of the seabed. A packer (plug) is fitted in the hole above the waste cylinders and filled with concrete back to the level of the seabed. All that is visible is the re-entry cone protruding from the seabed. The location of the re-entry cone, hole and contents are charted. Should there ever be a reason to recover the waste canisters within the first 100 years, the hole would be re-entered, the concrete plug drilled out, the packer recovered, and the waste cylinders retrieved back to a ship. Their condition could be inspected remotely before they were recovered to the ship. Re-entering a hole, drilling out a concrete plug, and recovering equipment from a well are state of the art in the offshore oil industry. The safe recovery ability will be a function of the durability of the metal cylinders used to enclose the waste.

Protection

By the nature of its remote location and depth in thousands of meters of water and tens of meters of seabed, humans and sea life are protected from the waste repository. Anyone attempting to reach the waste will require large, seaborne sophisticated equipment to locate, drill out the plug, and recover the contents of a sequestration hole. Additionally, such an action will take time. To protect against such an attempt, a number of security features are available using existing capabilities.

An acoustic array can be installed around the perimeter of the disposal area and cabled back to a shore station on the proximate island. This technology is based upon the Navy's Sound Surveillance Systems (SOSUS) installed during the Cold War to passively monitor the movement

of Soviet submarines [15]. The cable is multifunctional, providing power and data links to multiple site instruments. The hydrophone array provides early acoustic warning of any attempts to access the disposal area by intruders. Acoustic array shore stations are typically automated and alert an operator if there are changes from a preset acoustic baseline. Satellite detection capability could also monitor the site for intruders. Should an attempt to access the site be detected, national authorities would be alerted to intervene. Their authority would be enforcement of activity within the US EEZ.

Approach Summarized

To summarize the process, SNF and HLW would be consolidated into cylindrical storage containers suitable for transporting and disposal. Those containers would be transported to the port of debarkation and loaded aboard a ship. The ship would sail to the repository, stack the waste canisters into prepared holes, and plug the holes with concrete. The waste is now sequestered safely within the seabed. This process is repeated as many times as required, only limited by the site's surface area and the consideration to space the wells far enough apart to prevent overlap of the heat affected zone around the well. The radioactive waste has multiple levels of containment from the deep ocean environment: vitrification glass, metal cylindrical shells, well tubing, and pelagic clay sediments. It is isolated under kilometers of ocean. Should there ever be a need to recover the cylinders within the first 100 years, a drillship could return to the site, re-enter the hole, drill out the concrete, and recover the waste cylinders.

LEGAL ENVIRONMENT

For centuries, people have used the ocean as a dump. Many things were disposed with little thought for future consequences. Some examples include ordnance, chemical weapons, industrial chemicals, municipal garbage, medical waste, sewage, and even nuclear waste in 208-liter (55-gallon) drums. This abuse of the oceans threatened the health of fishing grounds on the continental shelf, and some of these materials washed up on beaches. This provoked an international outcry which resulted in the passage of the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, also known as the London Convention. The US signed on to the London Convention. The London Convention prohibited the "dumping" of radioactive wastes into the ocean. This has been interpreted by some as prohibiting drums full of radioactive waste being rolled off the back of ships, but not prohibiting HLW being emplaced below the seabed [16].

In 1996, an update to the Convention, known as the London Protocol, banned all dumping with a list of exceptions for dredged material; sewage sludge; fish wastes; vessels and platforms; inert organic geological material; organic material of natural origin; bulky items primarily comprised of iron, steel, and concrete; and carbon dioxide for sequestration [17]. The Protocol took the added step of clarifying that sub-seabed disposal of HLW was considered to be "dumping" [16]. The view at the time was that nuclear waste was the source country's problem, and not to be transferred to a common area. As of this writing, the 1996 London Protocol has not been ratified by the US.

The United Nations Convention on the Law of the Sea (UNCLOS) of 10 December 1982 is another treaty pending ratification by the US which includes provisions to limit ocean dumping. Between the London Protocol of 1996 and the UNCLOS, both unratified by the US at this time, the window of international law under which sub-seabed disposal can be implemented is closing.

WAY AHEAD – PILOT PROJECT PROPOSAL

The way ahead is to restart and accelerate the research for a sub-seabed waste disposal capability as an alternative or complement to Yucca Mountain or the status quo. To that end, a full scale pilot project is proposed which will develop and implement a prototype sub-seabed disposal area within the US EEZ as a way to demonstrate the process, work out process details and procedures, instrument a subsea test site, and collect data on a small HLW disposal installation – which would be fully recoverable within the timeframe of the pilot program. With a coordinated inter-agency approach, such a pilot project could be implemented in a few years and give the US a credible alternative to mined geological repositories.

An international solution will require international legislation for the London Convention and Protocol and the UNCLOS. Such support will be much easier to obtain with full scale pilot data in hand and a viable proposal to safely implement waste sequestration. The existing UNCLOS should permit such an experiment. From UNCLOS Part 1, Article 1, Part 1 (5) (b) (ii) "Dumping does not include placement of matter for a purpose other than the mere disposal thereof, provided that such placement is not contrary to the aims of this Convention." [18]. This provision implies that placement of waste in the sub-seabed for an experimental pilot project would be permissible under the UNCLOS. In the interim, the US should defer ratification of the 1996 London Protocol, as the US is complying with the spirit of the agreement already. Its ratification would remove sub-seabed disposal as an option until 2019. Eventually for sub-seabed waste disposal to work in the long term, the London Protocol will need to be amended to reclassify managed sub-seabed disposal as a recognized exception.

CONCLUSION

The proposed strategy for safely sequestering nuclear waste in the sub-seabed is an opportunity to permanently solve the US radioactive waste disposal problems. The present approach of a deep geological repository at Yucca Mountain, now on hold, has led to inadequate facilities for storage and disposal of SNF and HLW. A consequence of the government's inability to provide long-term storage or disposal facilities is a growing liability to the US Treasury from the power industry. Additionally, the inability to develop adequate facilities for sequestration of SNF and HLW for present and future needs constrains the development and construction of a clean source of electric power.

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ACKNOWLEDGEMENTS

The opinions expressed herein are those of the author and do not represent the position or policy of the US Navy.

ATTACHMENT B

Burial of Radioactive Waste under the Seabed

Charles D. Hollister and Steven Nadis

Burial of Radioactive Waste under the Seabed

Although the notion troubles some environmentalists, the disposing of nuclear refuse within oceanic sediments merits consideration

by Charles D. Hollister and Steven Nadis

On the floor of the deep oceans, poised in the middle of the larger tectonic plates, lie vast mudflats that might appear, at first glance, to constitute some of the least valuable real estate on the planet. The rocky crust underlying these "abyssal plains" is blanketed by a sedimentary layer, hundreds of meters thick, composed of clays that resemble dark chocolate and have the consistency of peanut butter. Bereft of plant life and sparsely populated with fauna, these regions are relatively unproductive from a biological standpoint and largely devoid of mineral wealth.

Yet they may prove to be of tremendous worth, offering a solution to two problems that have bedeviled humankind since the dawn of the nuclear age: these neglected suboceanic formations might provide a permanent resting place for high-level radioactive wastes and a burial ground for the radioactive materials removed from nuclear bombs. Although the disposal of radioactive wastes and the sequestering of material from nuclear weapons pose different challenges and exigencies, the two tasks could have a common solution: burial below the seabed.

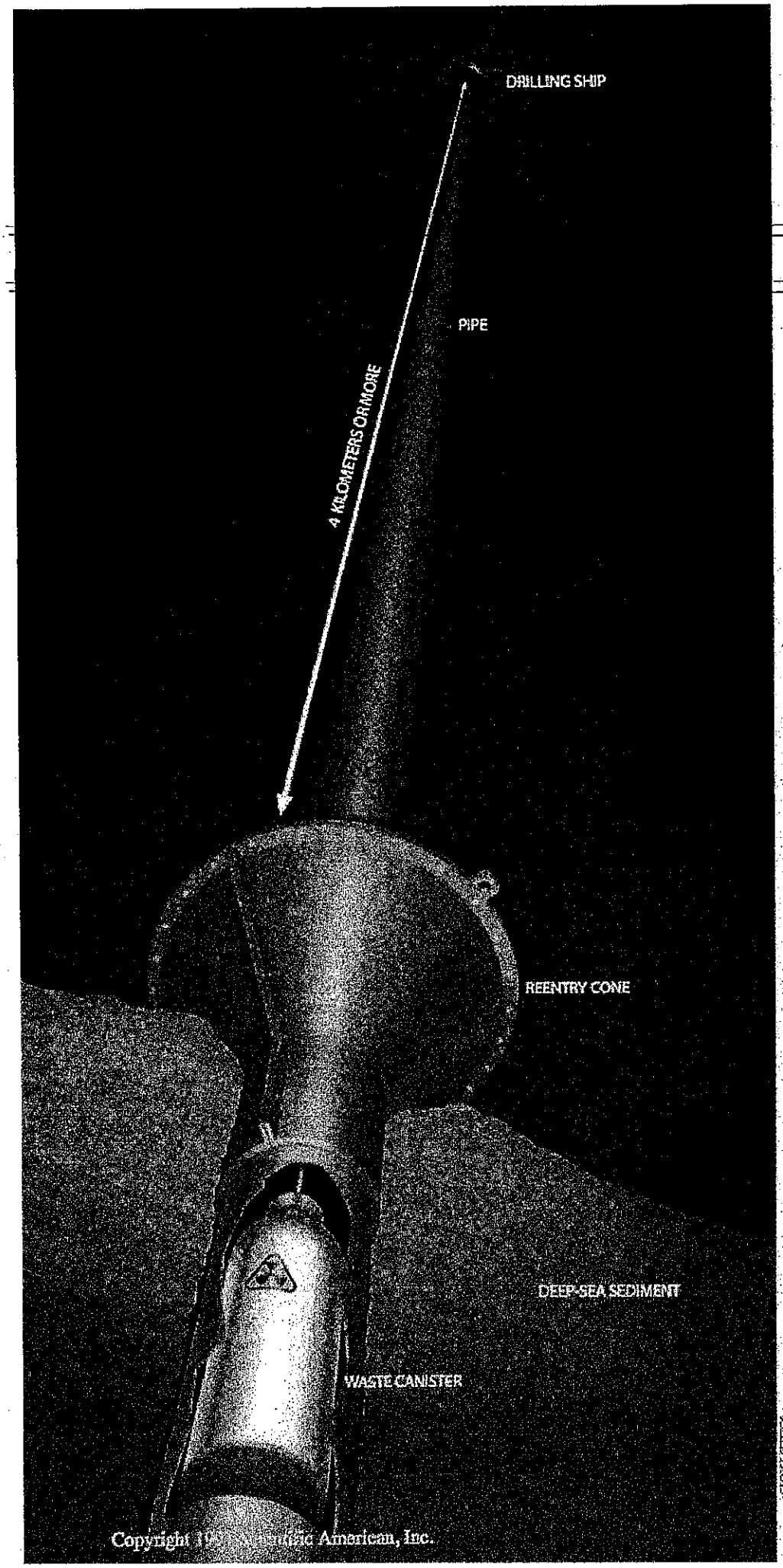
High-level radioactive wastes—in the form of spent fuel rods packed into pools at commercial nuclear power plants or as toxic slurries housed in tanks and drums at various facilities built for the production of nuclear weapons—have been accumulating for more than half a century, with no permanent disposal method yet demonstrated. For instance, in the U.S. there are now more than 30,000 metric tons of spent fuel stored at nuclear power plants, and the amount grows by about 2,000 metric tons a year. With the nuclear waste repository under development at Yucca Mountain, Nev., now mired in controversy and not expected to open before 2015 at the earliest [see "Can Nuclear Waste Be Stored Safely at Yucca Mountain?" by Chris G. Whipple; SCIENTIFIC AMERICAN, June 1996], pressure is mounting to put this material somewhere.

The disposition of excess plutonium and uranium taken from decommissioned nuclear weapons is an even more pressing issue, given the crisis that might ensue if such material were to fall into the wrong hands. The U.S. and Russia have each accumulated more than 100 metric tons of weapons-grade plutonium, and each country should have at least 50 metric tons of excess plutonium, plus hundreds of tons of highly enriched uranium, left over from dismantled nuclear weapons. Preventing terrorists or "rogue states" from acquiring this material is, obviously, a grave concern, given that a metric ton of plutonium could be used to make hundreds of warheads, the precise number depending on the size of the bomb and the ingenuity of the designer.

The Clinton administration has endorsed two separate methods for ridding the nation of this dangerous legacy. Both entail significant technical, economic and political uncertainties. One scheme calls for the surplus weapons plutonium to be mixed with radioactive wastes and molded into a special type of glass (a process called vitrification) or, perhaps, ceramic for subsequent burial at a site yet to be chosen. The glass or ceramic would immobilize the radioactive atoms (to prevent them from seeping into the surrounding environment) and would make deliberate extraction of the plutonium difficult. But the matrix material does not shield against the radiation, so vitrified wastes would still remain quite hazardous before disposal. Moving ahead with vitrification in the U.S. has required construction of a new processing plant, situated near Aiken, S.C. Assuming this facility performs at its intended capacity, each day it will produce just one modest cylinder of glass containing about 20 or so kilograms of plutonium. The projected cost is $1.4 million for each of these glassy logs. And after that considerable expense and effort, someone still has to dispose of the highly radioactive products of this elaborate factory.

The second option would be to combine the recovered plutonium with uranium oxide to create a "mixed oxide" fuel for commercial reactors—although most nuclear power plants in the U.S. would require substantial modification before they could run on such a blend. This alternative measure of consuming mixed-oxide fuels at commercial power plants is technically feasible but nonetheless controversial. Such activities

STEEL PIPE, lowered from a ship on the surface, would be used to drill holes in the deep-sea muds and, later, convey nuclear waste containers for permanent burial—according to the plan envisioned. Mud pumped into the borehole would then seal the nuclear refuse within the clay-rich undersea formation, effectively isolating the radioactive materials.

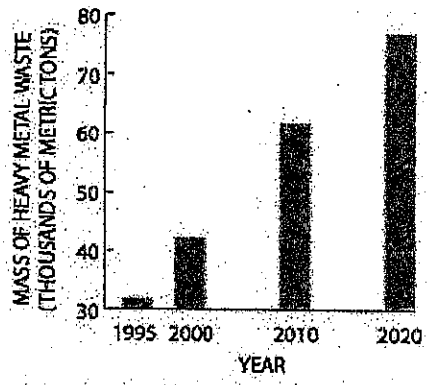


would blur the traditional separation between military and civilian nuclear programs and demand heightened security, particularly at mixed-oxide fabrication plants (of which none currently exist in the U.S.), where material suitable for building a nuclear bomb might be stolen. And in the end, mixed-oxide reactors would produce other types of radioactive waste. Hence, neither of the schemes planned for disposing of material from nuclear weapons is entirely satisfactory.

Pressing Problems

For the past 15 years, the operators of nuclear power plants in the U.S. have been paying the Department of Energy in advance for the eventual storage or disposal of their wastes. Even though there is no place yet available to put this radioactive refuse, the courts have ordered the DOE to meet its contractual obligations and begin accepting expended fuel rods from nuclear utilities this year. It is not at all clear what the DOE will do with these materials. One plan supported by the U.S. Senate is to build a temporary storage facility in Nevada near the Yucca Mountain site, but President Bill Clinton opposes this stopgap measure. In any event, the mounting pressure to take some action increases the likelihood of hasty, ill-considered judgments. The best course, in our opinion, would be to do nothing too drastic for now; immediate action should be limited to putting the spent fuel currently residing in cooling ponds into dry storage as needed and trying to stabilize the leaks in high-level-waste containers at weapons sites, while scientists and engineers thoroughly investigate all reasonable means for permanent disposal.

Although some ambitious thinkers have suggested that nuclear waste might one day be launched into space and from there cast into the sun, most people who have studied the problem agree that safety and economy demand that the waste be put permanently underground. Curiously, the search for a suitable nuclear graveyard has been confined almost exclusively to sites on the continents, despite the fact that geologic formations below the world's oceans, which cover some 70 percent of the planet's surface, may offer even greater potential. The disposal of nuclear weapons and wastes below the seabed should not be confused with disposal in the deep-



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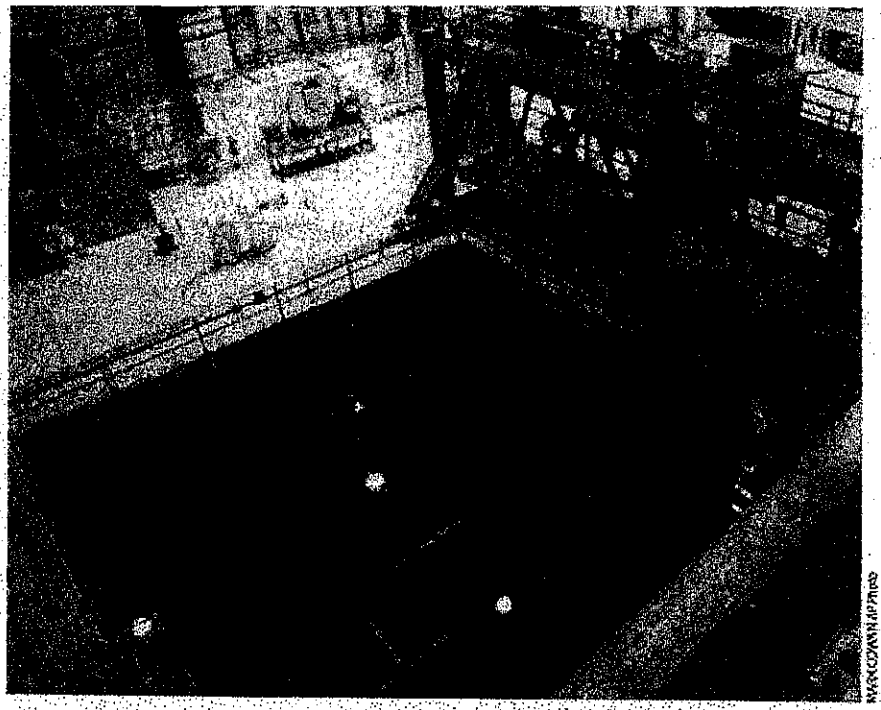


MARCO GRUNDLER/AP PHOTO

SPENT REACTOR FUEL will more than double in quantity in the U.S. by the year 2020, even if no new nuclear power plants are built, according to estimates of the Department of Energy (*graph*). Because no procedures for permanent disposal are yet established, the spent nuclear fuel is now stored temporarily at the reactor sites, often in cooling ponds (*above*).

ocean trenches formed at the juncture of two tectonic plates—a risky proposition that would involve depositing waste canisters into some of the most geologically unpredictable places on the earth, with great uncertainty as to where the material would finally reside.

Subseabed disposal, in contrast, would utilize some of the world's most stable and predictable terrain, with radioactive waste or nuclear materials from warheads "surgically" implanted in the middle of oceanic tectonic plates. Selecting sites for disposal that are far from plate boundaries would minimize chances of disruption by volcanoes, earthquakes, crustal shifts and other seismic activity. Many studies by marine scientists have identified broad zones in the Atlantic and Pacific that have remained geologically inert for tens of millions of years. What is more, the clay-rich muds that would entomb the radioactive materials have intrinsically favorable characteristics: low permeability to water, a high adsorption capacity for these dangerous elements and a natural plasticity that enables the ooze to seal up any cracks or rifts that might develop around a waste container. So the exact form of the wastes (for example, whether they are vitrified or not) does not affect the feasibility of this approach. No geologic formations on land are known to offer all these favorable properties.

It is also important to note that disposal would not be in the oceans, per se, but rather in the sediments below. Placing nuclear waste canisters hundreds of meters underneath the floor of the deep ocean (which is, itself, some five or so kilometers below the sea surface) could be accomplished using standard deep-sea drilling techniques. The next step—backfilling to seal and pack the boreholes—is also a routine practice. This technology has proved itself through decades of use by the petroleum industry to probe the continental shelves and, more recently, by members of the Ocean Drilling Program, an international consortium of scientific researchers, to explore deeper locales.

We envision a specialized team of drillers creating boreholes in the abyssal muds and clays at carefully selected locations. These cylindrical shafts, some tens to hundreds of meters deep, would probably be spaced several hundred meters apart to allow for easy maneuvering. Individual canisters, housing plutonium or other radioactive wastes, would then be lowered by cable into the holes. The canisters would be stacked vertically but separated by 20 or more meters of mud, which could be pumped into the hole after each canister was emplaced.

As is the case for disposal within Yucca Mountain, the waste canisters themselves would last a few thousand years at most. Under the seabed, however, the muddy clays, which cling tenaciously to plutonium and many other radioactive elements, would prevent these substances from seeping into the waters above. Experiments conducted as part of an international research program concluded that plutonium (and other transuranic elements) buried in the clays would not migrate more than a few meters from a breached canister after even 100,000 years. The rates of migration for uranium and some other radioactive waste elements need yet to be properly determined. Still, their burial several tens to 100 meters or more into the sediments would most likely buy enough time for the radioactivity of all the waste either to decay or to dissipate to levels below those found naturally in seawater.

The Seabed Working Group, as the now defunct research program was called, consisted of 200 investigators from 10 countries. Led by the U.S. and sponsored by the Nuclear Energy Agency of the Organization for Economic Cooperation and Development, the project ran from 1976 to 1986 at a total cost of about $120 million. This program was an outgrowth of a smaller effort at Sandia National Laboratories that was initiated in response to a suggestion by one of the authors (Hollister), who conceived of the idea of subseabed disposal in 1973.

As part of the international program, scientists extracted core samples of the seabed and made preliminary environmental observations at about half a dozen sites in the northern Atlantic and Pacific oceans. The collected sediments showed an uninterrupted history of geologic tranquillity over the past 50 to 100 million years. And there is no reason to believe that these particular sites are extraordinary. On the contrary, thousands of cores from other midplate locations since examined as part of the Ocean Drilling Program indicate that the sediments that were studied origi-

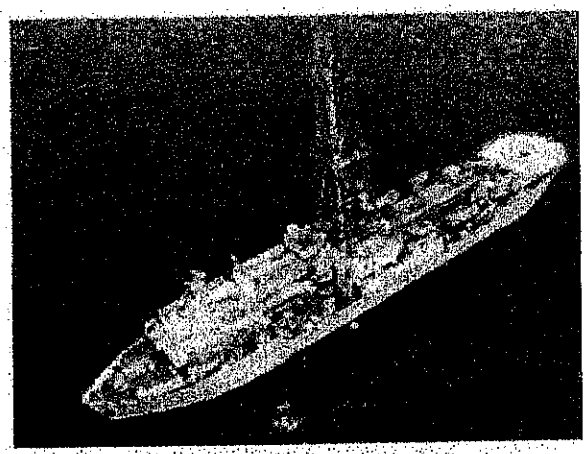
nally are typical of the abyssal clays that cover nearly 20 percent of the earth. So one thing is clear: although other factors may militate against subseabed disposal, it will not be constrained by a lack of space.

Reviving an Old Idea

The Seabed Working Group concluded that although a substantial body of information supports the technical feasibility of the concept, further research "should be conducted before any attempt is made to use seabed disposal for high-level waste and spent fuel." Unfortunately, the additional investigations were never carried out because the U.S.—the principal financial backer of this research—cut off all funding in 1986 so that the nation could concentrate its efforts on land-based disposal. A year later the federal government elected to focus exclusively on developing a repository at Yucca Mountain—a shortsighted decision, especially in view of current doubts as to whether the facility will ever open. And even if the Yucca Mountain repository does become operational, it will not be able to handle all the high-level wastes from military and commercial sources that will have accumulated by the time of its inauguration, let alone the 2,000 or more tons of waste each year the nuclear industry will continue to churn out.

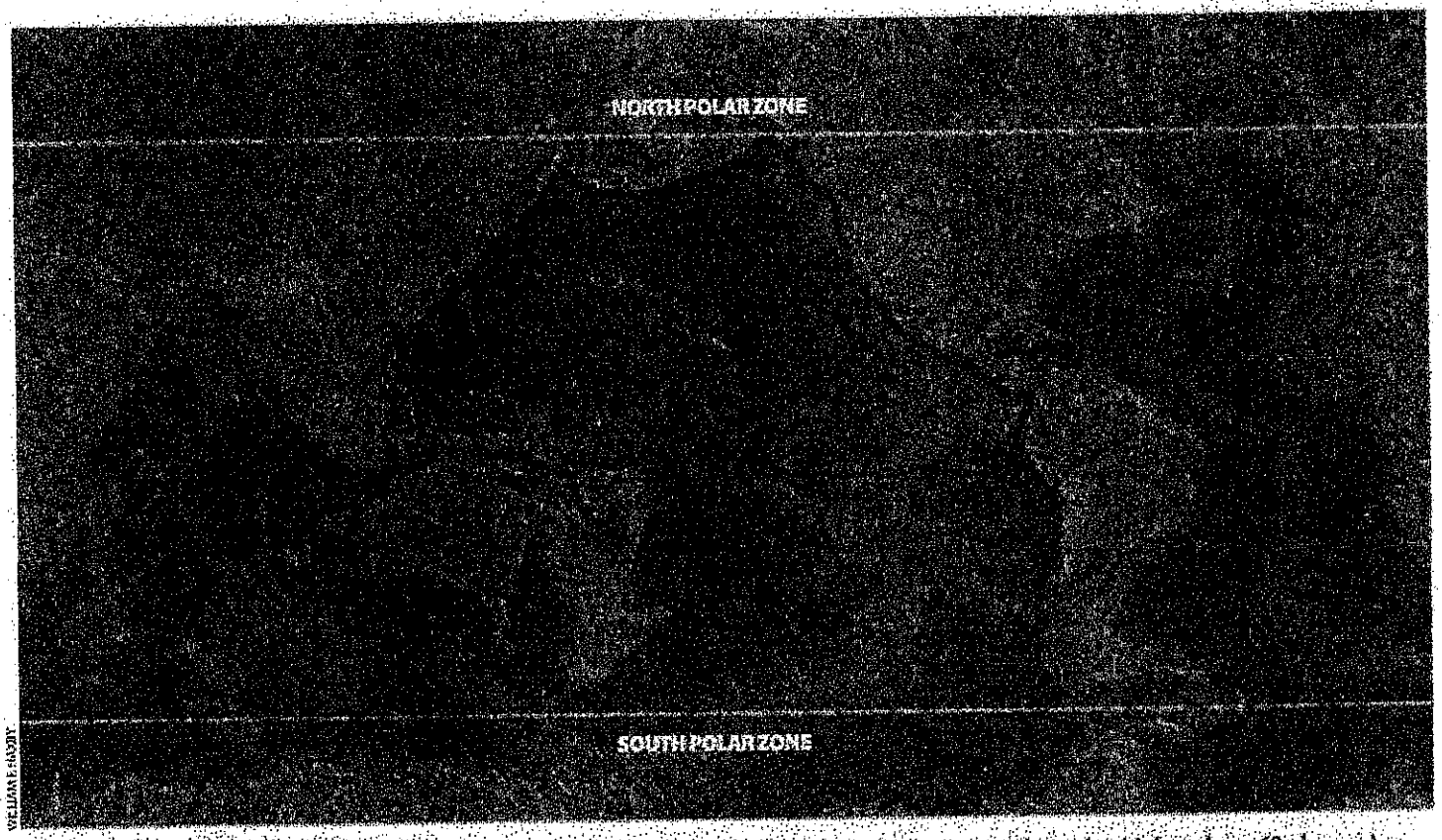
At some point, policymakers are going to have to face this reality and start exploring alternative sites and approaches. This view was precisely the conclusion expressed in a 1990 report from the National Academy of Sciences, which said that alternatives to mined geologic repositories, including subseabed disposal, should be pursued—a recommendation that remains absolutely valid today.

Fortunately, most of the experiments needed to assess more fully both the reliability and safety of subseabed disposal have been designed, and in many cases prototype equipment has already been built. One important experiment that remains to be done would be to test whether plutonium and other radioactive elements move through ocean-floor clays at the same rates measured in the laboratory. And more work is required



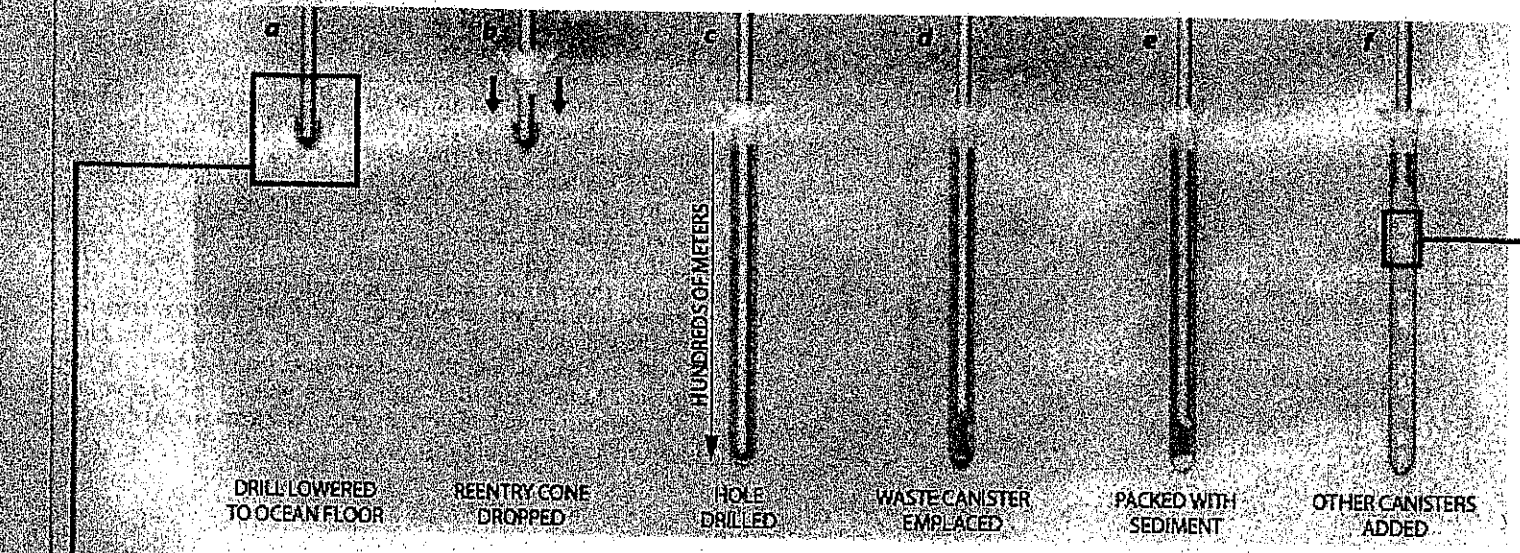
COURTESY JOINT OCEANOGRAPHIC INSTITUTIONS

DEEP-SEA DRILL SHIP, such as the one used by scientists of the Ocean Drilling Program, could bore holes under the seabed, insert nuclear waste containers and seal them with mud.



WILLIAM E. HAUBY

SEAFLOOR PROVINCES are not all suited for the disposal of nuclear wastes. In searching for candidate areas, scientists would probably eliminate places where the ocean floor is shallower than about four kilometers (*light blue*), because these areas coincide with plate-tectonic spreading centers and are often blanketed by inappropriate types of sediments. They would also rule out other regions of tectonic activity, such as plate collision (*red*) or vulcanism. Polar zones (latitudes higher than 60 degrees) would be discounted because marine sediments there commonly contain coarse rock fragments carried in by icebergs. Even after these and other broad areas (such as around continental rises, where the sediments are thick enough to house valuable quantities of oil or gas) are exempted, vast stretches of seafloor still offer ample possibilities for burying nuclear wastes (*dark blue*).



to learn how the heat given off by fuel rods (caused by the rapid decay of various products of nuclear fission) would affect surrounding clays.

Research is also needed to determine the potential for disturbing the ecology of the ocean floor and the waters above. At present, the evidence suggests that mobile, multicellular life-forms inhabit only the top meter or so of the abyssal clays. Below a meter, there appear to be no organisms capable of transporting radioactive substances upward to the seafloor. Still, scientists would want to know exactly what the consequences would be if radioactive substances diffused to the seafloor on their own. Researchers would want to ascertain, for instance, exactly how quickly relatively soluble carriers of radioactivity (such as certain forms of cesium and technetium) would be diluted to background levels. And they would want to be able to predict the fate of comparatively insoluble elements, such as plutonium.

So far no evidence has been found of currents strong enough to overcome gravity and bring claybound plutonium particles to the ocean surface. Most likely the material would remain on the seabed, unless it were carried up by creatures that feed on the sea bottom. That prospect, and all other ways that radioactive materials might rise from deep-sea sediment layers to surface waters, warrant further investigation. The transportation of nuclear waste on the high seas also requires careful study. In particular, procedures would need to be developed for recovering lost cargo should a ship carrying radioactive materials sink or accidentally drop its load.

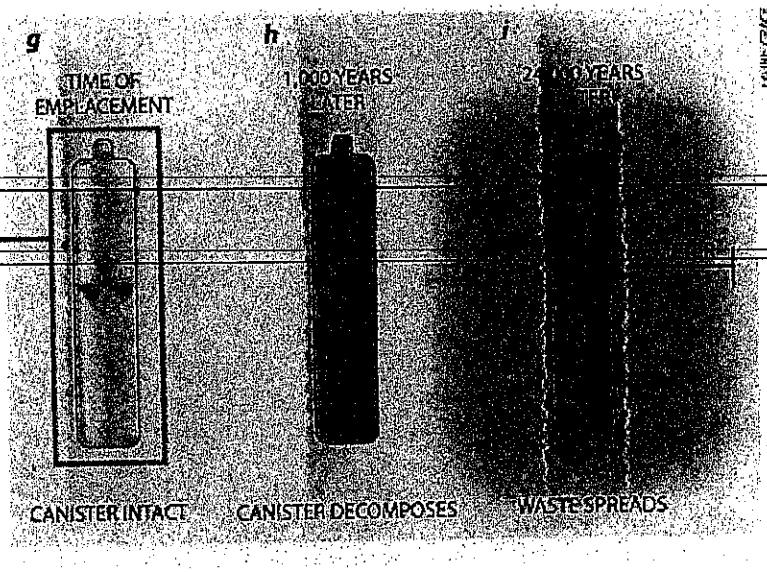
Engineers would probably seek to design the waste containers so that they could be readily retrieved from the bottom of the ocean in case of such a mishap or, in fact, even after their purposeful burial. Although subseabed disposal is intended to provide a permanent solution to the nuclear waste crisis, it may be necessary to recover material such as plutonium at some point in the future. That task would require the same type of drilling apparatus used for emplacement. With the location of the waste containers recorded at the time of interment, crews could readily guide the recovery equipment to the right spot (within a fraction of a meter) by relying on various navigation aids. At present, no nonnuclear nation has the deep-sea technology to accomplish this feat. In any event, performing such an operation in a clandestine way would be nearly impossible. Hence, the risk that a military or terrorist force could hijack the disposed wastes from under the seabed would be negligible.

All Eggs in One Basket

The overall cost of a concerted program to evaluate subseabed disposal might reach $250 million—admittedly a large sum for an oceanographic research endeavor. But it is a relatively modest price to pay considering the immense benefits that could result. (As a point of comparison, about $2 billion has already been spent on site evaluation at Yucca Mountain, and another billion or two will probably be needed to complete further studies and secure regulatory approval. No actual construction, save for exploratory tunneling, has yet begun.) Yet no nation seems eager to invest in any research at all on subseabed disposal, despite the fact that it has never been seriously challenged on technical or scientific grounds. For example, a 1994 report by the National Academy of Sciences that reviewed disposal options for excess weapons plutonium called subseabed disposal "the leading alternative to mined geologic repositories" and judged implementation to be "potentially quick and moderate to low cost." But the academy panel stopped short of recommending the approach because of the anticipated difficulties in gaining public acceptance and possible conflicts with international law.

Convincing people of the virtues of subseabed burial is, admittedly, a tough sell. But so is the Yucca Mountain project, which is strongly opposed by state officials and residents of Nevada. Subseabed disposal may turn out to be easier to defend among the citizenry than land-based nuclear waste repositories, which are invariably subject to the "not in my backyard" syndrome.

In any case, subseabed disposal is certain to evoke significant opposition in the future should the idea ever go from being a remote possibility to a serious contender. Oddly, the concept has recently come under direct fire, even though no research has been done in more than a decade. A bill introduced last year in the House of Representatives contains a provision that would prohibit the subseabed disposal of spent nuclear fuel or high-level radioactive waste as well as prevent federal funding for any activity relating to subseabed dis-



JAMIE GRAGE

SEAFLOOR DISPOSAL would require a series of operations. After lowering a long, segmented drill pipe several kilometers to the ocean floor (*a*), technicians on the ship would put a "reentry cone" around the pipe and drop the device to the bottom (*b*). (The cone could guide another drill pipe to the hole later, should the need arise.) Turning and advancing the pipe (to which a bit is attached) would drill it into the ocean floor (*c*). By releasing the bit, the drillers could then lower a waste canister within the pipe using an internal cable (*d*). After packing that part of the hole with mud pumped down through the pipe (*e*), they would emplace other canisters above it (*f*). The topmost canister would reside at least some tens of meters below the seafloor (*g*). In about 1,000 years the metal sheathing would corrode, leaving the nuclear waste exposed to the muds (*h*). In 24,000 years (the radioactive half-life of plutonium 239), plutonium and other transuranic elements would migrate outward less than a meter (*i*).

posal—apparently including research. The intent of part of this bill is reasonable: subseabed disposal should be illegal until outstanding safety and environmental issues can be resolved. But it makes absolutely no sense to ban research on a technically promising concept for the disposal of weapons plutonium and high-level nuclear wastes.

Subseabed disposal faces serious international hurdles as well. In 1996, at a meeting sponsored by the International Maritime Organization, contracting parties to the so-called London Dumping Convention voted to classify the disposal of nuclear material below the seabed as "ocean dumping" and therefore prohibited by international law. This resolution still awaits ratification by the signatory nations, and the outcome may not be known for several years. But regardless of how that vote goes, we submit that "ocean dumping" is a wholly inappropriate label. It makes as much sense as calling the burial of nuclear wastes in Yucca Mountain "roadside littering."

Yet even assuming that the nations involved uphold the ban, the bylaws of the London convention would allow for subseabed disposal to be reviewed in 25 years, an interval that would provide sufficient time to complete a comprehensive appraisal of this disposal method. The 25-year moratorium could be wisely spent addressing the remaining scientific and engineering questions as well as gaining a firmer grasp of the economics of this approach, which remains one of the biggest uncertainties at present. In our most optimistic view, the legal infrastructure already established through the London convention could eventually support a program of subseabed disposal on an international basis.

A parallel effort should be devoted to public education and discussion. Right now there seems to be a strong aversion among some environmental advocates to any action at all to address the nuclear waste problem—and a solution that involves the oceans seems particularly unpalatable. But it makes no sense to dismiss the possibility of disposal in stable suboceanic formations—which exceed the land area available for mined repositories by several orders of magnitude—simply because some people object to the concept in general. It would be much more prudent to base a policy for the disposal of nuclear waste, whose environmental consequences might extend for hundreds of thousands of years, on sound scientific principles.

Barring a miraculous technical breakthrough that would allow radioactive elements to be easily transformed into stable ones or would provide the safe and economic dispatch of nuclear wastes to the sun, society must ultimately find somewhere on the planet to dispose of the by-products of the decades-long nuclear experiment. Americans in particular cannot responsibly pin all hopes on a single, undersized facility in a Nevada mountainside. They owe it to future generations to broaden their outlook and explore other possibilities, including those that involve the thick, muddy strata under the sea.

The Authors

CHARLES D. HOLLISTER and STEVEN NADIS began regular discussions about subseabed disposal of nuclear wastes in 1995. Hollister, who is a vice president of the corporation of Woods Hole Oceanographic Institution, has studied deep-sea sediments for the past three decades. He continues to do research in the department of geology and geophysics at Woods Hole. Nadis graduated from Hampshire College in 1977 and promptly joined the staff of the Union of Concerned Scientists, where he conducted research on nuclear power, the arms race and renewable energy sources. He then wrote about transportation policy for the World Resources Institute. Currently a Knight Science Journalism Fellow at the Massachusetts Institute of Technology, Nadis specializes in writing about science and technology.

Further Reading

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ATTACHMENT C

Sub-Seabed Burial of Nuclear Waste: If the Disposal Method Could Succeed Technically, Could I t Also Succeed Legally?

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Boston College Environmental Affairs Law Review

Volume 41 | Issue 2

Article 6

4-11-2014

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SUB-SEABED BURIAL OF NUCLEAR WASTE: IF THE DISPOSAL METHOD COULD SUCCEED TECHNICALLY, COULD IT ALSO SUCCEED LEGALLY?

AMAL BALA*

Abstract: Nuclear power is a relatively familiar method of generating electricity in the United States, but the process remains controversial because of high-level radioactive waste. Conventional nuclear reactors use uranium fuel to sustain nuclear fission, but eventually such fuel becomes spent and requires storage and disposal because of its dangerous radioactive properties. The United States produces a large amount of nuclear waste every year but has struggled to develop a long-term disposal strategy. America favors land-based disposal methods and is not giving serious consideration to alternative methods, including sub-seabed burial. This Note discusses preliminary research on sub-seabed burial of nuclear waste and examines a sample of domestic and international laws that could apply if the United States were to use the disposal method. This Note concludes that if further research were to show that sub-seabed disposal would work properly, the United States could probably engage in deep burial through drilling without violating the applicable international and domestic laws discussed in this Note.

INTRODUCTION

Sustainable living is a popular environmental philosophy that promotes the importance of "living in harmony with nature."[1] This concept sometimes appears as a trendy marketing device to sell eco-friendly products ranging from electric lawnmowers to "Grow Your Own Mushrooms" kits, but the underlying idea of preserving Earth's environment remains important.[2] Unfortu-

* Editor in Chief, BOSTON COLLEGE ENVIRONMENTAL AFFAIRS LAW REVIEW, 2013–2014. The author thanks his family, the EALR staff, and the Boston College Law School community.

[1] *See* Robert F. Housman, *Sustainable Living: Seeking Instructions for the Future: Indigenous Peoples' Traditions and Environmental Protection*, 3 TOURO J. TRANSNAT'L L. 141, 145 (1992).

[2] *See id.* (suggesting that the goal of sustainable living is to "determine how we can raise global standards of living while . . . minimizing current and future environmental impacts and remedying our past environmental faults"); *Earthwise 20 Inch 12 Amp Electric Lawn Mower with Grass Bag*, EARTHEASY, http://eartheasy.com/earthwise-20-inch-12-amp-electric-lawn-mower-with-grass-bag (last visited Jan. 31, 2014), *available at* http://perma.cc/6KHP-HE6Z; *Grow Your Own Mushrooms*

nately, nuclear energy policy in the United States threatens this ideal.[3] Nuclear power plays a significant role in supplying electricity to homes and businesses across the nation.[4] America's nuclear power industry has become unsustainable, however, because the United States continues to create huge amounts of high-level radioactive waste with no clear plan for long-term storage or disposal.[5] Without proper storage or disposal, nuclear waste can contaminate the environment and threaten human health for extremely lengthy periods of time.[6]

Leaks discovered in 2013 at the Hanford Nuclear Reservation in Washington state illustrate this problem.[7] Officials found that six underground tanks were leaking nuclear waste and threatening to contaminate soil and groundwater beneath the site, which was established in 1943 as part of the U.S. government's Manhattan Project.[8] The leaks were discovered at a time when federal budget cuts threatened to delay cleanup efforts.[9] The government planned a multi-billion dollar cleanup that would make the waste suitable for burial elsewhere, but the plan was announced as being years from implementation.[10] The EPA estimated that disposal from weapons production at the 586-square-mile site contributed to 130 million cubic yards of contaminated soil and debris.[11] About 475 billion gallons of contaminated water have entered the soil.[12]

The environmental damage from the Hanford site illustrates a lack of foresight.[13] The United States has ignored the consequences of unrestrained

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Kit, EARTHEASY, http://eartheasy.com/grow-your-own-mushroom-kit (last visited Jan. 31, 2014), *available at* http://perma.cc/N8J6-UVSW.

[3] *See* Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 196 (1983) (discussing health effects and economic issues related to nuclear waste).

[4] *See, e.g.*, ANDREW C. KLEIN, CLEAN ENERGY, GUARANTEED: WHY NUCLEAR ENERGY IS WORTH THE COST 1 (2010), *available at* http://www.progressivefix.com/wp-content/uploads/2010/03/Clean-Energy-Guaranteed.pdf and http://perma.cc/Q94D-V9NL.

[5] *See* BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, REPORT TO THE SECRETARY OF ENERGY, at vi (2012), *available at* http://brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf and http://perma.cc/955X-EWH7 (stating that America's nuclear waste policy "has been troubled for decades and has now all but completely broken down").

[6] *Pacific Gas*, 461 U.S. at 196.

[7] Greg Botelho, *Governor: 6 Tanks Leaking Radioactive Waste at Washington Nuclear Site*, CNN (Feb. 22, 2013), http://www.cnn.com/2013/02/22/us/washington-nuclear/index.html, *available at* http://perma.cc/D9WR-ZBKH.

[8] *Id.*; Eric Johnson, *Radioactive Waste Leaking from Six Tanks at Washington State Nuclear Site*, REUTERS (Feb. 23, 2013), http://www.reuters.com/article/2013/02/23/us-usa-nuclear-leak-idUSBRE91L19G20130223, *available at* http://perma.cc/B8XF-QUA8.

[9] Botelho, *supra* note 7.

[10] Johnson, *supra* note 8.

[11] *Id.*

[12] *Id.*

[13] *See, e.g.*, GREENPEACE, NUCLEAR POWER: A DANGEROUS WASTE OF TIME 4 (2009), *available at* http://www.greenpeace.org/international/Global/international/planet-2/report/2009/4/nuclear-power-a-

nuclear activity in a rush to develop atomic weapons and generate nuclear power for electricity.[14] The Obama Administration recently halted construction of a national nuclear waste repository at Yucca Mountain, Nevada, because of local political opposition.[15] After this failure, President Obama's blue-ribbon panel on nuclear disposal still advocated "one or more geologic disposal facilities."[16] Perhaps to buy more time, the Nuclear Regulatory Commission declared in 2012 that decommissioned nuclear plants could store nuclear waste for at least sixty years after the licensed life of a plant, which is twice the length of the previous rule.[17] Despite the difficulties that America has encountered with land-based storage, alternative disposal options are potentially available.[18] One such option would involve burying nuclear waste deep under the ocean floor, but this option has not received serious attention lately despite its potentially attractive benefits.[19]

Part I of this Note summarizes the science of nuclear power, examines some of the arguments on both sides of the nuclear energy controversy, and discusses the risks of nuclear power.[20] Part II examines nuclear waste disposal, surveys the U.S. government's current disposal methods, and introduces sub-seabed disposal.[21] Part III summarizes a sample of international and domestic laws that govern nuclear waste disposal.[22] Finally, Part IV argues that if research were to show that sub-seabed disposal of nuclear waste would work properly and would not introduce radioactive matter into the water, the United States probably would not violate any of its obligations under international and

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dangerous-was.pdf and http://perma.cc/S2QC-UY9G (discussing the perils of nuclear waste production considering that "humankind has been on Earth for the last 200,000 years, yet it takes 240,000 years for plutonium to be considered safe").

[14] *See* BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at vi ("Put simply, this nation's failure to come to grips with the nuclear waste issue has already proved damaging and costly and it will be more damaging and more costly the longer it continues . . . .").

[15] *See id.* at vi, 22. Local opponents derided the legislation designating Yucca Mountain as the only candidate for a national nuclear waste site as the "Screw Nevada" bill. *Id.* at 22.

[16] *Id.* at vii.

[17] *See* New York v. Nuclear Reg. Comm'n, 681 F.3d 471, 475 (D.C. Cir. 2012).

[18] *See, e.g.*, *Storage and Disposal Options*, WORLD NUCLEAR ASS'N, http://goo.gl/6v1UEx (last updated Aug. 2013), *available at* http://perma.cc/7AK4-4QQ5.

[19] *See* Steven Nadis, *The Sub-Seabed Solution*, ATLANTIC MONTHLY, Oct. 1996, at 28, *available at* http://www.theatlantic.com/magazine/archive/1996/10/the-sub-seabed-solution/308434 and http://perma.cc/S2U6-SR9B (describing sub-seabed disposal as "possibly the best solution yet advanced to the nuclear-waste problem" despite setbacks from "a series of political blunders").

[20] *See infra* notes 24–62 and accompanying text.

[21] *See infra* notes 63–134 and accompanying text.

[22] *See infra* notes 135–189 and accompanying text.

domestic laws if America were to implement such disposal methods, at least not based on the limited sample of laws discussed in this Note.[23]

I. NUCLEAR POWER

A. *Overview of Nuclear Power*

Nuclear power involves splitting atoms to create a tremendous amount of heat that boils water.[24] The water turns into steam that pushes turbines to create electricity.[25] As of 2011, nuclear power provided about 5% of the world's "total primary energy supply" and 11.7% of "world electricity generation" in terms of fuel shares, with the United States, France, and Russia combining to create about 56% of the world's nuclear-generated electricity.[26] As of January 2014, 435 nuclear reactors were operational in thirty nations around the world with seventy-one reactors under construction.[27] Some submarines and aircraft carriers also use nuclear reactors for propulsion.[28] As of January 2014, the United States had 100 nuclear power reactors in 31 states that were operated by 30 different power companies.[29] Such power plants have generated an estimated 20% of the nation's electricity every year starting in 1990.[30]

Nuclear energy remains controversial because of the potential for radioactive contamination of the environment and extreme damage to human health in the event of an accident.[31] Nuclear power is also sometimes an expensive alternative to burning fossil fuels to generate electricity because of potentially

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[23] *See infra* notes 190–265 and accompanying text.

[24] Amit Asaravala, *How Nuclear Power Works*, WIRED (July 5, 2005), http://www.wired.com/science/discoveries/news/2005/07/68074, *available at* http://perma.cc/RV6U-BLLG.

[25] *Id.*

[26] INT'L ENERGY AGENCY, KEY WORLD ENERGY STATISTICS 6, 24, 17 (2013), *available at* http://www.iea.org/publications/freepublications/publication/KeyWorld2013.pdf and http://perma.cc/Q37C-ZTQR.

[27] *World Nuclear Power Reactors & Uranium Requirements*, WORLD NUCLEAR ASS'N (Jan. 3, 2014), http://www.world-nuclear.org/info/Facts-and-Figures/World-Nuclear-Power-Reactors-and-Uranium-Requirements, *available at* http://perma.cc/DSE8-4G9B.

[28] *Powering the Nuclear Navy*, NAT'L NUCLEAR SECURITY ADMIN., http://nnsa.energy.gov/ourmission/poweringnavy (last visited Feb 1, 2014), *available at* http://perma.cc/VPL2-VLVQ.

[29] *Nuclear Power in the USA*, WORLD NUCLEAR ASS'N, http://www.world-nuclear.org/info/Country-Profiles/Countries-T-Z/USA—Nuclear-Power/ (last updated January 2014), *available at* http://perma.cc/6EUS-3HHZ.

[30] *Frequently Asked Questions: How Many Nuclear Power Plants Are in the U.S. and Where Are They Located?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/tools/faqs/faq.cfm?id=207&t=3 (last updated Jan. 10, 2013), *available at* http://perma.cc/E4D3-74B2.

[31] *See Push for No New Nukes*, GREENPEACE, http://www.greenpeace.org/usa/en/campaigns/nuclear (last visited Feb. 2, 2014), *available at* http://perma.cc/EQC4-RFU9.

high costs of nuclear fuel, building nuclear plants, and waste disposal.[32] Proponents of nuclear power, including the World Nuclear Association and International Atomic Energy Agency, suggest that nuclear power is an ideal form of sustainable energy that can help alleviate anthropogenic global warming by reducing carbon emissions.[33] Proponents also claim that nuclear power offers stable fuel prices, competitive energy output, and reduced pollution.[34] In contrast, opponents of nuclear energy, including international environmental groups such as Greenpeace, argue that nuclear power is inordinately expensive, nuclear waste is an unacceptably dangerous byproduct because of radiation hazards, and safer alternatives are available for generating electricity.[35]

B. *The Science of Nuclear Energy*

Conventional nuclear power plants use nuclear fission to generate heat, steam, and ultimately electricity.[36] Nuclear fission involves bombarding fissionable material, including certain variations of uranium and plutonium, with neutrons to split the nuclei of atoms in a chain reaction.[37] This process releases heat, energy, and more neutrons that continue the reaction.[38] The heat boils water, and the resulting steam powers turbines that generate electricity.[39]

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[32] *The Economics of Nuclear Power*, WORLD NUCLEAR ASS'N, http://www.world-nuclear.org/info/Economic-Aspects/Economics-of-Nuclear-Power (last updated Oct. 2013), *available at* http://perma.cc/44UY-M4EJ.

[33] *See, e.g.*, *Electricity Generation: What Are the Options?*, WORLD NUCLEAR ASS'N, http://www.world-nuclear.org/Nuclear-Basics/Electricity-generation---what-are-the-options-/ (last visited Feb. 2, 2014), *available at* http://perma.cc/YLR3-WE3V (suggesting that nuclear power is advantageous because "only small amounts" of greenhouse gases result from the nuclear fuel cycle); Burton Richter, *Between Two Devils*, IAEA BULLETIN, Mar. 2006, at 14, 14, *available at* http://www.iaea.org/Publications/Magazines/Bulletin/Bull472/pdfs/betwecn2devils.pdf and http://perma.cc/58CH-2CHJ (advocating for nuclear energy as a solution to help mitigate climate change); James Lovelock, *Nuclear Power Is the Only Green Solution*, INDEPENDENT (May 24, 2004), http://www.independent.co.uk/voices/commentators/james-lovelock-nuclear-power-is-the-only-green-solution-6169341.html, *available at* http://perma.cc/C4WK-N8XV (advocating for nuclear power as "the safest of all energy sources" and a solution to global warming).

[34] *See* KLEIN, *supra* note 4, at 1, 2 (discussing reduced carbon emissions, stable fuel costs, and competitive energy output as benefits of nuclear power).

[35] *See, e.g.*, *Push for No New Nukes*, *supra* note 31; *Dirty, Dangerous and Expensive: The Truth About Nuclear Power*, PHYSICIANS FOR SOCIAL RESPONSIBILITY, http://www.psr.org/chapters/washington/resources/nuclear-power-factsheet.html (last visited Feb. 2, 1014), *available at* http://perma.cc/W88-SMKQ.

[36] Asaravala, *supra* note 24.

[37] *Id.*; *Nuclear Fission and Fusion*, INT'L ENERGY AGENCY, http://www.iea.org/topics/nuclearfissionandfusion (last visited Feb. 1, 2014), *available at* http://perma.cc/32CT-YS2X.

[38] Asaravala, *supra* note 24.

[39] *Id.*

When nuclear fuel is no longer capable of sustaining further reactions in the fission process, it requires careful storage and disposal because the material is thermally hot and extremely radioactive.[40] Radioactive matter emits surplus energy through radioactive decay.[41] Some matter can lose its radioactivity within fractions of a second, but other matter can remain radioactive for billions of years.[42]

Spent nuclear fuel (SNF) can no longer sustain the nuclear fission process in conventional thermal reactors.[43] Varieties of SNF exist, however, and in some instances manufacturers can reprocess SNF to recover other valuable materials that can serve as fuel in certain types of nuclear reactors.[44] Some scientists have predicted that SNF might become a significant source of fuel in the future as nuclear technology continues to develop.[45] Various techniques for disposal and storage of SNF exist in different nations around the world.[46]

C. *Health Risks and Environmental Hazards*

Nuclear fuel can sustain the fission process in a conventional thermal reactor for about four to six years.[47] After this time, SNF requires extraction from the reactor and physical isolation because its radioactive properties pose an extraordinary danger to living creatures and the environment.[48] The type of radiation that characterizes SNF involves unstable atoms emitting excess ener-

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[40] *High-Level Waste*, NUCLEAR REG. COMM'N, http://www.nrc.gov/waste/high-level-waste.html (last updated Apr. 6, 2012), *available at* http://perma.cc/TXA2-YN2V.

[41] RUTGERS ENVTL. SCIENCES TRAINING CTR., WHAT IS RADIOACTIVE MATERIAL? 1 (1996), *available at* http://www.nj.gov/dep/rpp/llrw/download/fact01.pdf and http://perma.cc/3L8T-6V87.

[42] *Id.* at 2.

[43] *See Spent Nuclear Fuel*, NUCLEAR REG. COMM'N, http://www.nrc.gov/reading-rm/basic-ref/glossary/spent-nuclear-fuel.html (last updated Dec. 11, 2013), *available at* http://perma.cc/U3N4-H523.

[44] *What Is Spent Nuclear Fuel?*, IDAHO NAT'L LABORATORY, https://inlportal.inl.gov/portal/server.pt/community/national_spent_nuclear_fuel/389/national_spent_nuclear_fuel_-_what_is_snf_ (last visited Feb. 1, 2014), *available at* http://perma.cc/RAZ8-3N2M (discussing different types of spent fuel); *see* John Matson, *MOX Battle: Mixed Oxide Nuclear Fuel Raises Safety Questions*, SCI. AM. (Mar. 25, 2011), http://www.scientificamerican.com/article.cfm?id=mox-fuel-nuclear, *available at* http://perma.cc/Y69N-GLJ2 (discussing MOX, a mixed oxide fuel that can serve as a method of disposing of excess plutonium).

[45] David Biello, *Is Spent Nuclear Fuel a Waste or a Resource?*, SCI. AM. (Sept. 18, 2010), http://www.scientificamerican.com/article.cfm?id=is-spent-nuclear-fuel-waste-or-resource, *available at* http://perma.cc/KD45-SRRB.

[46] Megan Easley, Note, *Standing in Nuclear Waste: Challenging the Disposal of Yucca Mountain*, 97 CORNELL L. REV. 659, 665 (2012) (mentioning that SNF disposal is diverse); *Storage and Disposal Options*, *supra* note 18 (describing varieties of storage and disposal).

[47] *New York v. Nuclear Reg. Comm'n*, 681 F.3d at 474.

[48] *See id.*

gy.[49] Such radiation can cause severe damage to living tissue.[50] For example, nuclear waste can cause or contribute to "genetic mutations, birth defects, cancer, [leukemia] and disorders of the reproductive, immune, cardiovascular and endocrine systems."[51] When scientists remove SNF from reactors, the waste emits enough radiation to kill anyone nearby within minutes.[52]

SNF remains dangerous "for time spans seemingly beyond human comprehension."[53] Some materials in SNF can remain radioactive for millions of years.[54] Accordingly, storing and disposing of America's vast amount of SNF, which is constantly growing and might reach 150,000 metric tons by 2050, remains a major challenge because of the unique hazards involved.[55] Leaving SNF in permanent storage at nuclear power plants can pose several dangers, including human exposure to storage tanks that could leak radioactive waste, providing terrorists with easy targets for attack, and allowing natural disasters to become even worse.[56] The 2011 Japan earthquake, which triggered a tsunami and caused a meltdown of multiple nuclear reactors, exposes the potential dangers of storing SNF on site.[57]

Preparing nuclear fuel for use in reactors also involves significant health and environmental risks.[58] Nuclear power plants typically use uranium as fuel, but preparing uranium for use in a reactor requires mining, extraction, and processing of uranium ore.[59] The mining and refinement processes have a potential to damage the environment through the release of toxic substances.[60] Ura-

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[49] *See, e.g.*, *What Is Radiation?*, HEALTH PHYSICS SOC'Y, http://hps.org/publicinformation/ate/faqs/whatisradiation.html (last updated Dec. 7, 2013), *available at* http://perma.cc/F2E8-S4ZN (discussing ionizing radiation as a product of unstable atoms); *Radiation Doses in Perspective*, ENVTL. PROT. AGENCY, http://www.epa.gov/radiation/understand/perspective.html (last updated Sept. 24, 2013), *available at* http://perma.cc/ERL9-T6L5 (mentioning radiation doses from nuclear power plants).

[50] *See Health Effects*, ENVTL. PROT. AGENCY, http://www.epa.gov/rpdweb00/understand/health_effects.html (last updated Aug. 7, 2012), *available at* http://perma.cc/K6PY-FLSR.

[51] GREENPEACE, *supra* note 13, at 2.

[52] *New York v. Nuclear Reg. Comm'n*, 681 F.3d at 474.

[53] Nuclear Energy Inst., Inc. v. Envtl. Prot. Agency, 373 F.3d 1251, 1258 (D.C. Cir. 2004).

[54] *Id.*

[55] *New York v. Nuclear Reg. Comm'n*, 681 F.3d at 474.

[56] Easley, *supra* note 46, at 690.

[57] *3 Nuclear Reactors Melted Down After Quake, Japan Confirms*, CNN (June 7, 2011), http://edition.cnn.com/2011/WORLD/asiapcf/06/06/japan.nuclear.meltdown/index.html, *available at* http://perma.cc/V24J-39VD. SNF did not cause the reactors in Japan to undergo meltdowns, but the presence of SNF could conceivably make such disasters significantly worse. *See id.*

[58] GREENPEACE, *supra* note 13, at 2.

[59] *What Is Uranium? How Does It Work?*, WORLD NUCLEAR ASS'N, http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Introduction/What-is-Uranium---How-Does-it-Work-/ (last updated Dec. 2012), *available at* http://perma.cc/SW4P-KX3L.

[60] *See* GREENPEACE, *supra* note 13, at 2.

nium ore typically consists of only a small amount of uranium.[61] A significant amount of matter extracted during uranium ore mining is waste that contains radioactive and toxic substances.[62]

II. Disposal of Nuclear Waste

A. *Overview of Nuclear Waste Disposal*

According to one of many varying estimates, in 2012 the United States was storing at least 71,000 tons of spent nuclear fuel (SNF) at nuclear power plants across the nation with a generation rate of at least 2200 tons of SNF per year.[63] SNF usually exists in a solid state and consists of fuel pellets in long metal rods.[64] Developing a strategy for storage, reprocessing, and disposal of these used fuel pellets is a national priority because of the dangers that such high volumes of radioactive waste can pose to humans and the environment.[65] Scientists advise that long-term policies for handling SNF are necessary to protect living creatures and ecosystems from the potentially lethal effects of radioactive matter.[66]

Reprocessing is a partial solution that can allow manufacturers of nuclear energy to recover unused uranium and plutonium from SNF and gain additional energy from the original materials.[67] Reprocessing can turn SNF into a liquid state, and research is ongoing to develop processes to solidify such waste

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[61] *Id.*

[62] *Id.*; John D. Collins, *Reclamation and Groundwater Restoration in the Uranium Milling Industry: An Assessment of UMTRCA, Title II*, 11 J. Nat. Resources & Envtl. L. 23, 28 (1996).

[63] Associated Press, *Panel: Start Now to Replace Nevada Nuke Site*, NewsOK (Jan. 26, 2012), http://newsok.com/panel-start-now-to-replace-nevada-nuke-site/article/feed/340450, *available at* http://perma.cc/6NWU-ZY8Q. Other estimates have placed the total number lower, around 65,000 tons of SNF. *See* Blue Ribbon Comm'n on America's Nuclear Future, *supra* note 5, at 14.

[64] Nuclear Reg. Comm'n, Radioactive Waste: Production, Storage, Disposal 2 (2002), *available at* http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0216/r2/br0216r2.pdf and http://perma.cc/D8SE-M7HW.

[65] *See, e.g.*, Charles H. Montange, *Federal Nuclear Waste Disposal Policy*, 27 Nat. Resources J. 309, 376–79 (1987) (discussing the radiation hazards of SNF and history of nuclear power regulation in the United States).

[66] *See Managing Radioactive Materials & Waste*, Envtl. Prot. Agency, http://www.epa.gov/radiation/manage.html (last updated Apr. 24, 2012), *available at* http://perma.cc/XY7T-C3BL (stating that disposal of radioactive waste is vital "to protecting the public's health and safety and the quality of the environment").

[67] *See Processing of Used Nuclear Fuel*, World Nuclear Ass'n, http://www.world-nuclear.org/info/Nuclear-Fuel-Cycle/Fuel-Recycling/Processing-of-Used-Nuclear-Fuel/ (last updated Sept. 2013), *available at* http://perma.cc/93XJ-CQPY.

for geologic burial.[68] Reprocessing cannot eliminate all nuclear waste, however, so nuclear power plant operators still require long-term storage or disposal for their remaining SNF.[69] Options for storage and disposal have included deep geological repositories,[70] ejecting SNF into outer space on rockets,[71] shooting SNF into the Sun on rockets,[72] dumping SNF into the sea,[73] and injecting SNF into the deep seabed.[74]

Scientists disfavor the notion of sending SNF into outer space on rockets because of fears that attempts to launch such rockets could fail and spread radioactive matter.[75] The U.S government attempted to establish a deep geological repository for SNF at Yucca Mountain but failed because of political opposition from Nevada.[76] The United States no longer dumps radioactive waste into the sea.[77] Sub-seabed burial of SNF remains a potential option but has not received serious consideration lately.[78]

B. *Current Storage Practices for Nuclear Waste, and Brief History*

The nuclear energy industry in the United States generally consists of privately owned nuclear power plants that the Nuclear Regulatory Commission

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[68] *Spent Nuclear Fuel and High-Level Radioactive Waste*, ENVTL. PROT. AGENCY, http://www.epa.gov/rpdweb00/docs/radwaste/402-k-94-001-snf_hlw.html (last updated July 8, 2011), *available at* http://perma.cc/9U5F-P7FQ.

[69] GREENPEACE, *supra* note 13, at 5.

[70] *See* Richard B. Stewart, *U.S. Nuclear Waste Law and Policy: Fixing a Bankrupt System*, 17 N.Y.U. ENVTL. L.J. 783, 795–97 (2008) (discussing the planned geological repository at Yucca Mountain).

[71] Robin Dusek, Note, *Lost in Space: The Legal Feasibility of Nuclear Waste Disposal in Outer Space*, 22 WM. & MARY ENVTL. L. & POL'Y REV. 181, 195–96 (1997).

[72] *Id.*

[73] Dominique P. Calmet, *Ocean Disposal of Radioactive Waste: Status Report*, 31 IAEA BULLETIN, No. 4, 1989, at 47, 47, *available at* http://www.iaea.org/Publications/Magazines/Bulletin/Bull314/31404684750.pdf and http://perma.cc/H5VS-GCFD.

[74] *Id.* at 50.

[75] *E.g.*, Bjorn Carey, *FYI: Why Not Just Dispose of Nuclear Waste in the Sun?*, POPULAR SCI. (Apr. 13, 2010), http://www.popsci.com/technology/article/2010-04/why-not-just-dispose-nuclear-waste-sun, *available at* http://perma.cc/67MX-MEKC.

[76] *See* BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at 23.

[77] INT'L ATOMIC ENERGY AGENCY, INVENTORY OF RADIOACTIVE WASTE DISPOSALS AT SEA 3–4, 64–68 (1999), *available at* http://www-pub.iaea.org/MTCD/publications/PDF/te_1105_prn.pdf and http://perma.cc/4GFB-EWWA (providing a chronology of sea dumping and presenting an inventory of America's past dumping activities).

[78] *See* MARK HOLT, CIVILIAN NUCLEAR WASTE DISPOSAL 10 (2003), *available at* http://assets.opencrs.com/rpts/IB92059_20030806.pdf and http://perma.cc/J2SU-PFD6 (mentioning disposal in deep-sea trenches as an alternative not under consideration).

(NRC) approves and licenses.[79] Nuclear energy producers currently store SNF in concrete pools with steel lining or huge airtight canisters made of concrete and steel.[80]

The U.S. government began formulating a national plan for SNF during the 1970s, when nuclear power was rising in prominence.[81] Congress passed the Nuclear Waste Policy Act (NWPA) in 1982 and declared that the federal government was responsible for permanent disposal of civilian nuclear waste in geologic repositories.[82] The NWPA placed the cost of disposal on civilian nuclear power plants.[83] Nuclear power plant owners (and their ratepayers) have been paying fees into the Nuclear Waste Fund based on energy output since 1983.[84] In exchange, the Department of Energy (DOE) assumed responsibility for disposing of civilian-generated SNF beginning on January 31, 1998.[85] Persistent delays in selecting a site for a national repository mounted because of political wrangling, and thus Congress passed the Nuclear Waste Policy Amendments Act of 1987 and selected Yucca Mountain as a national repository for SNF.[86]

Under the Obama Administration, however, the DOE succumbed to political opposition in March 2009 and finally abandoned the Yucca Mountain site, despite about $15 billion in expenditures.[87] Opponents of the project did not want Nevada to become the nation's dumping ground for nuclear waste.[88] Some commentators have been urging the federal government to find alternative options for disposal.[89] The NRC recently ruled that manufacturers can

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[79] *Backgrounder on Nuclear Power Plant Licensing Process*, NUCLEAR REG. COMM'N, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/licensing-process-bg.html (last updated Sept. 22, 2009), *available at* http://perma.cc/D7BR-CFM2 (describing a two-step licensing process for nuclear plants).

[80] *Nuclear Waste Management*, NUCLEAR ENERGY INST., http://www.nei.org/keyissues/nuclearwastedisposal (last visited Feb. 1, 2014), *available at* http://perma.cc/H57H-Y8YJ.

[81] Easley, *supra* note 46, at 665.

[82] 42 U.S.C. § 10131(a)(4) (2006); Aletheia Gooden, *The 10,000 Year Guarantee: High-Level Radioactive Waste Disposal at Yucca Mountain, Nevada*, 26 ENVIRONS ENVTL. L. & POL'Y J. 95, 101–03 (discussing the history and various provisions of the NWPA).

[83] 42 U.S.C. § 10131(a)(4).

[84] BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at 70.

[85] *Id.* at 70–71.

[86] Easley, *supra* note 46, at 668.

[87] *See* Mike Ahlers, *Yucca Mountain Project Setup Took Years; Shutdown Taking Only Months*, CNN (May 10, 2011), http://www.cnn.com/2011/US/05/10/yucca.mountain.shutdown/index.html, *available at* http://perma.cc/S93S-SL42 (discussing the abandonment of the Yucca Mountain project); Steve Hargreaves, *Nuclear Waste: Back to Yucca Mountain?*, CNN MONEY (July 11, 2011), http://money.cnn.com/2011/07/06/news/economy/nuclear_waste/index.htm, *available at* http://perma.cc/4KSP-PH24 (mentioning the $15 billion cost).

[88] BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at 22.

[89] *See* Associated Press, *supra* note 63.

safely store SNF at decommissioned nuclear plants for at least sixty years after the licensed life of a plant, which is twice the length of the previous rule.[90] The U.S. Court of Appeals for the D.C. Circuit required the NRC to conduct a more in-depth analysis of the environmental impacts of this rule, and more recently the court ordered the NRC to resume processing of the DOE's Yucca Mountain licensing application because of the statutory mandate.[91]

C. Underwater Disposal of Nuclear Waste

In general, two related methods of underwater disposal of SNF exist: dumping containers of radioactive waste into the ocean, and sub-seabed disposal.[92] The purpose of underwater disposal of SNF is the same as any other type of SNF disposal, which is to isolate radioactive waste from human contact and the environment long enough for any release of radiation to become harmless.[93] The potential advantages of certain types of underwater SNF disposal for the United States could include effective containment of the waste and avoiding the controversy of a land-based national repository, such as the failed project at Yucca Mountain.[94] Underwater disposal of SNF, specifically sub-seabed disposal, could occur far from the coast of any state or nation and could thereby avoid the NIMBY ("not in my backyard") syndrome, but this result is not guaranteed considering existing laws and a popular belief that Earth's oceans are a global commons.[95] Problems with underwater SNF disposal as a national policy include prohibitions under U.S. law, bans imposed by international law, and a potential for radioactive contamination of the marine environment and coastal areas.[96]

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[90] New York v. Nuclear Reg. Comm'n, 681 F.3d 471, 475 (D.C. Cir. 2012).

[91] *Id.* at 473 (noting that "the Commission failed to properly examine future dangers and key consequences" of significantly extending the period that SNF can safely be stored on-site at decommissioned nuclear power plants); *In re* Aiken County, 725 F.3d 255, 257–59, 266–67 (D.C. Cir. 2013) (ordering the NRC to resume processing of the DOE's Yucca Mountain licensing application because Congress had passed a law requiring the NRC to issue a final decision).

[92] *Storage and Disposal Options*, *supra* note 18.

[93] *See* Calmet, *supra* note 73, at 47.

[94] *See* Nadis, *supra* note 19, at 30 (discussing promising results from preliminary scientific experiments on sub-seabed disposal).

[95] *See* COMM. ON RADIOACTIVE WASTE MGMT., LONG LIST OF OPTIONS 28 (2004), *available at* http://goo.gl/1oI3lq and http://perma.cc/B5RR-WGW8 (mentioning avoidance of the NIMBY syndrome as a possible benefit of sub-seabed disposal); NIREX, REVIEW OF CORWM DOCUMENT NO. 625 SUB SEABED DISPOSAL 4–5 (2005), *available at* http://goo.gl/snxpk0 and http://perma.cc/CWS8-N3DN?type=pdf (discussing how the public might reject sub-seabed disposal because people consider the Earth's seas as a global commons, and also calling for clarification on the legality of sub-seabed disposal).

[96] *See, e.g.*, Marine Protection, Research, and Sanctuaries Act of 1972, 33 U.S.C. § 1411(a) (2006) (stating that "no person shall transport from any location any material for the purpose of dump-

The dumping method of underwater SNF disposal is relatively simple.[97] This method generally involves shipping SNF out to sea and dropping the waste into the ocean in packaging designed to break at a certain depth, which results in dispersion of the waste, or packaging designed to sink intact to the ocean floor.[98] Before the U.S. government banned or stopped sea dumping of SNF around the 1980s, the United States reportedly dumped about 112,000 containers of nuclear waste at thirty locations in the Atlantic and Pacific oceans.[99] Several European nations, along with Japan and South Korea, have also engaged in sea dumping of radioactive material.[100]

Sub-seabed disposal is more complicated and involves at least two related methods: creating a repository with a potential for retrieval of SNF, and permanent burial.[101] Creating a repository, which Sweden and the United Kingdom have considered, could allow for retrieval of SNF and could include access to the repository from land.[102] An advantage of such a sub-seabed repository would be an increased ability to monitor SNF, as compared to the dumping method.[103] Another advantage could be a potential for access from land, which could allow the repository method to avoid violating international bans against oceanic dumping, but accessing certain underwater locations by land might be impossible.[104]

Permanent burial is another method of sub-seabed disposal and could include at least three options: (1) Shallow penetration of the seabed, (2) deep burial through drilling, and (3) subduction involving tectonic dissipation of

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ing it into ocean waters"); Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter art. I–IV, *opened for signature* Dec. 29, 1972, 1046 U.N.T.S. 138 (entered into force Aug. 30, 1975) [hereinafter London Convention of 1972] (prohibiting dumping of wastes into the world's seas by international agreement); *Thousands of Radioactive Waste Barrels Rusting*, GREENPEACE (Jun. 19, 2000), http://www.greenpeace.org.uk/media/press-releases/thousands-of-radioactive-waste-barrels-rusting-away-on-the-seabed, *available at* http://perma.cc/RE3E-TNNJ (discussing radioactive waste barrels polluting the marine environment).

[97] *See* Kirsti-Liisa Sjoblom & Gordon Linsley, *Sea Disposal of Radioactive Wastes: The London Convention 1972*, 36 IAEA BULLETIN, No. 2, 1994, at 12, 14, *available at* http://www.iaea.org/Publications/Magazines/Bulletin/Bull362/36205981216.pdf and http://perma.cc/6ZFC-FV3B (providing a brief history of sea disposal of radioactive waste and describing the methods).

[98] *Storage and Disposal Options*, *supra* note 18; COMM. ON RADIOACTIVE WASTE MGMT., *supra* note 95, at 24.

[99] James Waczewski, Comment, *Legal, Political, and Scientific Response to Ocean Dumping and Sub-Seabed Disposal of Nuclear Waste*, 7 J. TRANSNAT'L L. & POL'Y 97, 99 (1997). Reports are unclear as to whether available international dumping statistics represent dumping by government entities, private industry, or both. *See id.*; INT'L ATOMIC ENERGY AGENCY, *supra* note 77, at 64, 67.

[100] INT'L ATOMIC ENERGY AGENCY, *supra* note 77, at 9.

[101] *See Storage and Disposal Options*, *supra* note 18; NIREX, *supra* note 95, at 3.

[102] *Storage and Disposal Options*, *supra* note 18.

[103] *Id.*

[104] COMM. ON RADIOACTIVE WASTE MGMT., *supra* note 95, at 26.

SNF.[105] These options are not rigidly separated categories.[106] They are related approaches that share similar features and could lead to similar outcomes.[107]

1. Shallow Penetration of the Seabed

Disposal of SNF through shallow penetration of the seabed would involve placing waste containers several meters beneath the sediment on the ocean floor.[108] Handlers of the waste could allow SNF canisters to free fall into the ocean sediment or could devise mechanisms to implant the canisters into place.[109] Heavy penetrating devices, possibly in the form of SNF containers modified to possess additional weight, would sink quickly and gain sufficient speed to become embedded in the ocean floor upon impact.[110] Scientists have also considered launching SNF in canisters similar to torpedoes into the seabed.[111] In any variant of this option, SNF would theoretically remain buried under sediment and would not come into contact with water.[112]

In 1986, researchers studying shallow penetration of the seabed achieved encouraging results in the Mediterranean Sea and were able to close the pathways created by the penetrating devices with sediment.[113] An international group of scientists conducted experiments from 1974 to 1986 that suggested that any leakage from SNF containers placed ten meters below the seabed could conceivably remain sealed in clays and muds for millions of years.[114] The thick clays on the ocean floor can resemble a slosh of creamy peanut but-

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[105] W.F. Fyfe et al., *The Geology of Nuclear Waste Disposal*, NATURE, Aug. 1984, at 537, 538 (discussing subduction zones as potential SNF burial sites); Letter from Jim Baird, patent holder of subductive waste disposal method, to Timothy Frazier, Blue Ribbon Commission on America's Nuclear Future, Department of Energy (May 7, 2010) [hereinafter Letter from Jim Baird], *available at* http://goo.gl/xu6WZ and http://perma.cc/URS8-CJWA (discussing the possibility of subduction zones for America's nuclear waste); *Storage and Disposal Options*, *supra* note 18 (discussing SNF burial through shallow penetration and deeper drilling).

[106] *See, e.g.*, *Storage and Disposal Options*, *supra* note 18 (discussing shallow burial and deeper drilling as related concepts within a broader context of sealing SNF beneath ocean floor sediments).

[107] *See id.*

[108] *Id.* (suggesting a minimum burial depth of about fifty meters for SNF); Nadis, *supra* note 19, at 30 (suggesting that a depth as shallow as ten meters could be feasible).

[109] Nadis, *supra* note 19, at 38 (discussing the need for further research on the best methods for implementing shallow burial of SNF).

[110] *See Storage and Disposal Options*, *supra* note 18; COMM. ON RADIOACTIVE WASTE MGMT., *supra* note 95, at 26.

[111] Annemarie Wall, *Going Nowhere in the Nuke of Time: Breach of the Yucca Contract, Nuclear Waste Policy Act Fallout and Shelter in Private Interim Storage*, 12 ALB. L. ENVTL. OUTLOOK J. 138, 153 (2007).

[112] *See, e.g.*, *Storage and Disposal Options*, *supra* note 18.

[113] *Id.*

[114] Nadis, *supra* note 19, at 30.

ter and might be able to seal SNF canisters tightly only a few meters beneath the surface.[115]

2. Deep Burial Through Drilling

Scientists have considered disposing of SNF by using familiar drilling technologies to drill bore holes deep into the seabed, place canisters of SNF inside, and pack the holes with sediment.[116] Preliminary research has suggested that the risk of radioactive contamination of the marine environment would be low, considering the significant depths that drilling could achieve as well as the thick clays on the ocean floor.[117] For example, waste handlers could dispose of SNF in holes drilled to 800 meters underneath the ocean floor, with SNF stacked in the holes up to about 300 meters beneath the seabed.[118] Corrosion-resistant containers could help seal the SNF.[119]

Deep burial of SNF through drilling could be advantageous because the clays on the ocean floor have "low permeability to water, a high adsorption capacity for [radioactive waste] and a natural plasticity that enables the ooze to seal up any cracks or rifts that might develop around a waste container."[120] SNF disposal in bore holes could be appropriate for certain radioactive material that has a long period of radioactive decay.[121] Experiments have suggested that if SNF canisters in bore holes were to rupture, the radioactive material "would not migrate more than a few meters from a breached canister after even 100,000 years" because the thick clays on the ocean floor would prevent the waste from moving.[122] Deep burial through drilling in the middle of large oceanic tectonic plates might be preferable relative to similar burial in subduction

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[115] Christopher Meisenkothen, Note, *Subseabed Disposal of Nuclear Waste: An International Policy Perspective*, 14 CONN. J. INT'L L. 631, 657–58 (1999) (mentioning the thick clays on the ocean floor that could seal SNF); Charles D. Hollister & Steven Nadis, *Burial of Radioactive Waste Under the Seabed*, SCI. AM., Jan. 1998, at 60, 60 (describing the characteristics of the clays on the deep ocean floor).

[116] *See* Hollister & Nadis, *supra* note 115, at 62 (describing SNF burial through deep-sea drilling); *Offshore Drilling*, NAT. GAS SUPPLY ASS'N, http://www.naturalgas.org/naturalgas/extraction_offshore.asp (last visited Feb. 1, 2014), *available at* http://perma.cc/N7D2-R2BW (illustrating the varieties of deep-sea drilling technologies that are familiar to the drilling industry in the United States).

[117] *See Storage and Disposal Options*, *supra* note 18 (discussing the use of familiar drilling technology to drill bore holes in the ocean floor and stack SNF canisters inside the holes).

[118] *See id.*

[119] *Id.*

[120] Hollister & Nadis, *supra* note 115, at 62.

[121] *See id.*

[122] *Id.*

zones, or the area where two tectonic plates meet, because subduction zones can be unpredictable from a geological standpoint.[123]

3. Subduction Zones

Disposal of SNF through burial in subduction zones would use the same technology as deep burial through drilling, but waste handlers would select a location where the SNF would eventually become pulled inside the Earth.[124] In the normal subduction process that occurs deep inside the Earth, one gigantic tectonic plate slides underneath another plate and becomes reabsorbed inside the Earth's hot mantle.[125] Specifically, a denser part of the Earth's crust moves underneath and toward a lighter portion of the crust, which creates underwater trenches.[126] The lower plate eventually descends into the Earth's mantle and can melt in certain areas.[127] Disposal of SNF in this option would involve placing the SNF in a trench area in a way that draws the waste inside the Earth's mantle and effectively isolates it.[128] At the outset, corrosion of waste containers might be minimal because most trench areas are extremely cold.[129]

Subduction zones remain geographically restricted in terms of access despite their presence in various locations around the world.[130] Subduction would not necessarily be feasible for every nation that produces SNF.[131] Subduction areas are huge, however, and could potentially accommodate a large amount of SNF.[132] The Cascadia Subduction Zone, which runs roughly parallel to the upper West Coast of the United States, could potentially be accessible to the

[123] *See id.*; COMM. ON RADIOACTIVE WASTE MGMT., *supra* note 95, at 26.

[124] *See* Fyfe et al., *supra* note 105, at 538 (discussing the possibility of SNF disposal in subduction zones and calling for further research); *Storage and Disposal Options*, *supra* note 18 (explaining subduction zones and stating that the goal of SNF disposal through subduction "would be to dispose of wastes in [an underwater] trench region such that they would be drawn deep into the Earth").

[125] *Storage and Disposal Options*, *supra* note 18 (describing the process of subduction within the context of SNF disposal); *see* Donald J. Kochan & Tiffany Grant, *In the Heat of the Law, It's Not Just Steam: Geothermal Resources and the Impacts on Thermophile Biodiversity*, 13 HASTINGS W.-N.W. J. ENVTL. L. & POL'Y 35, 41 (2007) (explaining that "[w]here two [tectonic] plates converge, one plate will move downwards in a process called subduction").

[126] COMM. ON RADIOACTIVE WASTE MGMT., *supra* note 95, at 32 (describing the movements of portions of the Earth's crust); *Storage and Disposal Options*, *supra* note 18 (mentioning the creation of underwater trenches).

[127] *Storage and Disposal Options*, *supra* note 18.

[128] *See id.*; COMM. ON RADIOACTIVE WASTE MGMT., *supra* note 95, at 32.

[129] Fyfe et al., *supra* note 105, at 538.

[130] *Storage and Disposal Options*, *supra* note 18.

[131] *See id.*

[132] Fyfe et al., *supra* note 105, at 538.

United States for SNF disposal.[133] Attempting SNF disposal in subduction zones could be risky, however, because such areas can be geologically unpredictable.[134]

III. Laws Applicable to Sub-Seabed Disposal of Nuclear Waste

A. *Overview of Regulatory Framework*

Disposal of spent nuclear fuel (SNF) has a tendency to create controversy because the radioactive waste can remain lethal for extremely lengthy periods of time and pose an ongoing threat to the surrounding environment.[135] For several decades, the United States has remained sensitive to underwater disposal of radioactive material because of its potential to inflict lasting damage to ecosystems, the food chain, and human health.[136] Multiple treaties, federal statutes, and agency regulations exist that directly or indirectly govern the disposal of America's SNF.[137] An evaluation of any SNF disposal method as a potential national solution must therefore consider how the method would fit within the existing framework of laws and regulations.[138]

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[133] *See Cascadia Subduction Zone*, U.S. Geological Surv., http://earthquake.usgs.gov/research/structure/crust/cascadia.php (last updated Aug. 17, 2012), *available at* http://perma.cc/D87X-7B9B.

[134] Hollister & Nadis, *supra* note 115, at 61–62.

[135] *See, e.g.*, Nuclear Energy Inst., Inc. v. Envtl. Prot. Agency, 373 F.3d 1251, 1258 (D.C. Cir. 2004) (noting that SNF remains dangerous for extremely lengthy periods of time); Blue Ribbon Comm'n on America's Nuclear Future, *supra* note 5, at 22 (summarizing the contentious political climate before and after Congress's selection of Yucca Mountain in Nevada as a national SNF repository).

[136] *See* Envtl. Prot. Agency, Ocean Dumping: Briefing Document 23–26 (1972), *available at* http://goo.gl/mlljf and http://perma.cc/ZV4H-QDK8 (summarizing a 1970 report to President Nixon from the Council on Environmental Quality, which recommended continuing to prohibit ocean dumping of high-level radioactive wastes); Moira Hayes Waligory, Note, *Radioactive Marine Pollution: International Law and State Liability*, 15 Suffolk Transnat'l L.J. 674, 676 (1992) (mentioning the long-term, extensive hazards of radioactive contamination).

[137] *See, e.g.*, Atomic Energy Act, 42 U.S.C. § 2021(a)–(e) (establishing parameters for cooperation between the several states and the Nuclear Regulatory Commission (NRC) "with respect to the regulation of byproduct, source, and special nuclear materials"); London Convention of 1972 art. I, *supra* note 96, 1046 U.N.T.S. at 140 (stating that signatory nations must "take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea," which includes nuclear waste); 10 C.F.R. § 60.3 (2013) (establishing a rule that the Department of Energy "shall not receive or possess source, special nuclear, or byproduct material at a geologic repository operations area" unless the agency receives a license from the NRC).

[138] *See, e.g.*, Nirex, *supra* note 95, at 5 (arguing that "[t]he legal status of the sub seabed disposal options needs to be made clear" before the United Kingdom could reach a final determination on the feasibility of SNF disposal through such methods).

Disposal methods of SNF have improved in the past several decades because of increasing public awareness of the need to protect the environment from radioactive waste.[139] Since the early era of nuclear production in the 1940s, policymakers have gradually expanded their awareness of the need for safe disposal methods beyond their original, limited focus on nuclear weapons development and national security.[140] Even though private industry controls nuclear power in the United States today, the federal government has assumed responsibility for researching SNF disposal options and ultimately formulating a national disposal plan for civilian waste.[141]

The Department of Energy (DOE) is responsible for regulating and handling SNF related to the creation of nuclear weapons and certain types of scientific research.[142] The Nuclear Regulatory Commission (NRC) and some state governments that have received authority from the federal government regulate SNF from civilian nuclear power plants and other non-military nuclear activity.[143] Other federal agencies, including the EPA, Department of Transportation, and Department of Health and Human Services, also participate in regulating SNF.[144]

Despite several decades of delays and failures, land-based repositories remain the favored approach for storage and disposal of SNF in the United States.[145] In 1987, Congress created the Office of Subseabed Disposal Research within the Department of Energy but quickly defunded the program.[146] If the United States were to reconsider sub-seabed disposal of SNF today, var-

[139] *See* Montange, *supra* note 65, at 377–78 (explaining that SNF disposal standards have improved only gradually because government policy originally neglected the development of disposal regulations, most SNF was originally only a military concern, and broad public awareness developed slowly and started only around the early 1970s).

[140] *See* BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at 19–23 (tracing the history of nuclear waste policy in the United States).

[141] Easley, *supra* note 46, at 664 (discussing government involvement in the civilian nuclear power industry, which includes some funding assistance).

[142] *See* NUCLEAR REG. COMM'N, *supra* note 64, at 1.

[143] *Id.*

[144] *Id.*

[145] *See* BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at vii (including "[p]rompt efforts to develop one or more geologic disposal facilities" as among the eight core elements of a new disposal strategy for the United States, even after the federal government's failure to complete a partially built repository at Yucca Mountain).

[146] Nadis, *supra* note 19 (describing the views of the former director of the Office of Subseabed Disposal Research, who stated his belief that Congress defunded the office because of policy views that land-based approaches to SNF disposal were superior).

ious treaties and laws could apply and would influence the feasibility of such underwater disposal methods.[147]

B. *International Laws Regarding Underwater Disposal of SNF*

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter ("London Convention of 1972") banned oceanic dumping of wastes among signatory nations when the treaty took effect in August 1975.[148] A 1996 Protocol that took effect in 2006 explicitly restricted signatory nations from engaging in sub-seabed disposal of waste by expanding the definition of dumping to include "any storage of wastes or other matter in the seabed and the subsoil thereof . . . ."[149] Some dispute exists regarding whether the Protocol bans all methods of sub-seabed disposal, even those options that would include an underwater repository accessible by land.[150] The United States is a party to the London Convention of 1972 and signed the amending Protocol in 1998, but the Senate has not ratified the Protocol.[151]

Parties to the 1996 Protocol (and the original London Convention of 1972) include France, Japan, Russia, and the United Kingdom, which are all major producers of SNF.[152] The Protocol, which supersedes the original London Convention of 1972 entirely for member nations, places a broad prohibition on dumping any materials into the world's seas, with a few limited exceptions for which signatory nations may issue permits.[153] The Protocol defines

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[147] *See, e.g.*, 33 U.S.C. § 1411(a) (2006) (prohibiting the dumping of wastes into ocean waters); London Convention of 1972 art. I, *supra* note 96, 1046 U.N.T.S. at 140 (calling for the cessation of dumping into the world's oceans).

[148] London Convention of 1972 art. II, *supra* note 96, 1046 U.N.T.S. at 140 (stating that signatory nations must "take effective measures individually, according to their scientific, technical and economic capabilities, and collectively, to prevent marine pollution caused by dumping and shall harmonize their policies in this regard").

[149] 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter art. 1, Nov. 7, 1996, 36 I.L.M. 1, 8 [hereinafter 1996 Protocol].

[150] *See* Letter from Jim Baird, *supra* note 105 (arguing that sub-seabed burial with an underwater repository accessible from land would not violate the 1996 Protocol).

[151] MARY JANE ANGELO ET AL., RECLAIMING GLOBAL ENVIRONMENTAL LEADERSHIP: WHY THE UNITED STATES SHOULD RATIFY TEN PENDING ENVIRONMENTAL TREATIES 22–24 (2012), *available at* http://www.progressivereform.org/articles/International_Environmental_Treaties_1201.pdf and http://perma.cc/A96X-GC7S (stating that the Senate Foreign Relations Committee approved ratification of the 1996 Protocol, which made significant changes to the original London Convention, but the full Senate has not considered the Protocol).

[152] 1996 Protocol, *supra* note 149, 36 I.L.M. at 4 (listing the nations); *see* INT'L ENERGY AGENCY, *supra* note 26, at 16–17 (listing the top producers of electricity through nuclear power).

[153] 1996 Protocol art. 4, art. 23, *supra* note 149, 36 I.L.M. at 10 (creating a blanket prohibition in Article 4 on "the dumping of any wastes or other matter" other than materials explicitly listed in Annex 1, which does not list SNF as an exception), 18 (stating in Article 23 that the Protocol replaces the

seas as "all marine waters other than the internal waters of States, as well as the seabed and the subsoil thereof . . ."[154] Some commentators have expressed criticism regarding the inclusion of sub-seabed disposal within the Protocol's definition of dumping.[155]

The United Nations Convention on the Law of the Sea (UNCLOS) also plays a role in restricting underwater disposal of nuclear waste.[156] UNCLOS, which entered into force in November 1994, provides that member nations "have the obligation to protect and preserve the marine environment" from pollution.[157] UNCLOS defines pollution of the marine environment as introducing "substances or energy" that "results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities . . . ."[158] UNCLOS also requires member nations to "adopt laws and regulations to prevent, reduce and control pollution of the marine environment by dumping."[159] UNCLOS defines dumping to include "any deliberate disposal of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea."[160] UNCLOS also requires member nations to "adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from or in connection with sea-bed activities subject to their jurisdiction," which could apply to sub-seabed disposal of SNF.[161]

UNCLOS does not explicitly mention nuclear waste in its text, but the treaty implicitly forbids underwater dumping of SNF through its broad provisions.[162] The United States has not ratified the treaty.[163] Since the 1980s, the

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London Convention entirely). Under the Protocol, dumping does not include incidental disposal of material "from the normal operations of vessels, aircraft, platforms or other man-made structures at sea and their equipment," so long as the material was not transported to sea for disposal. *Id.* art. 1, 36 I.L.M. at 8.

[154] *Id.* art 1, 36 I.L.M. at 9.

[155] *See* Hollister & Nadis, *supra* note 115, at 62 (arguing that calling sub-seabed disposal ocean dumping "makes as much sense as calling the burial of nuclear wastes in Yucca Mountain 'roadside littering'").

[156] Waczewski, *supra* note 99, at 107 (stating that UNCLOS regulates sea dumping but does so "in more general terms" compared to the London Convention).

[157] *Id.* at 108 (providing the date that the treaty took effect and stating that the "general environmental purpose of UNCLOS is to prevent and reduce pollution of the marine environment from any source"); United Nations Convention on the Law of the Sea art. 192, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397, 477 [hereinafter UNCLOS] (entered into force Nov. 16, 1994) (stating the general obligation of member nations).

[158] UNCLOS art. 1, *supra* note 157, 1833 U.N.T.S. at 399.

[159] *Id.* art. 210, 1833 U.N.T.S. at 483.

[160] *Id.* art. 1, 1833 U.N.T.S. at 399.

[161] *Id.* art. 208, 1833 U.N.T.S. at 482.

[162] Waczewski, *supra* note 99, at 108.

United States has implemented many provisions of UNCLOS as national policy despite not ratifying the treaty.[164]

C. *Domestic Laws Regarding Underwater Disposal of SNF*

Various laws within the United States regulate the discharge of wastes into the nation's oceans, streams, and other bodies of water.[165] These laws appear to prohibit underwater disposal of SNF in a general sense, at least through the dumping method, in America's navigable waters.[166] For several centuries, laws in the United States have attempted to protect the quality of America's waters for human use.[167] Because pollution from various types of sources can impair the nation's waterways, Congress has passed multiple laws addressing this issue.[168]

The United States ceased underwater disposal of radioactive waste around 1970 as land-based disposal options increased in availability.[169] This section of the Note presents some of the most relevant statutes that would likely apply to sub-seabed disposal of SNF today.[170]

Congress passed the Clean Water Act (CWA) in 1972 to create a comprehensive regulatory structure to prevent and eliminate water pollution in the United States.[171] The CWA's goal is "to restore and maintain the chemical,

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[163] *Chronological Lists of Ratifications of, Accessions and Successions to the Convention and the Related Agreements*, UNITED NATIONS, http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm (last updated Sept. 20, 2013), *available at* http://perma.cc/WFQ8-5GTL (providing a list of nations that have ratified UNCLOS, which excludes the United States).

[164] Howard S. Schiffman, *U.S. Membership in UNCLOS: What Effects for the Marine Environment?*, 11 ILSA J. INT'L & COMP. L. 477, 479–80, 482 (2005) (discussing the history of UNCLOS, including President Reagan's decision that the United States would follow the treaty's main provisions despite not ratifying it, and concluding that "most substantive provisions of UNCLOS are already part of U.S. policy and have been for many years").

[165] *See, e.g.*, 33 U.S.C. § 1251 (2006) (stating that "it is the national policy that the discharge of toxic pollutants in toxic amounts [into American waters] be prohibited"); 33 U.S.C. § 1411(a) (2006) (stating that "no person shall transport from any location any material for the purpose of dumping it into ocean waters").

[166] *See, e.g.*, Steven J. Moore, *Troubles in the High Seas: A New Era in the Regulation of U.S. Ocean Dumping*, 22 ENVTL. L. 913, 927–28, 931–34 (1992) (discussing the federal government's careful regulation of discharges into American waters under the Clean Water Act (CWA) and Marine Protection, Research, and Sanctuaries Act (MPRSA)).

[167] *See id.* at 924–28 (discussing the history of water protection laws in America).

[168] *See id.*

[169] Waligory, *supra* note 136, at 686 (discussing the decline in sea dumping as a result of increased convenience in land burial sites as well as the need for sea dumping permits).

[170] *See, e.g.*, Moore, *supra* note 166, at 927–30 (discussing the CWA and MPRSA as two of the most prominent statutes that apply to pollution of the marine environment).

[171] David Drelich, *Restoring the Cornerstone of the Clean Water Act*, 34 COLUM. J. ENVTL. L. 267, 268 (2009) (discussing the novelty and virtues of the CWA upon its enactment).

physical, and biological integrity of the Nation's waters."[172] The CWA declares that "the discharge of any pollutant by any person shall be unlawful" except in accordance with specific provisions of the CWA.[173] The CWA created the National Pollutant Discharge Elimination System, which establishes a permit system and regulates certain dischargers of pollution through technology-based requirements.[174] The CWA as enforced by the EPA does not regulate SNF, though the statute's text does not state such an exclusion.[175] The CWA's original text includes radioactive material in its definition of "pollutant," but the EPA regulations implementing the CWA limit radioactive materials to those substances not covered by the Atomic Energy Act of 1954 (AEA).[176]

The AEA regulates nuclear source fuels, including uranium.[177] Congress passed the AEA to place civilian nuclear power plants under the control of private industry.[178] The Atomic Energy Commission and its successor, the NRC, received authority to implement regulations on civilian use of nuclear fuel, licensing of nuclear power plants, and other civilian uses of nuclear material.[179] The NRC indicates that only two storage methods are acceptable for nuclear power plants after manufacturers remove SNF from their reactors: spent fuel pools on site, and dry cask storage if those pools exhaust their capacity.[180]

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[172] 33 U.S.C. § 1251(a) (2006).

[173] *Id.* § 1311(a).

[174] *Id.* § 1342 (creating a permit program); William L. Andreen, *Water Quality Today: Has the Clean Water Act Been a Success?*, 55 ALA. L. REV. 537, 537 (2004) (describing the CWA's permit program and "technology-based effluent limitations").

[175] Charles de Saillan, *The Use of Imminent Hazard Provisions of Environmental Laws to Compel Cleanup at Federal Facilities*, 27 STAN. ENVTL. L.J. 43, 85–86 (2008) (describing the EPA regulations implementing the CWA as defining "pollutant" to exclude SNF).

[176] 33 U.S.C. § 1362(6) (providing the CWA's definition of pollutant); 40 C.F.R. § 122.2 (2013) (providing the EPA's definition of pollutant). The EPA's decision was based at least in part on legislative history from the House of Representatives on the CWA. *See* De Saillan, *supra* note 175, at 86. The Supreme Court affirmed the EPA's decision. *Id.*

[177] 42 U.S.C. § 2014(z) (2006) (defining the term "source material" for the regulation of nuclear power as including uranium); De Saillan, *supra* note 175, at 83 (stating that the AEA's definitions "cover virtually all forms of radioactive materials and radioactive waste"). The NRC's regulations further define materials under the AEA to include nuclear fuel. *See* De Saillan, *supra* note 175, at 83; 10 C.F.R. § 40.4 (2013).

[178] Elizabeth Schulte, *Is Nuclear Waste Coming to Utah? An In-Depth Look at* Skull Valley Band of Goshute Indians v. Leavitt, 24 J. LAND RESOURCES & ENVTL. L. 115, 118 (2004).

[179] *See id.* at 118 (describing the history of the NRC); 42 U.S.C. § 2201 (2006) (describing the NRC's powers). Under the AEA, however, the DOE has discretion regarding substances within America's nuclear weapons program and is not subject to regulatory oversight from other agencies. De Saillan, *supra* note 175, at 82.

[180] *Storage of Spent Nuclear Fuel*, NUCLEAR REG. COMM'N, http://www.nrc.gov/waste/spent-fuel-storage.html (last updated Aug. 20, 2013), *available at* http://perma.cc/WR6Q-59U8. The Supreme Court has treated the AEA as "an extremely broad grant of authority" to the NRC and has acknowledged the agency's significant discretion under the statute. Montange, *supra* note 65, at 380.

Looking beyond the NRC's authority under the AEA, the Nuclear Waste Policy Act of 1982 (NWPA) represents a highly specific embodiment of U.S. policy toward permanent disposal of SNF.[181] Congress amended the NWPA in 1987 to mandate the construction of a deep geologic repository in Yucca Mountain, Nevada, for the nation's collective SNF.[182] Under the NWPA, the NRC, DOE, and EPA all shared responsibility for developing the Yucca Mountain site.[183] Local political opposition pressured the federal government into abandoning the Yucca Mountain repository despite significant financial expenditures.[184] Litigation has been ongoing to compel the NRC to comply with the statutory mandate under the NWPA to consider the DOE's construction application for the site.[185]

Finally, Congress has stated that it did not intend for the NWPA to affect the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA).[186] The MPRSA prohibits the importing of radioactive waste, including SNF, for dumping into the nation's waters.[187] The MPRSA also prohibits shipping SNF from the United States for dumping "into ocean waters."[188] The MPRSA guides the EPA and U.S. Army Corps of Engineers to create and maintain a permit system for oceanic dumping of waste, but permits remain unavailable for high-level radioactive waste.[189]

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[181] *See* 42 U.S.C. § 10131 (2006) (establishing federal responsibility for the long-term storage and disposal of civilian-generated nuclear waste).

[182] 42 U.S.C. § 10172 (2006) (designating Yucca Mountain as a national repository).

[183] *See* BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at 22 (discussing the NWPA's provisions involving the DOE, NRC, and EPA).

[184] *See id.* (mentioning political opposition to the Yucca Mountain project from Nevada); Ahlers, *supra* note 87 (discussing abandonment of the project); Hargreaves, *supra* note 87 (mentioning the $15 billion cost of the uncompleted project).

[185] *See, e.g.*, *In re* Aiken County, 725 F.3d 255, 259, 266–67 (D.C. Cir. 2013) (stating that "the President may not decline to follow a statutory mandate or prohibition simply because of policy objections," and ordering the NRC, an independent agency, to resume processing of the DOE's Yucca Mountain licensing application); BLUE RIBBON COMM'N ON AMERICA'S NUCLEAR FUTURE, *supra* note 5, at 23 (discussing the Obama Administration's attempt to withdraw the DOE's application for construction of the site).

[186] 42 USC § 10104.

[187] *See* 33 U.S.C. § 1411(b) (2006) (stating that "no person shall dump any material transported from a location outside the United States (1) into the territorial sea of the United States, or (2) into a zone contiguous to the territorial sea of the United States"); Charles B. Anderson, *Ocean Dumping and the Marine Protection, Research and Sanctuaries Act*, 1 LOY. MAR. L.J. 79, 91 (2002) (mentioning that under the MPRSA, the dumping of high-level radioactive waste "is prohibited under any circumstances").

[188] 33 U.S.C. § 1411(a) (stating that "no person shall transport from the United States . . . any material for the purpose of dumping it into ocean waters"); Anderson, *supra* note 187, at 84 (stating that the MPRSA forbids transporting high-level radioactive waste "beyond the territorial jurisdiction of the United States").

[189] 33 U.S.C. § 1412; Anderson, *supra* note 187, at 84.

IV. LEGALITY OF SUB-SEABED DISPOSAL FOR THE UNITED STATES

A. *Restarting Research on Sub-Seabed Disposal of SNF*

The United States has not seriously considered sub-seabed disposal of spent nuclear fuel (SNF) since 1986, when it ceased funding an international team of scientists known as the Seabed Working Group.[190] This group consisted of about 200 researchers from ten different nations and received significant funding during its active years.[191] The group concluded its work with a call for further research after preliminary testing from 1976 to 1986 at about six sites in the Atlantic and Pacific oceans showed promise for sub-seabed burial of SNF in ocean floor sediment.[192] The United States, which provided most of the group's funding, withdrew its support in favor of land-based SNF disposal methods around the time that Congress selected Yucca Mountain as a national SNF repository.[193]

If the United States were to reconsider sub-seabed disposal as a potential option for disposal of the nation's collective SNF, America would need to restart the research that was previously abandoned.[194] Restarting such research could benefit from a fresh look at national and international laws that could apply.[195] The feasibility of sub-seabed disposal as a national solution for SNF requires careful consideration of applicable laws that could make the disposal method impractical from a legal standpoint.[196]

B. *Laws That Could Apply to Sub-Seabed Disposal of SNF*

On an international level, nations across the world remain justified in their eagerness to prohibit the dumping of SNF into the world's seas because high-level radioactive waste can cause severe harm to the environment and human health.[197] Congress is understandably sensitive to the disposal of radio-

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[190] *See* Hollister & Nadis, *supra* note 115, at 62–63.

[191] *See id.* at 62. The total cost of this research group was about $120 million. *Id.*

[192] *Id.* at 62–63.

[193] *Id.* at 63.

[194] *See id.* (calling for America to restart research on sub-seabed disposal of SNF); Meisenkothen, *supra* note 115, at 657 (arguing that policymakers worldwide should conduct further research on sub-seabed disposal); Fyfe et al., *supra* note 105, at 540 (encouraging further research on sub-seabed disposal because of promising results).

[195] *See* Meisenkothen, *supra* note 115, at 655 (stating that "[the] legitimacy of [sub-seabed disposal] will justifiably be questioned at a national and international level").

[196] *See id.*

[197] *See, e.g.*, New York v. Nuclear Reg. Comm'n, 681 F.3d 471, 474 (D.C. Cir. 2012) (mentioning that "SNF poses a dangerous, long-term health and environmental risk").

active waste into America's waters for the same reason.[198] On a conceptual level, however, significant differences seem to exist between ocean dumping and the burial techniques of sub-seabed disposal.[199] In the latter method, waste and waste canisters would not remain in contact with the surrounding ocean water, at least according to preliminary scientific research and tests.[200] Therefore, if sub-seabed burial actually works properly, dumping might not be an appropriate label for the method because waste canisters would pass through the water on their way to permanent burial beneath the ocean floor and would not remain within the water.[201]

Further research would be necessary to determine whether sub-seabed burial is a viable disposal option from a technical standpoint.[202] If such research shows that sub-seabed burial would work properly and would not release SNF into the water, the United States could probably engage in the method, at least in some form, without placing America in violation of international or domestic laws that regulate ocean dumping.[203]

1. International Law

International law probably would not prohibit the United States from implementing sub-seabed burial of SNF, assuming that sub-seabed burial works properly and does not disperse waste into the water.[204] America's international

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[198] *See id.* Federal regulation of America's waters was originally motivated by concerns for navigation and commerce, but by the 1970s Congress realized the health risks from water pollution and began to legislate accordingly. *See* Anderson, *supra* note 187, at 81–82.

[199] *See Storage and Disposal Options*, *supra* note 18 (listing "Disposal at sea" and "Sub seabed disposal" as separate categories in a list of SNF disposal options and describing the distinguishing characteristics of each method).

[200] *See* Hollister & Nadis, *supra* note 115, at 62 (stating that "[u]nder the seabed . . . the muddy clays, which cling tenaciously to plutonium and many other radioactive elements, would prevent these substances from seeping into the waters above" in the event of a breached SNF canister). The effects of an earthquake or volcanic eruption on SNF buried under the ocean floor are less clear, but scientists could conceivably minimize risks of such incidents through selection of sites away from the boundaries of tectonic plates. *See id.*

[201] *See id.* at 65 (arguing that calling sub-seabed disposal ocean dumping "makes as much sense as calling the burial of nuclear wastes in Yucca Mountain 'roadside littering'").

[202] *See id.* at 63–64 (arguing that further research on the viability of sub-seabed disposal should include how well the clays on the ocean floor would work to contain the SNF, and whether such disposal would disturb the marine ecosystems on the ocean floor).

[203] *See, e.g.*, 33 U.S.C. § 1411(a) (2006) (stating that "no person shall transport from the United States . . . any material for the purpose of dumping it into ocean waters"); London Convention of 1972 art. III–IV, *supra* note 96, 1046 U.N.T.S. at 140–41 (requiring signatory nations to prohibit the dumping of wastes into the world's oceans, but not including sub-seabed disposal within the definition of dumping).

[204] *See, e.g.*, London Convention of 1972 art. III–IV, *supra* note 96, 1046 U.N.T.S. at 140–41.

commitments appear somewhat limited in this regard considering that the United States has not ratified either of two major treaties that regulate oceanic activity.[205]

The London Convention of 1972 and subsequent 1996 Protocol that replaced the earlier treaty both ban oceanic dumping of wastes, but in different ways.[206] The Protocol states that signatory nations must "prohibit the dumping of any wastes or other matter," with limited exceptions that do not include SNF.[207] The Protocol also includes "any storage of wastes or other matter in the seabed and the subsoil thereof" within its definition of dumping.[208] The Protocol therefore appears to treat dumping and sub-seabed disposal as equivalent and forbids both.[209] Interestingly, however, the Protocol defines sea as "all marine waters other than the internal waters of States, as well as the seabed and the subsoil thereof; it does not include sub-seabed repositories accessed only from land."[210] This appears to create an exception for sub-seabed disposal of waste in a repository beneath the ocean floor, with access exclusively by land.[211]

In contrast, the London Convention of 1972 does not address sub-seabed disposal at all.[212] The London Convention only states that signatory nations

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[205] *See* ANGELO ET AL., *supra* note 151, at 23 (stating that the United States signed the 1996 Protocol, which replaced the London Convention of 1972, on March 31, 1998 but has not yet ratified the Protocol); *Chronological Lists of Ratifications of, Accessions and Successions to the Convention and the Related Agreements*, *supra* note 163 (listing the members of UNCLOS and excluding the United States). Other treaties exist, however, that regulate introducing wastes into the world's seas. *See, e.g.*, Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973, Feb. 17, 1978, 1340 U.N.T.S. 61 [hereinafter MARPOL 1978] (modifying the 1973 treaty); International Convention for the Prevention of Pollution from Ships, 1973, 1340 U.N.T.S. 184 [hereinafter MARPOL 1973] (regulating the discharges of substances from vessels at sea). The United States has implemented at least portions of MARPOL 1978. *IMO Documentation*, AUSTRALIAN MARITIME SAFETY AUTHORITY, https://imo.amsa.gov.au/public/parties/marpol78.html (last visited Feb. 2, 2014), *available at* http://perma.cc/F38G-VFEH.

[206] *Compare* 1996 Protocol art. 1, *supra* note 149, 36 I.L.M. at 8 (defining dumping to include sub-seabed disposal of waste), *with* London Convention of 1972 art. III, *supra* note 96, 1046 U.N.T.S. at 140 (defining dumping in a way that does not include sub-seabed disposal).

[207] 1996 Protocol art. 4, *supra* note 149, 36 I.L.M. at 10 (requiring prohibitions against dumping); *id.* Annex 1 at 21 (providing a list of materials that signatory nations may consider for dumping, but not including SNF).

[208] *Id.* art 1 at 8.

[209] *Id.* (defining dumping to include regular dumping and sub-seabed disposal); *id.* art. 4 at 10 (requiring signatory nations to prohibit dumping).

[210] *Id.* art. 1 at 9 (defining "sea" to exclude sub-seabed repositories accessed only from land).

[211] *See id.*

[212] *See, e.g.*, London Convention of 1972 art. III, *supra* note 96, 1046 U.N.T.S. at 140 (defining dumping in a way that does not include sub-seabed disposal); Meisenkothen, *supra* note 115, at 649 (stating that the definition of dumping in the London Convention is "ambiguous" regarding sub-seabed disposal of SNF).

must "prohibit the dumping of any wastes or other matter in whatever form or condition," with limited potential exceptions that do not include SNF, and a list of permanently prohibited materials that includes high-level radioactive waste.[213] The London Convention defines dumping as including "any deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea."[214] Shallow penetration of the seabed by dropping SNF canisters overboard could potentially fit within this definition of dumping, but deep burial through drilling could achieve greater depths and might not constitute "disposal at sea" under the London Convention considering that the SNF would merely pass through the water on the way to burial deep beneath the ocean floor.[215]

The United States has not ratified the 1996 Protocol, which generally forbids sub-seabed disposal as a form of dumping.[216] The United States is only a party to the original London Convention of 1972, which does not mention sub-seabed disposal.[217] Therefore, the United States is not bound to refrain from sub-seabed disposal under the Protocol.[218] The United States would also not necessarily be bound to refrain from all forms of sub-seabed disposal under the London Convention, but this is assuming that sub-seabed disposal of SNF works properly would not disperse high-level radioactive waste into the sea.[219] If the United States were to bury SNF into the seabed, and if the waste were to enter the water under any circumstances, America would probably violate its obligations under the London Convention.[220] Deep burial through drilling,

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[213] London Convention of 1972, *supra* note 96, 1046 U.N.T.S. at 140, 203 (requiring nations to prohibit dumping under Article IV, creating a list of substances (excluding SNF) in Annex II that nations may include in permit programs for limited dumping, and listing high-level radioactive waste in Annex I as substances that nations must always forbid from dumping).

[214] *Id.* art. III at 140.

[215] *See, e.g.*, Hollister & Nadis, *supra* note 115, at 62 (describing SNF burial through deep-sea drilling).

[216] 1996 Protocol art. 1, *supra* note 149, 36 I.L.M. at 8 (defining dumping to include sub-seabed disposal); *id.* art. 4 at 10 (requiring prohibitions against dumping); ANGELO ET AL., *supra* note 151, at 23 (stating that America has not yet ratified the Protocol).

[217] *See* London Convention of 1972, *supra* note 96, 1046 U.N.T.S. at 138, 140 (defining dumping in Article III in a way that does not include or mention sub-seabed disposal, and mentioning America's ratification in the Preamble).

[218] *See, e.g.*, ANGELO ET AL., *supra* note 151, at 23 (stating that the United States has not yet ratified the Protocol, which implies that America is not bound by the treaty).

[219] London Convention of 1972 art. III, *supra* note 96, 1046 U.N.T.S. at 140 (defining dumping in a way that does not include sub-seabed disposal of waste).

[220] *Id.* arts. III–IV, 1046 U.N.T.S. at 140–41 (defining dumping as "any deliberate disposal at sea of wastes or other matter" and requiring signatory nations to prohibit dumping "of any wastes or other matter in whatever form or condition").

however, could allow the United States to bypass the London Convention's definition of dumping.[221]

The United Nations Convention on the Law of the Sea (UNCLOS) is another major treaty addressing pollution into the world's oceans.[222] UNCLOS defines oceanic dumping as "any deliberate disposal of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea" and states that signatory nations must "adopt laws and regulations to prevent, reduce and control pollution of the marine environment by dumping."[223] The treaty requires signatory nations to take actions necessary to regulate pollution of the ocean "from any source."[224] UNCLOS does not appear to explicitly forbid sub-seabed disposal of wastes, however, and does not appear to mention the method explicitly anywhere in its text.[225]

Despite participating in the creation of UNCLOS, the United States has not ratified the treaty.[226] The United States has incorporated the substantive provisions of UNCLOS as national policy but lacks an international obligation to follow the treaty.[227] Therefore, the United States could engage in sub-seabed disposal of SNF without violating any obligations under UNCLOS because America is not a party to the treaty and has no such obligations in the first place.[228] In contrast to the previous discussion of the London Convention, sub-seabed disposal that accidentally releases high-level radioactive waste would

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[221] *See, e.g.*, Hollister & Nadis, *supra* note 115, at 62 (describing SNF burial through deep-sea drilling).

[222] Waczewski, *supra* note 99, at 107 (stating that UNCLOS regulates sea dumping but does so "in more general terms" relative to the London Convention).

[223] UNCLOS art. 1, *supra* note 157, 1833 U.N.T.S. at 399 (defining dumping); *id.* art. 210 at 483 (creating an obligation for signatory nations to regulate dumping).

[224] *Id.* art. 194, 1833 U.N.T.S. at 478.

[225] *See, e.g.*, *id.* art. 1, 1833 U.N.T.S. at 399 (defining oceanic dumping in a way that does not include or mention sub-seabed disposal of waste).

[226] Jon L. Jacobson, *International Fisheries Law in the Year 2010*, 45 LA. L. REV. 1161, 1178 (1985) (mentioning the American delegation's involvement in the formation and signing of UNCLOS); Parker Clote, *Implications of Global Warming on State Sovereignty and Arctic Resources Under the United Nations Convention on the Law of the Sea: How the Arctic Is No Longer* Communis Omnium Naturali Jure, 8 RICH. J. GLOBAL L. & BUS. 195, 236 (2008) (stating that the Senate "has steadfastly refused ratification [of UNCLOS] for fear of the obligations it would place upon American economic interests").

[227] *See* Schiffman, *supra* note 164, at 482 (stating that "most substantive provisions of UNCLOS are already part of U.S. policy and have been for many years"); Clote, *supra* note 226, at 236–37 (stating that "[t]he U.S. currently resides in a gray area regarding UNCLOS" because America has adopted UNCLOS provisions as national policy toward the oceans yet refuses to bind itself to the treaty).

[228] *See, e.g.*, *Chronological Lists of Ratifications of, Accessions and Successions to the Convention and the Related Agreements*, *supra* note 163 (providing a list of the members of UNCLOS and excluding the United States).

not place the United States in violation of UNCLOS because America has no binding obligations under a treaty that it has not ratified.[229] For America's purposes under international law, whether UNCLOS could forbid sub-seabed disposal of SNF under various interpretations or scenarios is mostly irrelevant because the United States is not a party to the treaty by lack of ratification.[230]

In summary, under two major treaties that regulate dumping wastes into the world's seas (the 1996 Protocol to the London Convention, and UNCLOS), the United States would not violate any binding obligations under international law by engaging in sub-seabed burial of SNF because America has no such binding obligations in the first place through a lack of ratification.[231] The United States is a party to the original London Convention of 1972 but could conceivably engage in sub-seabed burial using deep drilling methods that might avoid the treaty's definition of dumping.[232] Whether sub-seabed burial of America's SNF would violate other international law is beyond the scope of this Note, but assuming that sub-seabed disposal works properly and is generally not a form of oceanic dumping, similar results could be possible.[233]

2. Domestic Laws

The portions of the Nuclear Waste Policy Act of 1982 (NWPA) addressing disposal of high-level radioactive waste appear to establish land-based repositories for SNF as the national policy of the United States.[234] The NWPA also appears to reflect a general distrust of underwater disposal of SNF through a terse provision that the NWPA must be construed so as not to disturb the prohibitions against water pollution in the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA).[235] Despite this characterization, the NWPA

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[229] *See* Vienna Convention on the Law of Treaties art. 2, May 23, 1969, 1155 U.N.T.S. 331, 333 (defining party as "a State which has consented to be bound by the treaty and for which the treaty is in force"). The United States is not a party to UNCLOS under this definition because America has not consented to be bound, through lack of ratification. *See id.*

[230] *See id.*

[231] *See, e.g.*, ANGELO ET AL., *supra* note 151, at 23 (stating that the United States has not ratified the Protocol, which implies that America is not bound by the treaty); *Chronological Lists of Ratifications of, Accessions and Successions to the Convention and the Related Agreements*, *supra* note 163 (providing a list of the members of UNCLOS and excluding the United States).

[232] *See, e.g.*, Hollister & Nadis, *supra* note 115, at 62 (describing SNF burial through deep-sea drilling).

[233] *See, e.g.*, MARPOL 1978 and MARPOL 1973, *supra* note 205.

[234] *See, e.g.*, 42 U.S.C. § 10131(b)(1) (2006) (placing a primary focus on "establish[ing] a schedule for the siting, construction, and operation of repositories that will provide a reasonable assurance that the public and the environment will be adequately protected from the hazards posed by high-level radioactive waste").

[235] *See id.* § 10104.

does not explicitly forbid other methods of SNF disposal.[236] The NWPA actually encourages research on alternative methods of disposal, so at the very least, restarting research on sub-seabed disposal of SNF probably would not violate the NWPA.[237]

Under the United States's current regulatory structure, the Clean Water Act (CWA) probably would not forbid sub-seabed disposal of SNF.[238] Congress passed the CWA in 1972 to protect the nation's waters from pollution, including "radioactive materials."[239] The EPA regulations that implement the CWA, however, specifically exempt from regulation any radioactive materials that the Atomic Energy Act of 1954 (AEA) regulates, which includes radioactive nuclear material such as certain forms of uranium.[240]

Even if the EPA were to revise its regulations to include SNF, sub-seabed disposal would not necessarily violate the CWA.[241] The CWA prohibits "the discharge of pollutants into the navigable waters" of the United States and declares that "it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited."[242] Sub-seabed disposal of SNF through shallow penetration of the ocean floor would not necessarily constitute a "discharge of pollutants into the navigable waters" if further research were to show that the method works properly and does not allow nuclear waste or waste containers to remain in perpetual contact with the water.[243] Sub-seabed burial of SNF through deep drilling would also not necessarily constitute a "discharge of pollutants" if such disposal works as intended and does not release SNF into America's navigable waters.[244]

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[236] *See, e.g.*, *id.* § 10132 (presenting extensive guidelines for site selection of land-based SNF repositories); *id.* § 10202 (calling for a continuation of "research, development, and investigation of alternative means and technologies" for disposal of civilian SNF that "shall include examination of various waste disposal options").

[237] *See id.* § 10202.

[238] *See, e.g.*, De Saillan, *supra* note 175, at 85–86 (explaining that the EPA's regulations implementing the CWA exempt nuclear waste).

[239] *See* 33 U.S.C. § 1251 (2006) (stating the purpose of the CWA); *id.* § 1362(6) (placing "radioactive materials" within the definition of pollutant); De Saillan, *supra* note 175, at 96 (discussing the history of the CWA and providing the date of implementation).

[240] 42 U.S.C. § 2014(z) (2006) (defining the term "source material" for the regulation of nuclear power as including uranium); 40 C.F.R. § 122.2 (2013) (providing the EPA's definition of pollutant under the CWA).

[241] *See, e.g.*, Hollister & Nadis, *supra* note 115, at 62 (describing SNF burial through deep-sea drilling and noting that "disposal would not be in the oceans, per se, but rather in the sediments below").

[242] 33 U.S.C. § 1251.

[243] *See, e.g.*, *Storage and Disposal Options*, *supra* note 18 (describing SNF containers sinking to the ocean floor and becoming buried in the sediment); Nadis, *supra* note 19, at 30, 38 (discussing shallow burial of SNF and calling for further research).

[244] *See* Hollister & Nadis, *supra* note 115, at 62 (discussing SNF burial through drilling).

Under the AEA, the Nuclear Regulatory Commission (NRC) possesses authority to manage the civilian use and disposal of nuclear materials.[245] The AEA does not appear to require any particular method of SNF disposal or by-product material disposal but instead vests the NRC with authority to promulgate regulations.[246] The NRC may "establish by rule, regulation, or order, such standards and instructions to govern the possession and use of special nuclear material, source material, and byproduct material . . . ."[247] The NRC indicates that spent fuel pools and dry cask storage are the only two storage methods that are acceptable for nuclear power plants after manufacturers remove SNF from their reactors.[248] Because the AEA does not appear to forbid sub-seabed disposal of SNF or mandate the use of any particular disposal method to the exclusion of other methods, the NRC could exercise its discretion and modify its rules to allow sub-seabed disposal, if the United States were to decide to implement such a disposal method.[249]

Finally, the MPRSA's prohibition against dumping wastes into the nation's waters would not necessarily forbid sub-seabed burial of SNF.[250] The MPRSA's purpose is "to prevent or strictly limit the dumping into ocean waters of any material which would adversely affect human health . . . ."[251] The MPRSA defines material to include "radioactive materials" and defines dumping as "a disposition of material," but excludes any disposition, or dumping, that the AEA regulates.[252] Casting aside the AEA exemption for the sake of discussion, shallow burial of SNF in the ocean floor by releasing SNF canisters

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[245] *See* 42 U.S.C. § 2201(b) (2006) (providing the NRC with authority to manage civilian use of nuclear materials); Schulte, *supra* note 178, at 118 (discussing the NRC's "regulatory and licensing power" under the AEA).

[246] *See, e.g.*, 42 U.S.C. § 2201(b) (providing regulatory authority to the NRC); *id.* § 2111(b)(1) (discussing general requirements for the disposal of nuclear byproduct material in disposal facilities, including safety and licensure).

[247] *Id.*

[248] *See* NUCLEAR REG. COMM'N, *supra* note 64, at 9–10 (presenting spent fuel pools and dry storage casks as the only two acceptable storage options for SNF).

[249] *See, e.g.*, 42 U.S.C. § 2114 (providing the NRC with significant discretion in managing by-product material, including disposal methods). The AEA remains "[t]he chief guidance for . . . NRC requirements and criteria applicable to disposal of high-level radioactive waste and spent nuclear fuel," which comes in the form of the AEA's grant of authority to promulgate regulations. Montange, *supra* note 65, at 380. Furthermore, the Supreme Court treats the AEA as "an extremely broad grant of authority" to the NRC and has acknowledged the agency's discretion under the statute. *Id.*

[250] *See* 33 U.S.C. § 1401(b) (2006) (establishing a prohibition against ocean dumping of harmful wastes as a national policy); Hollister & Nadis, *supra* note 115, at 62 (discussing sub-seabed disposal of SNF through deep-sea drilling and placement in bore holes, which is not necessarily equivalent to ocean dumping).

[251] 33 U.S.C. § 1401(b).

[252] *Id.* § 1402.

overboard from ships at sea could constitute dumping under the MPRSA.[253] Under a different interpretation, however, such disposal might not be dumping because SNF would be passing through the water on its way to burial underneath several meters of sediment on the ocean floor.[254] Deep burial of SNF through drilling, whereby SNF canisters would remain packed in bore-holes deep beneath the ocean floor, could fall outside the MPRSA's prohibition of dumping because the waste would not enter the water.[255] This reasoning assumes that further research could show that deep burial through drilling would not release waste into the water.[256]

In summary, the domestic laws and regulations surveyed in this Note probably would not stop the United States from implementing at least some options within the sub-seabed burial method.[257] The NWPA encourages research on alternative disposal methods, the EPA's implementation of the CWA probably does not regulate SNF, and the AEA does not appear to require the NRC to promulgate rules for any particular method of SNF disposal.[258] Furthermore, the MPRSA probably would not prohibit sub-seabed disposal options such as deep burial through drilling, assuming that the method would not disperse waste into the water.[259] The MPRSA also appears to exempt disposal of wastes that the AEA regulates, namely SNF, from its definition of dumping.[260] Other domestic laws and agency rules relating to pollution that are outside the limited scope of this Note might also apply to sub-seabed disposal and deserve further legal analysis.[261]

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[253] *See id.* §§ 1401–1402 (defining dumping and restricting dumping of harmful materials).

[254] *See, e.g.*, *Storage and Disposal Options*, *supra* note 18 (describing SNF containers sinking to the ocean floor and becoming buried in the sediment).

[255] *See* Hollister & Nadis, *supra* note 115, at 62 (discussing SNF burial through drilling).

[256] *See id.* at 64 (calling for further research on whether deep burial through drilling would disturb marine ecosystems or would fail to seal the SNF beneath the ocean floor).

[257] *See id.* at 62 (describing deep burial of SNF through sub-seabed drilling, which could potentially avoid various statutory prohibitions on ocean dumping).

[258] *See* 42 U.S.C. § 10202 (2006) (calling for further research on alternative methods of SNF disposal aside from land-based storage, described in the NWPA); 42 U.S.C. § 2201(b) (2006) (delegating regulatory authority to the NRC under the AEA); 40 C.F.R. § 122.2 (2013) (providing the EPA's definition of pollutant under the CWA, which exempts materials under the AEA from regulation under the CWA's prohibitions against water pollution).

[259] *See* 33 U.S.C. § 1401(b) (2006) (establishing a prohibition against ocean dumping); Hollister & Nadis, *supra* note 115, at 62 (discussing SNF burial through drilling whereby "disposal would not be in the oceans, per se, but rather in the sediments below").

[260] *See* 33 U.S.C. § 1402 (defining dumping as a "disposition of material" but excluding any such "disposition" that the AEA regulates).

[261] *See, e.g.*, Rivers and Harbors Act of 1899 (Refuse Act), 33 U.S.C. § 407 (2006). The Refuse Act states generally that it is illegal to "throw, discharge, or deposit . . . either from or out of any ship, barge, or other floating craft of any kind, or from the shore, wharf, manufacturing establishment, or

Shallow penetration of the seabed by dropping heavy SNF canisters from ships could be a close call under any laws that forbid dumping, but deep burial through drilling probably is not dumping, especially not if the method keeps SNF sealed safely beneath the muddy clays on the ocean floor.[262] In all scenarios, however, further scientific research would be necessary to determine whether sub-seabed burial of SNF is a viable disposal option that would work as intended.[263] Only then would firm conclusions be possible regarding the legality of sub-seabed burial.[264] Until and unless the United States restarts research into sub-seabed burial, the best preliminary estimate available is that America could probably engage in deep burial through drilling without violating the applicable international and domestic laws discussed in this Note.[265]

CONCLUSION

Nuclear power is a relatively common yet controversial method of producing electricity. Many nuclear power plants use uranium fuel to sustain nuclear fission, but eventually such fuel becomes exhausted and requires careful storage and disposal because of its dangerous radioactive properties. The United States produces a large amount of nuclear waste every year that many civilian nuclear power plants store on site. The United States is searching for permanent solutions to this growing amount of nuclear waste, but America favors land-based disposal methods and is not giving serious consideration to alternative methods, including sub-seabed burial. If further scientific research could show that sub-seabed burial of nuclear waste works properly and would seal the waste beneath the ocean floor, the United States could probably engage in at least some form of the disposal method without transgressing the international and domestic laws analyzed in this Note.

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mill of any kind, any refuse matter of any kind or description whatever" into America's navigable waters. *Id.*

[262] *See* London Convention of 1972, *supra* note 96, 1046 U.N.T.S. at 140–41 (requiring nations to prohibit dumping under Article IV, and defining dumping in Article III as "any deliberate disposal at sea of wastes or other matter"); Hollister & Nadis, *supra* note 115, at 62 (discussing SNF burial through deep drilling whereby muddy clays on the ocean floor "would prevent [high-level radioactive waste] from seeping into the waters above").

[263] Hollister & Nadis, *supra* note 115, at 63–64 (calling for further research on sub-seabed disposal based on encouraging results from preliminary studies).

[264] *See id.* (stating that "scientists would want to know exactly what the consequences would be if radioactive substances diffused to the seafloor on their own," within a context of ecological protection of the marine environment). Such unintended diffusion of SNF would have implications for the legality of sub-seabed disposal. *See id.*

[265] *See id.* at 65 (arguing that dumping "is a wholly inappropriate label" for sub-seabed burial through deep drilling).

June 13, 2016

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By Fax – Response to IPC

To Whom It May Concern:

On April 26, 2016, I hand-delivered a letter with attachments regarding sub-seabed disposal of spent nuclear fuel (SNF) and high level nuclear waste (HLW) to Mr. John Kotek, Acting Assistant Secretary for Nuclear Energy with the U.S. Department of Energy (DOE). This occurred at the DOE consent-based siting public meeting in Sacramento, California. On April 28, 2016, I sent an electronic version of the letter to Mr. Kotek and subsequently received an e-mail response noting the letter would be included in the public record, and one of his colleagues would contact me to discuss the sub-seabed disposal option. I have not been contacted to date.

DOE's Office of Nuclear Energy provided questions for input in submitting comments on the *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste* (Strategy) [DOE 2016].

1. How, in your view, can fairness be best assured by the process for selecting a site?

   The consent-based process underway is a good first start. A report scheduled for release late this year should provide a complete list of all the issues discussed at the six meetings throughout the country as well as the issues raised in comments by e-mail, letter, or fax. Next steps involve designing a consent-based process to serve as a flexible framework for engaging with host communities, and using this framework to work with potential host communities. This process must be transparent and reflect input from all interested parties.

2. From your perspective, what experience and models do you think are most relevant to consider and draw from in designing the process for selecting a site?

   The experience at Yucca Mountain demonstrates the problems involved with a fixation on one site despite the scientific, environmental, and political issues that proved to be insurmountable. The successful siting of the Waste Isolation Pilot Plant in New Mexico and activities in Finland, France, Spain, and Sweden are more encouraging although I am not familiar with detailed information about specific siting issues and/or controversial matters.

3. What are your views on who should be involved and the roles participants should have?

   As noted in Mr. Kotek's statement on March 29, 2016, DOE hopes to hear from the public, communities, Tribal governments, and others on what matters to them in developing a consent-based process for siting facilities to store, transport, and dispose of SNF and HLW. The electric utilities who operate and maintain nuclear power plants should also be involved in this process particularly those who have or are involved in decommissioning activities (see remarks about Humboldt Bay Power Plant Unit 3 below). It is unclear to me at this time what roles these participants would have. This should be more apparent once a flexible framework for engaging with host communities is developed.

4. What information and resources would be essential to enable you to learn the most about and participate in the siting process?

   All the information gathered from the meetings and the various types of input to the DOE should be available on-line and hard copies should be available at future meetings. A national conference/workshop in Washington DC at some point could be useful. Financial assistance may be appropriate to encourage public attendance from around the country.

5. What else should be considered?

   At some point it must be acknowledged that the best solution to nuclear waste management is to stop generating it in the first place. The role of nuclear power in the US's (or the world's) future energy supply is an important and essential topic that policy makers and the public must address (Blue Ribbon Commission 2012). Projections by DOE estimated that up to 130,000 metric tons of waste will be required by 2017 from existing nuclear power plants, and between 150,000 200,000 metric tons by 2050 (McAllister 2013). The increase is partly related to the re-licensing of existing nuclear plants for another 30 to 40 years of operation. In contrast, the current inventory of DOE-managed SNF represents a relatively small fraction of the nation's total SNF: approximately 2,500 metric tons (Ibid. pg. 16). The commercial nuclear plants provide less than 20 percent of the nation's electricity and could be partially replaced by natural gas-fired plants. More importantly, increases in energy efficiency and renewable energy resources are more plentiful and cost effective than nuclear plants when considering life cycle costs. Ultimately, a comprehensive and thoughtful energy policy is something the DOE has to address in this and other forums.

Additional Comments

The Blue Ribbon Commission on America's Nuclear Future released a Report to the Secretary of Energy noting that a massive earthquake and devastating tsunami set off a chain of problems at the Fukushima Daiichi nuclear power station in northeastern Japan. Many Americans became newly aware of the presence of tens of thousands of tons of spent nuclear fuel at more than 70 nuclear power plant sites around the country – and of the fact that the United States currently has no physical capacity to do anything with this spent fuel other than to continue to leave it at the sites where it was first generated (Blue Ribbon Commission 2012). Three elements of a strategy identified in the Report are particularly important: 1) A new, consent-based approach to siting future nuclear waste management facilities; 2) Access to the funds nuclear ratepayers are providing for the purpose of nuclear waste management; and 3) Prompt efforts to prepare one or more geologic disposal facilities (Ibid. pg. vii).

A new, consent-based approach means all affected levels of government must have, at a minimum a meaningful consultative role in important decisions. Transparency, flexibility, patience, responsiveness, and a heavy emphasis on consultation and cooperation will be necessary. Revenues collected in the government's Nuclear Waste Fund must be made available for nuclear waste management research and construction of new facilities. Deep geologic disposal capacity is an essential component of a comprehensive nuclear waste management system and is the scientifically preferred approach reached by every expert panel that has looked at the issue and by every other country that is pursuing a nuclear waste management program (Ibid. pg. xi).

However, geologic disposal sites could be identified at sub-seabed locations beneath the Pacific, Atlantic, and Gulf Coasts adjacent to the United States. As noted in the April 26, 2016 letter to Mr. Kotek, sub-seabed refers to vast mudflats under abyssal plains in the middle of tectonic plates underneath the Earth's oceans. These neglected sub-oceanic formations, hundreds of meters thick, are composed of clays and mud that might provide a permanent resting place for high-level radioactive wastes and a burial ground for the radioactive materials removed from nuclear bombs (Hollister and Nadis 1998). Deep burial of these materials could be advantageous because the clays have low permeability to water, high adsorption capacity for [radioactive waste] and a natural plasticity that enables the ooze to seal up any cracks or rifts that might develop around a waste container (Bala 2014).

Considerable experience with drilling in sub-seabed areas was obtained with the Ocean Drilling Program (ODP) from 1983 to 2007. With funding from the National Science Foundation and international partners, 1,197 holes were drilled at 696 sites to explore the Earth's history and structure as recorded in the ocean basins in the Pacific and Atlantic. ODP provided sediment and rock samples (cores), downhole geophysical and geochemical measurements (logging), opportunities for special experiments to determine in situ conditions beneath the seafloor. ODP studies led to a better understanding of plate tectonic processes and Earth's crustal structure and composition

(ODP 2007). All of this information would be useful when renewing research on sub-seabed disposal of SNF and HLW.

The April 26, 2016 letter concludes that renewing research on the sub-seabed option is an opportunity to permanently solve the U.S. radioactive waste disposal dilemma. A full scale pilot project is needed which will develop and implement a prototype sub-seabed disposal area within the U.S. EEZ as a way to demonstrate the process, work out the details and procedures, and collect data on a small SNF/HLW disposal installation. Such a pilot project could be implemented in a few years and give the U.S. a credible alternative to mined geological repositories (McAllister 2013). If further scientific research could show that sub-seabed burial of nuclear waste works properly and would seal the waste beneath the ocean floor, the U.S. could probably engage in some form of the disposal method without violating international and domestic laws (Bala 2014). The DOE should work with utilities who own and/or operate nuclear power plants to include them in the applicable research regarding, among other things, moving SNF from dry casks or other cylinders to a drillship for transportation to selected burial sites.

For example, the Humboldt Bay Power Plant Unit 3 (HBPP) is located approximately four miles southwest of the city of Eureka, California on the mainland shore of Humboldt Bay which is subject to tidal fluctuations from the Pacific Ocean. HBPP was a 65-megawatt nuclear reactor that began commercial operation in August 1963 and was taken off-line in July 1963 for a refueling outage and to make seismic modifications (PG&E 2016). In 1979, prior to the completion and acceptance of the seismic modifications, the nuclear incident at Three-Mile Island occurred and as a result, the Nuclear Regulatory Commission mandated a comprehensive series of other modifications that would have required additional investment. The California Public Utilities Commission (Commission) approved an early decommissioning plan for HBPP because the additional investments by the NRC made restarting the plant uneconomic.

The Commission authorized a number of preparatory decommissioning activities including the construction of the Independent Spent Fuel Storage Installation (ISFSI). PG&E completed the transfer of the spent fuel from the Spent Fuel Pool to large concrete and steel dry casks which are stored underground in the ISFSI. This process was completed in 2008. PG&E commenced full decommissioning in 2009 (Ibid. pg. 4-3). PG&E has scheduled the remainder of the decommissioning of the HBPP over a period of approximately eight years finishing in 2019. After 2020, PG&E will be focused on ISFSI management, which is expected to last until 2030 (Ibid pgs. 4-43 & 44). Eventually, DOE is mandated by law to take possession of the SNF and the ISFSI site will be restored (Ibid. pgs. 4-20 & 21).

Sub-seabed disposal of the SNF at the HBPP ISFSI is a potential alternative to the current plan that could be implemented more quickly than the schedule noted above. This would be the last major activity needed to complete the decommissioning of HBPP and allow the site to be restored. This would be consistent with the Blue Ribbon Commission recommendation that ***spent fuel currently being stored at shutdown reactor sites be "first in line" for transfer to a consolidated storage facility*** (Blue

Ribbon Commission 2012). More specifically, DOE should work with PG&E to initiate a scale pilot project involving the removal of SNF from five dry casks (average weight 5.8 metric tons heavy metal [Ibid. pg. 36]) at the HBPP and subsequent sub-seabed disposal at an appropriate site in the U.S. EEZ in the eastern Pacific Ocean. PG&E could use funds under the administrative claims procedure in the settlement with the DOE and the Department of Justice, regarding the failure of DOE to build a nuclear waste repository or take possession of the SNF, to conduct research on engineering, environmental, and legal issues related to sub-seabed disposal. A number of issues are relevant. For example, can the SNF in concrete and steel casks stored underground at the HBPP be put in another cylinder and loaded onto a drillship similar to the one used by the ODP for sub-seabed burial? Could the drillship enter Humboldt Bay during high tide and get relatively close to the HBPP or would another ship be used to deliver the SNF to the drillship anchored off-shore? Given the fact that decommissioning activities (except for the ISFSI) will be completed in 2019, could the removal of the SNF begin within a couple of years? Have holes already drilled in sub-seabed locations and identified by a re-entry cone and acoustic beacon be appropriate for burial (McAllister 2013)? Would a state and/or federal environmental impact statement be required? What federal, state, and local laws would be applicable?

If this pilot project is successful, there is no reason why it couldn't be implemented at other coastal nuclear power plants (i.e. San Onofre Generating Station Units 1, 2 & 3) throughout the country. Other types of HLW could be disposed of in a similar manner. Monitored retrievable storage installations would not be needed and transportation on roads and highways would be minimal when compared to land-based disposal options. States, tribes, and local citizens would not bear the burden of hosting nuclear waste disposal sites for decades at best or in perpetuity at worst. Utility ratepayers could potentially save hundreds of millions if not billions of dollars in indefinite storage and facility construction costs and maintenance. Sub-seabed disposal costs could be paid out of the unspent $27 billion dollars in the U.S. government's Nuclear Waste Fund (Blue Ribbon Commission 2012). This option may appeal to communities, like Eureka and the surrounding area, who have nuclear power plants in shutdown and/or decommissioning mode that could benefit from solving the vexing problem of a permanent, safe, reliable, economic, and timely disposal of SNF and HLW. In any event, the sub-seabed disposal option research related to all the above should be renewed in a timely manner.

Interestingly, Japan's Ministry of Economy, Trade and Industry (METI) has established a Study Group on Technical Issues with Geologic Disposal in Coastal Areas (METI 2016). This action was taken after the release of an interim report in December 2015 by the Working Group on Geological Disposal Technology under the Advisory Committee for Natural Resources and Energy. In the interim report, coastal areas within a short distance, 10 to 15 kilometers, including cases in which the underground facilities would be located in sub-seabed geological formations accessed from land, were identified as more suitable, with a view to ensuring safety and security in the process of waste transportation. The METI Study Group is expected to finish the work this summer (Japan Times 2016).

In terms of process, it is my understanding that the consent-based siting initiative has three near-term steps (DOE 2016): 1) Engage with the public and interested parties on the elements of a consent-based siting process; 2) Design a consent-based siting process to serve as a flexible framework for engaging with potential host communities; and 3) Use the recruiting consent-based siting process to work with potential host communities. Phase 1 is ongoing and a summary report will be published late in 2016. It is unclear when Phases 2 and 3 will commence. I look forward to participating throughout this process.

Sincerely,

James Adams

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June 13, 2016

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(ODP 2007). All of this information would be useful when renewing research on sub-seabed disposal of SNF and HLW.

The April 26, 2016 letter concludes that renewing research on the sub-seabed option is an opportunity to permanently solve the U.S. radioactive waste disposal dilemma. A full scale pilot project is needed which will develop and implement a prototype sub-seabed disposal area within the U.S. EEZ as a way to demonstrate the process, work out the details and procedures, and collect data on a small SNF/HLW disposal installation. Such a pilot project could be implemented in a few years and give the U.S. a credible alternative to mined geological repositories (McAllister 2013). If further scientific research could show that sub-seabed burial of nuclear waste works properly and would seal the waste beneath the ocean floor, the U.S. could probably engage in some form of the disposal method without violating international and domestic laws (Bala 2014). The DOE should work with utilities who own and/or operate nuclear power plants to include them in the applicable research regarding, among other things, moving SNF from dry casks or other cylinders to a drillship for transportation to selected burial sites.

For example, the Humboldt Bay Power Plant Unit 3 (HBPP) is located approximately four miles southwest of the city of Eureka, California on the mainland shore of Humboldt Bay which is subject to tidal fluctuations from the Pacific Ocean. HBPP was a 65-megawatt nuclear reactor that began commercial operation in August 1963 and was taken off-line in July 1963 for a refueling outage and to make seismic modifications (PG&E 2016). In 1979, prior to the completion and acceptance of the seismic modifications, the nuclear incident at Three-Mile Island occurred and as a result, the Nuclear Regulatory Commission mandated a comprehensive series of other modifications that would have required additional investment. The California Public Utilities Commission (Commission) approved an early decommissioning plan for HBPP because the additional investments by the NRC made restarting the plant uneconomic.

The Commission authorized a number of preparatory decommissioning activities including the construction of the Independent Spent Fuel Storage Installation (ISFSI). PG&E completed the transfer of the spent fuel from the Spent Fuel Pool to large concrete and steel dry casks which are stored underground in the ISFSI. This process was completed in 2008. PG&E commenced full decommissioning in 2009 (Ibid. pg. 4-3). PG&E has scheduled the remainder of the decommissioning of the HBPP over a period of approximately eight years finishing in 2019. After 2020, PG&E will be focused on ISFSI management, which is expected to last until 2030 (Ibid pgs. 4-43 & 44). Eventually, DOE is mandated by law to take possession of the SNF and the ISFSI site will be restored (Ibid. pgs. 4-20 & 21).

Sub-seabed disposal of the SNF at the HBPP ISFSI is a potential alternative to the current plan that could be implemented more quickly than the schedule noted above. This would be the last major activity needed to complete the decommissioning of HBPP and allow the site to be restored. This would be consistent with the Blue Ribbon Commission recommendation that ***spent fuel currently being stored at shutdown reactor sites be "first in line" for transfer to a consolidated storage facility*** (Blue

Ribbon Commission 2012). More specifically, DOE should work with PG&E to initiate a scale pilot project involving the removal of SNF from five dry casks (average weight 5.8 metric tons heavy metal [Ibid. pg. 36]) at the HBPP and subsequent sub-seabed disposal at an appropriate site in the U.S. EEZ in the eastern Pacific Ocean. PG&E could use funds under the administrative claims procedure in the settlement with the DOE and the Department of Justice, regarding the failure of DOE to build a nuclear waste repository or take possession of the SNF, to conduct research on engineering, environmental, and legal issues related to sub-seabed disposal. A number of issues are relevant. For example, can the SNF in concrete and steel casks stored underground at the HBPP be put in another cylinder and loaded onto a drillship similar to the one used by the ODP for sub-seabed burial? Could the drillship enter Humboldt Bay during high tide and get relatively close to the HBPP or would another ship be used to deliver the SNF to the drillship anchored off-shore? Given the fact that decommissioning activities (except for the ISFSI) will be completed in 2019, could the removal of the SNF begin within a couple of years? Have holes already drilled in sub-seabed locations and identified by a re-entry cone and acoustic beacon be appropriate for burial (McAllister 2013)? Would a state and/or federal environmental impact statement be required? What federal, state, and local laws would be applicable?

If this pilot project is successful, there is no reason why it couldn't be implemented at other coastal nuclear power plants (i.e. San Onofre Generating Station Units 1, 2 & 3) throughout the country. Other types of HLW could be disposed of in a similar manner. Monitored retrievable storage installations would not be needed and transportation on roads and highways would be minimal when compared to land-based disposal options. States, tribes, and local citizens would not bear the burden of hosting nuclear waste disposal sites for decades at best or in perpetuity at worst. Utility ratepayers could potentially save hundreds of millions if not billions of dollars in indefinite storage and facility construction costs and maintenance. Sub-seabed disposal costs could be paid out of the unspent $27 billion dollars in the U.S. government's Nuclear Waste Fund (Blue Ribbon Commission 2012). This option may appeal to communities, like Eureka and the surrounding area, who have nuclear power plants in shutdown and/or decommissioning mode that could benefit from solving the vexing problem of a permanent, safe, reliable, economic, and timely disposal of SNF and HLW. In any event, the sub-seabed disposal option research related to all the above should be renewed in a timely manner.

Interestingly, Japan's Ministry of Economy, Trade and Industry (METI) has established a Study Group on Technical Issues with Geologic Disposal in Coastal Areas (METI 2016). This action was taken after the release of an interim report in December 2015 by the Working Group on Geological Disposal Technology under the Advisory Committee for Natural Resources and Energy. In the interim report, coastal areas within a short distance, 10 to 15 kilometers, including cases in which the underground facilities would be located in sub-seabed geological formations accessed from land, were identified as more suitable, with a view to ensuring safety and security in the process of waste transportation. The METI Study Group is expected to finish the work this summer (Japan Times 2016).

In terms of process, it is my understanding that the consent-based siting initiative has three near-term steps (DOE 2016): 1) Engage with the public and interested parties on the elements of a consent-based siting process; 2) Design a consent-based siting process to serve as a flexible framework for engaging with potential host communities; and 3) Use the recruiting consent-based siting process to work with potential host communities. Phase 1 is ongoing and a summary report will be published late in 2016. It is unclear when Phases 2 and 3 will commence. I look forward to participating throughout this process.

Sincerely,

James Adams

References

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McAllister 2013 – *Sub-Seabed Repository for Nuclear Waste – A Strategic Alternative*, Keith R. McAllister, WM2013 Conference, February 24 – 28, 2013.

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PG&E 2016 – Pacific Gas and Electric Company – 2015 Nuclear Decommissioning Cost Triennial Proceeding – Prepared Testimony – Chapter 4 – *Humboldt Bay Power Plant Unit 3 Updated Nuclear Decommissioning Cost.*

Consent-Based Siting

From: Bill Addington [mailto:waterislife231@gmail.com]
Sent: Sunday, July 31, 2016 11:58 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to DOE Invitation for Public Comment regarding Consent Based Siting

Response to DOE Invitation for Public Comment regarding Consent-Based Siting

Dear U.S. Department of Energy,

You should know our far west Texas region has a highly publicized and well known history of fighting radioactive waste disposal facilities (dumps) that goes back thirty two years.

In my county of Hudspeth we have defeated State of Texas proposed creation of three "low level" radioactive waste dump facilities in three communities from 1984 - to October 22, 1998. The first attempt by the Texas LL Radioactive Waste Disposal Authority, (TLLRWDA) a state agency, was in Dell City, Texas from 1984 -1986. Farmers and ranchers and others living in the farming community of Dell City organized a citizens group a stopped the proposal cold. You would not be able to label them "environmentalists" or "activists" as the Dell Valley area opponents of the RW dump, we're all small town down to earth citizens. The group they freed Alert Citizens for Environmental Safety, was the first but not the last as it turned out, environmental citizens group in Hudsoeth County.

The second state of Texas - TLLRWDA, directed by the Texas Legislature, was Ft Hancock, Texas, also in Hudsoeth County. (1987-1991) Hearing the news of the proposal, residents and members of the Catholic Church in Ft Hancock quickly organized. There was A lot of media attention fromEll Paso, Ft Hancock being 50 miles from downtown El Paso.The El Paso County Judge and Commissioners Court got involved, hiring a water and environmental attorney to contest and oppose the states attempt in state district court. Over the four year battle El Paso County spent over four million dollars in legal fees opposing the radioactive waste dump proposed 15 miles from Ft Hancock.
A state district judge, Bill Moody ruled against the state,denying the site proposal and going so far to order he state out of Hudsoeth County, because the states own siting maps showed most all of the County to be in an "exclusionary area" because of complex geology.

The Texas Legislature, tired of being stopped twice in rural west Texas then passed a bill (HB 2665) in 1991 that drew a 370 square mile "box"defined by longitude and latitude in eastern Hudspeth County. The RW dump facility could only be sited in this politically drawn "box" on a map politicians approved.
Before this Texas legislation, the TLLRWDA could look and propose a RW disposal facility anywhere in Texas. The legislation also gave the TLLRWDA eminent domain, power to enter property, and any litigation filed against the disposal authority in opposition to stop the creation of the RW disposal facility could only be filed in Travis County Texas, (Austin) 500 miles away from Hudspeth County.

The focus by the Texas disposal authority was on a ranch 5 miles east of Sierra Blanca that was for sale. Hearing this news, we quickly organized a citizens group, Save Sierra Blanca, then we also founded The Texas Nuclear Responsibly Network, a statewide group that later became the Sierra Blanca Legal Defense Fund. We retained an environmental attorney from Austin, and organized, fundraised, educated and politically and legally opposed the proposed LLRW dump facility.

We opposed and defeated the Texas LLRW Compact Consent Act in the US House of Representatives in 1995 on a record vote of 243 - 176.

After eight long years of fighting this disposal facility in Sierra Blanca, my home, we defeated Texas and Governors Ann Richards and George Bush's facility for Maine, Vermont, and Texas Nuclear Energy Utilities.

On October 22, 1998 the Texas Natural Resources Conservation Commission (TNRCC) commissioners unanimously ruled against the Sierra Blanca RW Dump. Head commissioner Barry McBee said in his motion that the Sierra Blanca disposal facility was the biggest and most opposed issue that had ever come before the Commission. Seventeen Texas Counties from El Paso to Brownsville passed resolutions opposing it, as did every US border state in Mexico and the The Mexican Federal Congress, unanimously. 600 Federal Mexican deputies of the lower house and 200 Senators voted for the resolution demanding this dump be taken far from the Texas- US border. A letter was then sent by Mexico,s Foreign Ministry to the US State Department demanding removal and cancellation of the Sierra Blanca Radioactive Waste Dump.

Literally thousands of articles from national, states and Mexican news outlets were generated over the eight years of Sierra Blanca radioactive waste war with Texas. Many are available online.

If you try to site a high level RW dump in west Texas, I can promise you their will be a fight. A big one. Please stop using our economically distressed region that is over 70 % people of Mexican origin as a sacrifice area. This is environmental racism. We are not the nuclear electric utilities dumping ground. We do not consent.

Continuing :

The federal government knows that no one wants radioactive waste in their backyard, and in 2012 the Blue Ribbon Commission on America’s Nuclear Future came out with a plan to get communities to “volunteer” to take dangerous radioactive waste from around the country. The truth is that there really is no such thing as “Consent” to radioactive waste storage. It can only be forced and coerced. Manufactured consent is not real consent and financial bribes should not be used to con a community into taking on this deadly legacy.

There is no need to consolidate radioactive waste for the purpose of storage. Any shipment of this cancer-causing waste should happen only once, and only to a permanent repository, if a site can be found based on sound science that might be able to isolate waste of over 250,000 years. The Nuclear Regulatory Commission has previously said that the least risky option is to keep the waste stored securely at or close to the site of generation, and most nuclear reactor sites are now licensed to do so.
If the plan to transport radioactive waste for consolidated storage moves forward, people in any host county or in any county through which radioactive waste would be transported should be able to vote on whether or not to “consent,” and not have state or local political leaders speak for them on this crucial health and safety issue. These are the people most at risk. Those living near aquifers that could become contaminated should be able to vote as well, and interests that stand to benefit from high-level radioactive waste storage, such as the license applicant, contractors and utilities, should be prohibited from expending funds to influence the elections.

Texas and New Mexico are the states most targeted for storing the nation’s high-level radioactive waste and should have been the first asked about whether they “consent,” but DOE failed to schedule even a single meeting in either state. This shows utter disregard for those the may get dumped on. Instead eight meetings

were held elsewhere around the country. Is this an effort to get people to gang up against our region? People at ground zero are most likely to be impacted, but DOE did not see fit to hold a meeting here. It is clear that rules and policies based on this "consent-based siting" process and the meetings held are likely to be unfair, inappropriate and perhaps designed to dump on our region.

Many people in Texas and New Mexico have signed petitions saying that they DO NOT CONSENT to having radioactive waste from the nation's nuclear reactors stored in their backyard. The 2016 Democratic Party Platform calls for a halt to the misguided plan for consolidated storage of high-level radioactive waste.

The effort to send the nation's most deadly radioactive waste to the Texas/New Mexico region is an example of extreme environmental injustice. The largely Hispanic communities in the Texas/ New Mexico region don't benefit from nuclear energy produced around the country. They should not have to suffer the burden of having deadly waste stored in their backyard, posing threats to their health and safety. It is not their patriotic duty to do so.

The plan to ship the nation's deadly nuclear reactor waste to Texas / New Mexico should be halted immediately due to the risks of radioactive contamination rom leaks, accidents or terrorist attacks. Our health, land and aquifers would be threatened. A person exposed up close to the waste would die within a week, and leaks could lead to cancer and genetic damage.

We ask that the DOE not portray us as wanting to accept this waste. People in Texas and New Mexico DO NOT CONSENT to having the nation's deadly radioactive waste dumped in our backyard.

Thank you for your consideration of these comments.

Sincerely,

Bill Guerra Addington
Co founder, Sierra Blanca Legal Defense Fund Inc
P.O. Box 218
Sierra Blanca, Texas 79851

Consent-Based Siting

From: Nancy Allen [mailto:nallen11@myfairpoint.net]
Sent: Friday, July 15, 2016 11:37 AM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: comment

Please tell me the purpose of these "consent based siting" meetings. Sounds like DOE is trying to get the public to "consent" to something that the community may not want.

Please answer the following questions:

Will all decisions on siting be decided by the community that is involved?
State, county and town committees? How will this be administrated?

What public interactive procedures for a community to decide will be made available?

Is the actual goal of the "consent based siting" be a forced decision to dump nuclear waste in some community?

Consent-Based Siting

From: Cindi Andersen [mailto:cindersnaps343@yahoo.com]
Sent: Monday, July 11, 2016 7:32 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: SONGS Nuclear Generating Plant, San Onofre, Calif.

Good afternoon, Department of Energy,

I would please like to ask if perhaps the DOE might be able to take a look at the former San Onofre Nuclear Generating Station (SONGS) property, which is located on Navy-owned land at San Onofre, California? I am merely a local resident who does not wish to see this invaluable piece of real estate and infrastructure be destroyed. Since the lease runs for many more years, is there any chance that the property could be put to productive use once again, as a clean natural gas generating station, along with a business park & hotel?

This is a once-in-a-lifetime opportunity that North San Diego County/South Orange County and Southern California will never have again, as the Coastal Commission and other uncooperative, environmentalist-controlled regulatory agencies would never allow for infrastructure like that of SONGS to have been built nowadays. Details of property use would be negotiated with Southern California Edison (SCE) and the Department of the Navy.

The existing electrical switchgear and transformers at SONGS can be re-purposed for use with a clean, natural gas-powered electrical plant on the property. I wouldn't think that the U.S. Navy would object to having electrical energy produced from natural gas rather than nuclear power, along with other industries, especially when Camp Pendleton itself would benefit and SCE/SDG&E would continue to pay the Navy rent on the property. Since the SONGS has its own dedicated BNSF (Burlington Northern Santa Fe Railway) spur, underutilized portions of the land could generate income as a civilian/military business park with light industry. The entire property also has immediate access to old U.S. Highway 101 and Interstate 5, with entry & exit ramps located at Basilone Road.

A little-known fact is that at the time WWII broke out, Mr. Jerome Baumgartner (an O'Neill family heir who had worked in the hospitality business up in San Francisco) was planning for a fine, full-service hotel

to be built at San Onofre, midway between San Diego & Los Angeles on U.S. Highway 101 (now Interstate 5).

Here is the link for this excellent book regarding the former Santa Margarita Rancho -

http://www.worldcat.org/title/rancho-santa-margarita-remembered-an-oral-history/oclc/18833653

Perhaps his luxury hotel idea (maybe incorporating an Art Deco "Streamline Moderne" architectural styling) could also eventually be brought to fruition on the SONGS property, along with a natural gas-fired electrical generating station, business park & small harbor. The business park and harbor could also be designed utilizing the Art Deco styling as well.

Also, local civilian harbors such as the ones at Dana Point & Oceanside lack vacancies for boats over 33' in length and have a severe shortage of room for dry-boat storage. As SONGS possesses a large seawall along the ocean-facing side of the plant, perhaps a small auxiliary harbor could be constructed along it. There was a very interesting 1949 design for a small harbor at San Clemente that was never built -- maybe the basic plan could be added to SONGS, along with an extension of the existing BNSF rail spur so as to accommodate the loading and unloading of cargoes. There are no other ocean-rail facilities located anywhere between Los Angeles & San Diego harbors. Security for SONGS would be enhanced through the presence of a small U.S. Coast Guard station at the harbor (as per the 1949 design) and of course, any or all of these options would help to raise money for SCE, SDG&E and the Navy through leases.

Small 1949 San Clemente Harbor Design -

http://www.habig.com/remember_harbor.html

Southern California needs the electricity and jobs that this location produced, and thousands of jobs were lost when SONGS closed down a few years ago. It is such a massive waste of infrastructure for a perfectly-good facility to be scrapped just because the nuclear aspect is no longer on the table. As things stand, even if a natural gas plant can be operated on SONGS, the closed nuclear portion of the facility might be able to be gradually converted for use as a Thorium-based reactor in the future, if Thorium is indeed as promising as it is claimed to be.

Thorium Reactor Advantages -

http://www.extremetech.com/extreme/160131-thorium-nuclear-reactor-trial-begins-could-provide-cleaner-safer-almost-waste-free-energy

Very respectfully,
Cindi Andersen

Posted September 26, 2015 - 10:39am

American Indians accuse NRC of 'environmental racism'

By Keith Rogers
Las Vegas Review-Journal

The feds call it "environmental justice." Western Shoshones say it's really "environmental racism." Whatever words apply, a challenge by American Indian tribes on that subject in the latest Nuclear Regulatory Commission report for disposing nuclear waste in Yucca Mountain could slam the brakes on the project.

This month, because of a 2013 federal appeals court decision, the commission rejuvenated proceedings on the Department of Energy's license application to build and operate a repository for the nation's highly radioactive waste at the mountain, 100 miles northwest of Las Vegas.
The project was mothballed in 2010 when the Obama administration decided not to fund it and instead pursue another path that favors a willing state or tribe to host a repository. Neither Nevada nor the Shoshones want it.

The NRC's draft, 173-page supplemental environmental impact report released in August shows radioactive particles from the planned repository would contaminate groundwater. That means it also would affect purity of traditional American Indian springs in Death Valley, Calif. While that translates to only a "small fraction" increase in the dose people receive from normal background radiation, according to the NRC staff's report, project opponents say it could be enough to disqualify the site for licensing on grounds of environmental injustice.

That's because burying 77,000 tons of highly radioactive defense wastes and spent fuel from power reactors there coupled with past episodes of fallout from nuclear weapons tests amounts to "environmental racism," according to the Western Shoshone and Timbisha Shoshone tribes and a Reno lawyer.

Western Shoshone Ian Zabarte, a board member of the Native Community Action Council, a party with standing in the NRC's licensing proceedings, was blunt in his public comments at an NRC panel meeting this month in Las Vegas. "From our perspective the processes employed by the DOE is environmental racism designed to systematically dismantle the living 'lifeways' of the Western Shoshone people in relation to our land," he said. Timbisha Shoshone tribe member, Joe Kennedy of Fish Lake Valley, backed up Zabarte's claim that the heritage of low-income Native Americans will be compromised if nuclear waste is entombed in Yucca Mountain — a more likely prospect under a Republican-controlled Congress that could try to reverse the Obama administration's mothballing of the project. DOE has spent roughly 25 years and $15 billion trying to determine whether the site and design are safe for long-term nuclear waste storage.

At the Sept. 15 meeting, Kennedy told a story about how his father taught him that all the springs that his tribe relies on for traditional and subsistence purposes are connected. Contaminating the purity of one downstream of the planned Yucca Mountain repository site could pollute all of them, he said.

NEVADA AND THE WEST

Verdes Elementary gets face lift

More than 400 volunteers from Las Vegas-based TELUS International helped paint murals and add other improvements to Vegas Verdes Elementary School on Saturday. B2

Inside

COMMENTARY

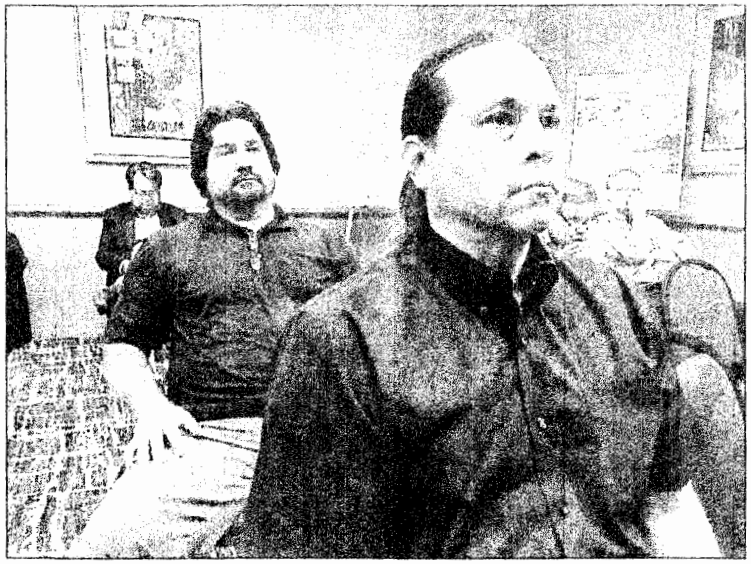
Trump telling truth? Don't bet on it

JOHN L. SMITH

If you haven't heard Republican presidential candidate Donald Trump brag about the vastness of his wealth

'EVIRONMENTAL RACISM'

Tribes unhappy with feds



Joe Kennedy, left, of the Timbisha Shoshone tribe, and Western Shoshone Ian Zabarte listen to a speaker Sept. 15 during a Nuclear Regulatory Commission meeting in Las Vegas about the Yucca Mountain Project. KEITH ROGERS/LAS VEGAS REVIEW-JOURNAL

American Indians say radioactive materials would contaminate water

By Keith Rogers
Las Vegas Review-Journal

The feds call it "environmental justice."

Western Shoshones say it's really "environmental racism."

Whatever words apply, a challenge by American Indian tribes on that subject in the latest Nuclear Regulatory Commission report for disposing nuclear waste in Yucca Mountain could slam the brakes on the project.

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The NRC's draft, 173-page supplemental environmental

SEE TRIBES, B9

Consent-Based Siting

From: Watch Man [mailto:watchman484@gmail.com]
Sent: Thursday, July 14, 2016 6:15 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

NO MORE NUKE WASTE TO IDAHO

Consent-Based Siting

From: gericolle@aol.com [mailto:gericolle@aol.com]
Sent: Friday, July 15, 2016 6:50 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

1. **Stop making it.** The only truly safe, sound, just solution for the radioactive waste problem, is to not make it in the first place. Electricity can be supplied by clean, safe, affordable renewable sources, such as wind and solar, and demand decreased significantly by efficiency, rather than generating radioactive waste via dirty, dangerous, and expensive nuclear power.
2. **Expedite the transfer of irradiated nuclear fuel from densely-packed "wet" storage pools into Hardened On-Site Storage (HOSS) dry casks**.
3. Store irradiated nuclear fuel in HOSS dry casks, **as safely and securely as possible, as close to the point of generation as possible, in a monitored, inspectable, retrievable manner.**
4. Given the unavoidable risks of high-level radioactive waste truck, train, and/or barge shipments on roads, rails, and/or waterways (Mobile Chernobyls, Dirty Bombs on Wheels, Floating Fukushimas), **transport irradiated nuclear fuel only once**, such as straight to a (suitable, acceptable, just) geological repository, **not to so-called centralized interim storage** (*de facto* permanent parking lot dumps, such as those currently targeted at Waste Control Specialists, LLC in Andrews County, west Texas; at Eddy-Lea Counties, near the Waste Isolation Pilot Plant in southeast New Mexico; Native American reservations; nuclear power plants, such as Exelon's Dresden in Morris, IL; etc.).
5. **Geological repositories** must be **scientifically suitable** (capable of isolating the hazardous high-level radioactive waste from the living environment forevermore), **socially acceptable** (genuinely consent-based), and **environmentally just**. Note that no such suitable/acceptable/just geologic repository has yet been found, in more than half a century of looking. DOE has admitted it can't open *any* repository (even an unsuitable/unacceptable/unjust one) till 2048 at the earliest, more than a century after Enrico Fermi, in 1942, generated the first high-level radioactive waste, in the world's first reactor, as part of the Manhattan Project to build atomic bombs; and more than 90 years years after the first "civilian" atomic reactor began generating waste at Shippingport, PA.
6. **Do not reprocess** (extract fissile plutonium and/or uranium from) irradiated nuclear fuel. Not only would this risk **nuclear weapons proliferation**, and be **astronomically expensive**; it would also very likely cause **environmental ruin downwind and downstream** of wherever it is carried out, as has been shown at such places as Hanford Nuclear Reservation in Washington; Savannah River Site, South Carolina; West Valley, New York; Sellafield, England; La Hague, France; Kyshtym, Russia; etc.
7. **Preserve and maintain "wet" storage pools – albeit *emptied* of irradiated nuclear fuel -- as an emergency back up location for cask-to-cask HOSS transfers**, when old HOSS casks deteriorate toward failure, and need to be replaced with brand new HOSS casks. That is, do not dismantle pools as part of nuclear power plant decommissioning post-reactor shutdown.

8. **Carefully pass information** about storing irradiated nuclear fuel as safely as possible, as close to the point of generation as possible, **from one generation to the next, à la the concept of "Rolling Stewardship"** described by the Canadian Coalition for Nuclear Responsibility.
9. **Address the shortfall in funding for forevermore storage of high-level radioactive waste**. Dr. Mark Cooper of Vermont Law School has estimated the first 200 years of commercial irradiated nuclear fuel storage (assuming just a single repository, although at least two will be required!) will cost $210 to $350 billion, even though there is only some tens of billions of dollars remaining in the now-terminated Nuclear Waste Fund, collected from nuclear power ratepayers.
10. **Environmental justice**, in keeping with Bill Clinton's 1994 **Executive Order 12898, demands that Native American communities and lands, as well as those of other low income and/or people of color communities, never again be targeted for high-level radioactive waste parking lot dumps or permanent burial sites, a shameful form of radioactive racism dating back decades in the U.S.**

Radioactive Eggs and Ham

DOE:
I am the DOE.
The DOE I am.

Non-consenting Volunteer:
That DOE! That DOE!
I don't like nuclear energy!

DOE:
Do you like radioactive waste?

Non-consenting Volunteer:
I don't like radioactive waste.

DOE:
Would you like it here or there?

Non-consenting Volunteer:
I would not like it here or there.
I would not like it anywhere.
Stop making radioactive waste.
I do not like it anyplace.

DOE:
Would you like it in Massachusetts?
Would you like it at Yucca Mountain?

Non-consenting Volunteer:
I would not like it in Massachusetts.
I would not like it at Yucca Mountain.
I do not like it here or there.
I do not like it anywhere.
Stop making radioactive waste.
I do not like it anyplace.

DOE:
Would you take it in Minnesota?
Would you take it in Arizona?

Non-consenting Volunteer:
Not Minnesota. Not Arizona.
Not Massachusetts. Not Yucca Mountain.
I would not take it here or there.
I would not take it anywhere.
Stop making radioactive waste.
I do not like it anyplace.

DOE:
Waste Control Specialists is in this Biz.
Take it! Take it! Here it is!

Non-consenting Volunteer:
No we cannot take their bids.
Texas does not want this for their kids.

DOE:
A train! A train! A train! A train!
Could you haul it on a train?

Non-consenting Volunteer:
Not on a train! Not through our yard!
Not on a truck! You make this hard!
I would not, could not, in Minnesota.
I could not, would not, in Arizona.
I will not take it in Massachusetts
I will not take it to Yucca Mountain.
I will not take it here or there.
I will not take it anywhere.
Stop making radioactive waste.
I do not like it anyplace.

DOE:
Could you, would you, in a borehole?

Non-consenting Volunteer:
I would not, could not, in a borehole!

DOE:
What if it's safe and under our control?

Non-consenting Volunteer:
I could not, would not, in a borehole.
It is not safe or under control.
I will not take it on a train.
You should not drive it through the rain.
Not on a truck! Not next to me!
Not through my yard! You let me be!
I do not like it in Arizona.
I do not like it in Minnesota.
I will not take in Massachusetts.
I will not take it to Yucca Mountain.
I do not like it here or there.
I do not like it ANYWHERE!
Stop making radioactive waste!
I do not like it anyplace.

DOE:
You do not like it, so you say.
What shall we do to save the day?

Non-consenting Volunteer:
Stop making radioactive waste!
Don't transport it all over the place.
Keep it on site,
And save the human race!

Consent-Based Siting

Public input on organizational principles that should be followed by a waste management organization.

Minnesota Administrative Rules

Auth

7845.0700 PROHIBITED ACTIVITIES.

Subpart 1. **In general; exceptions.** A commissioner or employee shall not directly or indirectly solicit or accept for the commissioner or employee, or for another person, any compensation, gift, gratuity, favor, entertainment, meal, beverage, loan, or other thing of monetary value from a public utility, telephone company, or party, that exceeds nominal value. This prohibition does not apply to:

A. books or printed materials that are relevant to the official responsibilities of the commission; or

B. an educational program devoted to improving the regulatory process or the administration of the commission that is open to other interested groups or state agencies under the same terms and conditions. Meals associated with the program must be paid for by a commissioner or employee who attends the program.

Subp. 2. **Outside income.** A commissioner or professional employee shall not receive personal income, directly or indirectly, from a public utility or telephone company subject to regulation by the commission. A commissioner or professional employee may receive dividends or other earnings from a mutual fund or trust so long as the mutual fund or trust does not hold a significant portion of its investments in public utilities or telephone companies subject to regulation by the commission.

Subp. 3. **Interests in utilities.** A commissioner or professional employee shall not invest in a public utility or telephone company, acquire a legal or equitable interest in it, however small, become its director or advisor, or actively participate in its affairs. This prohibition does not apply to:

A. ownership in a mutual fund or trust that holds securities in a telephone company or public utility unless the commissioner or professional employee participates in the management of the fund;

B. holding office or title in an educational, religious, charitable, fraternal, or civic organization that owns securities in a telephone company or public utility;

C. purchasing services from a telephone company or public utility on the same terms and conditions as a member of the general public; or

D. holding membership in a cooperative association under the same terms and conditions as other members of the cooperative.

Subp. 4. **Outside employment.** A commissioner or employee shall not negotiate for or accept outside employment or other involvement in a business or activity that will impair the person's independence of judgment in the exercise of official duties.

Subp. 5. **Insider information.** A commissioner or employee shall not directly or indirectly use, or permit others to use, information not made available to the general public, to advance a private interest.

Statutory Authority: *MS s 216A.037*

History: *12 SR 458*

Published Electronically: *January 5, 2010*

Minnesota Administrative Rules

Auth

7845.0400 CONFLICT OF INTEREST; IMPROPRIETY.

Subpart 1. **General behavior.** A commissioner or employee shall respect and comply with the law and shall behave in a manner that promotes public confidence in the integrity and impartiality of the commission's decision making process.

Subp. 2. **Actions prohibited.** Commissioners and employees shall avoid any action that might result in or create a conflict of interest or the appearance of impropriety, including:

A. using public office for private gain;

B. giving preferential treatment to an interested person or entity;

C. impeding the efficiency or economy of commission decision making;

D. losing independence or impartiality of action;

E. making a commission decision outside official channels; and

F. affecting adversely the confidence of the public in the integrity of the commission.

Statutory Authority: *MS s 216A.037*

History: *12 SR 458*

Published Electronically: *January 5, 2010*

WHAT COULD GO WRONG?

WCS wants to dump HIGH-LEVEL RADIOACTIVE WASTE from the nation's nuclear reactors in TEXAS!

High-level radioactive waste is the most dangerous of all radioactive materials. Contamination from the Fukushima meltdown disaster came from this same source - irradiated fuel from nuclear reactors.

Targeting a largely Hispanic region to store the nation's most dangerous radioactive waste is an extreme example of environmental injustice. WCS submitted a license application to the NRC in April, 2016. Two other companies have similar plans. AFCI now targets Culberson County and Eddy Lea Energy Alliance (ELEA) seeks a Hobbs, New Mexico site.

High-level radioactive waste includes irradiated (used) fuel rods from nuclear reactors that contain uranium and plutonium. Radiation exposure can cause genetic damage, leading to birth defects, and can lead to many kinds of cancers, radiation sickness and even death. Without shielding, a person exposed to spent fuel rods would be immediately incapacitated and die within a week according to the Texas Commission on Environmental Quality.

Nevada fought against burial of high-level radioactive waste at the Yucca Mountain site for decades, and other states have fought as well. Deaf Smith County in the Texas Panhandle was considered as a permanent repository site before Yucca Mountain was chosen, but ranchers and farmers fought hard due to concerns about radioactive water contamination - and won.

What Should Be Done With High-Level Radioactive Waste?

Consolidated Storage is NOT needed. The least risky option is to store fuel removed from nuclear reactor fuel pools in dry casks, secured at the site of generation, or nearby. Most reactor sites are now licensed to store waste for 60 years past decommissioning, and these sites will remain guarded for decades anyway.

Transporting radioactive waste increases risks of terrorism and accidents, in a process that would take over 20 years and involve thousands of shipments. Yucca Mountain efforts have failed and no permanent repository is available yet, so why ship this dangerous waste just to store it in a new location? Urge the NRC to prevent terrorism and accident risks by halting consideration of consolidated radioactive waste storage.

No Nuclear Waste Aqui Contacts: **www.NoNuclearWasteAqui.org**

- Karen Hadden, SEED Coalition, 512-797-8481 karendhadden@gmail.com
- Tom "Smitty" Smith, Public Citizen - Texas, 512-477-1155, smitty@citizen.org
- Former State Rep. Lon Burnam, Ft. Worth, 817-721-5846, lonburnam@gmail.com
- Diane D'Arrigo, Nuclear Information and Resource Services - NIRS, 202-362-6827. dianed@nirs.org,
- Humberto Acosta, Andrews, TX, 432-266-1179, westexmex@aol.com
- Rose Gardner, Eunice, NM , 575-394-0261, NMLady2000@hotmail.com

Most Texans DO NOT CONSENT to being the nation's radioactive waste dump. Our voices need to be heard by the Department of Energy (DOE) and Nuclear Regulatory Commission!

KEY FACTS:

Andrews and Culberson Counties in West Texas have been targeted for interim centralized storage of dangerous high-level radioactive waste from nuclear reactors around the country. WCS' license application is for storage for 40 years. What if an "interim" storage site became a de-facto permanent disposal site?

- High-level radioactive waste is so dangerous that it must remain isolated from living things for thousands of years. The irradiated (spent) fuel rods from nuclear reactors still contain most of the original uranium, along with radioactive strontium, cesium and plutonium which are created during the reactor fission process. Some of these materials have long half-lives. They're dangerous now and will remain so far into the future. Plutonium remains dangerous for over a quarter of a million years. Inhaling even a small amount is known to lead to cancer.
- Over 100,000 metric tons of irradiated fuel will have been generated by existing U.S. reactors by the time they cease operating. If the roughly 1000 metric tons of plutonium were separated out, it would be enough for 120,000 nuclear bombs. The total strontium-90, if diluted uniformly, would be enough the contaminate the entire world's fresh water supply to about 60 times the U.S. drinking water standard.
- Transporting high-level radioactive waste throughout the country and our state imperils our health and lives, creating risks of accidents, radiation releases, leaks or terrorist actions. TCEQ acknowledges that radioactive waste is vulnerable to sabotage during transport, and that "consequences due to sabotage or accidents are also higher during transport since the waste may be near population centers." Centralized (consolidated) Interim Storage of the nation's high-level waste at a single location would increase risks by creating an additional site that must be secured.
- At least one train accident was expected to occur if transport was mainly by train to the previously proposed but now cancelled Yucca Mountain repository in Nevada. DOE calculated a train accident rate of 1 in 10,000 shipments. If even one train accident occurred it could be a major disaster.
- DOE reported that a severe accident involving a radioactive waste cask that released only a small amount of waste would contaminate a 42-square mile area. Cleanup costs could exceed $620 million in a rural area. Clean up in an urban area would be more time consuming. It could cost up to $9.5 billion to raze and rebuild the most heavily contaminated square mile in a major city.
- Importing high-level radioactive waste might benefit a wealthy corporation, but millions of Texans and people along transport routes throughout the country would be put at risk of financial and health impacts that could result from radioactive accidents or terrorism.

What You Can Do:

Contact the DOE. Let them know you **do not consent** to having high-level radioactive waste storage or disposal in Texas or New Mexico. http://energy.gov/ne/consent-based-siting and consentbasedsiting@hq.doe.gov

Donate to efforts to protect our health and land and request email updates… Email or call 512-797-8481. www.NoNuclearWasteAqui.org. Tax deductible donations can be sent to SEED Coalition, 605 Carismatic Lane, Austin, TX 78748

Speak UP! Contact Congressional Representatives and Texas Legislators to say no to this dangerous plan. Write letters to the editors and call radio talk shows. Your voice is needed now.

Consent-Based Siting

From: Concerned Citizens for Nuclear Safety [mailto:ccns@nuclearactive.org]
Sent: Monday, July 11, 2016 6:48 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Re: Consent-based Siting Updates - need index to comments

Hi,
Downloading a comment document that is 549 pages long is unacceptable and burdensome for the public. Without an index, searching for comments will be extremely time-consuming.

Please break down the comments down into individual comments (as they were received by DOE) and provide separate links to each comment as the New Mexico Environment Department recently did for comments about the LANL draft Consent Order at https://www.env.nm.gov/HWB/lanlperm.html#Comments2016DraftCO

Thank you.
Joni Arends
CCNS

On 7/11/16 3:10 PM, Consent Based Siting wrote:

> Hello,
> Thank you for your interest in consent-based siting and participation in DOE public meetings. As a reminder, the Invitation for Public Comment closes on **Sunday July 31st at 11:59 PM ET**.
> Please email your comments to consentbasedsiting@hq.doe.gov or submit them using the options listed in the Federal Register notice before the closing date to have them considered in the draft summary report.
> Additionally, we are posting comments received to our website, and the first batch reflecting public input through July 1st is provided below. Comments received from July 1st - 31st will be posted in a similar manner after July 31st.
> Link to the document:
> http://www.energy.gov/sites/prod/files/2016/07/f33/CBS%20Inbox%20Thru%20July%201%202016_Final.pdf
> Link to the webpage: http://www.energy.gov/ne/downloads/invitation-public-comment-inform-design-consent-based-siting-process
> Please continue to check our website for the latest consent-based siting news and information.
> -The Department of Energy Consent-based Siting Team

- -

Concerned Citizens for Nuclear Safety (CCNS)
P. O. Box 31147
Santa Fe, NM 87594-1147
(505) 986-1973
www.nuclearactive.org

Consent-Based Siting

From: Concerned Citizens for Nuclear Safety [mailto:ccns@nuclearactive.org]
Sent: Sunday, July 31, 2016 11:48 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: CCNS Response to IPC

July 31, 2016

U.S. Department of Energy
Office of Nuclear Energy
Response to IPC
1000 Independence Ave. SW
Washington, DC 20585

Re: Response to Invitation for Public Comment - **We Do Not Consent!**

Dear Department of Energy Staffers:

Concerned Citizens for Nuclear Safety (CCNS) is a non-governmental organization based in Santa Fe, New Mexico – a state with no nuclear power plants, but with a long history of having the Department of Energy (DOE) and it predecessors, as well as its corporate contractors, break their promises of protection of public health and safety at Los Alamos National Laboratory (LANL) and the Waste Isolation Pilot Plant (WIPP). Please see the attached *Statement of Concerned Citizens for Nuclear Safety (CCNS) to Department of Energy Consent-Based Siting Initiative – Sacramento, CA – April 26, 2016.*

CCNS is disappointed by the problems encountered in this process, including:

1. unable to print out an *Integrated Waste Management Consent-Based Siting 2016* brochure before the Sacramento meeting. DOE never confirmed that they fixed the problem.
2. no DOE employee/contractor name was provided on the emails, nor on the website to contact directly. All email communication was by anonymous. *See* No. 3 below.
3. DOE's inability to break up large downloads (549 pages) of the meetings. Please see email traffic below:
4.

Here is a direct link to the Minneapolis video for reference
https://drive.google.com/file/d/0B4u0aBMYUyu4Y21Jdl93NE1yclE/view?usp=sharing

From: Concerned Citizens for Nuclear Safety [mailto:ccns@nuclearactive.org]
Sent: Tuesday, July 26, 2016 5:44 PM
To: ccns@nuclearactive.org; Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Re: Consent-based Siting Updates - need index to comments

Good afternoon,
CCNS is in the process of preparing comments about the Consent Based Siting process, which are due on Sunday, July 31, 2016. We have not received a response to our July 11, 2016 email request about indexing the documents posted on the website. It has been over two weeks since we emailed.

CCNS is wondering when the videos of the Minneapolis meeting will be posted.

Please respond.
Sincerely,
Joni Arends
CCNS

On 7/11/16 3:47 PM, Concerned Citizens for Nuclear Safety wrote:

Hi,
Downloading a comment document that is 549 pages long is unacceptable and burdensome for the public. Without an index, searching for comments will be extremely time-consuming.

Please break down the comments down into individual comments (as they were received by DOE) and provide separate links to each comment as the New Mexico Environment Department recently did for comments about the LANL draft Consent Order at https://www.env.nm.gov/HWB/lanlperm.html#Comments2016DraftCO

Thank you.
Joni Arends
CCNS

On 7/11/16 3:10 PM, Consent Based Siting wrote:

Hello,

Thank you for your interest in consent-based siting and participation in DOE public meetings. As a reminder, the Invitation for Public Comment closes on **Sunday July 31st at 11:59 PM ET**. Please email your comments to consentbasedsiting@hq.doe.gov or submit them using the options listed in the Federal Register notice before the closing date to have them considered in the draft summary report.

Additionally, we are posting comments received to our website, and the first batch reflecting public input through July 1st is provided below. Comments received from July 1st - 31st will be posted in a similar manner after July 31st.

Link to the document:
http://www.energy.gov/sites/prod/files/2016/07/f33/CBS%20Inbox%20Thru%20July%201%202016_Final.pdf

Link to the webpage: http://www.energy.gov/ne/downloads/invitation-public-comment-inform-design-consent-based-siting-process

Please continue to check our website for the latest consent-based siting news and information.

-The Department of Energy Consent-based Siting Team

CCNS adopts the *Top Ten List* of Beyond Nuclear about DOE's consent based siting initiative for irradiated nuclear fuel, also known as high-level radioactive waste.

1. **Stop making irradiated nuclear fuel.** The only truly safe, sound, just solution for the radioactive waste problem, is to not make it in the first place. Electricity can be supplied by clean, safe, affordable renewable sources, such as wind and solar, and demand decreased significantly by efficiency, rather than generating radioactive waste via dirty, dangerous, and expensive nuclear power. DOE must take the lead in encouraging, adequately funding and implementing energy efficiency. Do it NOW!

2. **Expedite the transfer of irradiated nuclear fuel from densely-packed "wet" storage pools into Hardened On-Site Storage (HOSS) dry casks**. Do it NOW!

3. Store irradiated nuclear fuel in HOSS dry casks, **as safely and securely as possible, as close to the point of generation as possible, in a monitored, inspectable, and retrievable manner.** Do it NOW!

4. Given the unavoidable risks of high-level radioactive waste truck, train, and/or barge shipments on roads, rails, and/or waterways (Mobile Chernobyls, Dirty Bombs on Wheels, Floating Fukushimas), **transport irradiated nuclear fuel only once**, such as directly to a (suitable, acceptable, just) geological repository, **not to so-called centralized interim storage** (*de facto* permanent parking lot dumps, such as those currently targeted at Waste Control Specialists, LLC in Andrews County, west Texas; at Eddy-Lea Counties, near the Waste Isolation Pilot Plant in southeast New Mexico; Native American reservations; nuclear power plants, etc.).

   CCNS asks: If Private Fuel Storage (PFS) had opened at Skull Valley after the Nuclear Regulatory Commission (NRC) rubber-stamped the license, all the waste could have been returned to sender in the end, correct? Or have gotten *de facto* permanently stuck there. The PFS plan was as "interim storage" (20-40 years), till the Yucca Mountain, NV dump opened. But Yucca Mountain was canceled. PFS then planned to "return to sender" all the waste that had been sent there.

   One key example: Maine Yankee - more than 50 giant rail-sized containers of irradiated nuclear fuel, transported 5,000 miles through numerous states, for nothing. In reality, would there have been a return to sender?

   Let's face facts: The actual "driver" of the consent-based siting initiative is the transfer of title and liability, from the companies that generated the waste, onto federal taxpayers.

5. **Geological repositories** must be **scientifically suitable** (capable of isolating the hazardous high-level radioactive waste from the living environment forevermore), **socially acceptable** (genuinely consent-based), and **environmentally just**. Note that no such suitable/acceptable/just geologic repository has yet been found, in more than half a century of looking. DOE has admitted it can't open *any* repository (even an unsuitable/unacceptable/unjust one) till 2048 at the earliest. That will be over a century after Enrico Fermi, in 1942, generated the first high-level radioactive waste, in the world's first reactor, as

part of the Manhattan Project to build atomic bombs; and more than 90 years years after the first "civilian" atomic reactor began generating waste at Shippingport, PA.

6. **Do not reprocess** (extract fissile plutonium and/or uranium from) irradiated nuclear fuel. Not only would this risk **nuclear weapons proliferation**, and be **astronomically expensive**; it would also very likely cause **environmental ruin downwind and downstream** of wherever it is carried out, as has been demonstrated at too many places, including the Hanford Nuclear Reservation in Washington; Savannah River Site, South Carolina; West Valley, New York; Sellafield, U.K.; La Hague, France; Kyshtym, Russia; etc.

7. **Preserve and maintain "wet" storage pools – albeit *emptied* of irradiated nuclear fuel -- as an emergency back up location for cask-to-cask HOSS transfers**, when old HOSS casks deteriorate toward failure, and need to be replaced with brand new HOSS casks. That is, do not dismantle pools as part of nuclear power plant decommissioning, post-reactor shutdown. For example, Rancho Seco in Sacramento, CA. It will not be possible to remove the fuel rods because the pools no longer exist.

8. **Carefully pass information** about storing irradiated nuclear fuel as safely as possible, as close to the point of generation as possible, **from one generation to the next, à la the concept of "Rolling Stewardship"** described by the Canadian Coalition for Nuclear Responsibility and discussed in the focus groups at the Sacramento, CA consent-based siting initiative meeting. Do it NOW!

9. **Address the shortfall in funding for forevermore storage of high-level radioactive waste**. Dr. Mark Cooper of Vermont Law School has estimated the first 200 years of commercial irradiated nuclear fuel storage (assuming just a single repository, although *at least two* will be required!) will cost $210 to $350 billion, even though there is only some tens of billions of dollars remaining in the now-terminated Nuclear Waste Fund, with additional fees no longer collected from nuclear power ratepayers. This will result in federal taxpayers being forced to make up for the shortfall when there are so many other needs in this country.

10. **Environmental justice**, in keeping with President Bill Clinton's 1994 **Executive Order 12898**, demands that **Native American communities and lands, Hispanic land grants, as well as those of other low income and/or people of color communities, never again be targeted** for high-level radioactive waste parking lot dumps or permanent burial sites, a shameful form of radioactive racism dating back decades in the U.S.

Thank you for your careful consideration of our comments. We respectfully request that DOE cancel these efforts.

Sincerely,

Joni Arends, Executive Director
Concerned Citizens for Nuclear Safety (CCNS)
P. O. Box 31147
Santa Fe, NM 87594-1147
(505) 986-1973
www.nuclearactive.org

Concerned Citizens for Nuclear Safety
22 Monte Alto
Santa Fe, New Mexico 87508
505.986.1973
www.nuclearactive.org

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STATEMENT OF CONCERNED CITIZENS FOR NUCLEAR SAFETY (CCNS) TO DEPARTMENT OF ENERGY CONSENT-BASED SITING INITIATIVE

Sacramento, California - April 26, 2016

Concerned Citizens for Nuclear Safety (CCNS) is a non-governmental organization based in Santa Fe, New Mexico -- a state with no nuclear power plants, but with a long history of having the Department of Energy (DOE) and its corporate contractors break their promises of safety at Los Alamos National Laboratory (LANL) and the Waste Isolation Pilot Plant (WIPP).

DOE also has tried to ignore federal and state laws that limit WIPP's mission. WIPP is a pilot project to demonstrate that salt can isolate the defense transuranic (plutonium) radioactive wastes for 10,000 years. Yet, DOE currently has five formal expansion proposals for disposal of surplus plutonium, Greater-than-Class C low-level wastes, commercial transuranic wastes, high-level radioactive wastes and surface storage of mercury waste at WIPP. This is an important lesson for communities thinking about "consenting" to DOE – DOE breaks its promises.

For over 35 years, New Mexico has told DOE and the nuclear corporations that it DOES NOT CONSENT to commercial irradiated nuclear fuel and defense high-level waste being stored or disposed in the state. In fact, Section 12 of the WIPP Land Withdrawal Act states, "The Secretary [of DOE] shall not transport high-level radioactive waste or spent nuclear fuel to WIPP or emplace or dispose of such waste or fuel at WIPP." Yet DOE continues to ignore the law and continues to push for expansion of WIPP even though it has failed in its "start clean, stay clean" mission.

DOE's "consent-based siting" is a sham, since it wants to offer incentive packages for volunteer sites, including to a few people with the Eddy-Lea Energy Alliance in southeastern New Mexico and the nuclear corporation, Holtec. Congress should not provide funding for the incentives.

The DOE "consent" process is to BOTH get the Eddy-Lea Energy Alliance and its neighbor on the Texas side of the border, Waste Control Specialists (WCS), to "volunteer" for consolidated interim storage and for a volunteer defense high-level waste repository at WIPP.

Further, Congress should not change the Nuclear Waste Policy Act (NWPA) to allow waste to be transported to consolidated interim storage sites before a disposal site is approved.

Finally, DOE should publicly affirm that states that do not consent will be excluded from any future nuclear facility siting processes.

Consent-Based Siting

From: Christopher Armerding [mailto:ddguy@nvbell.net]
Sent: Friday, July 29, 2016 4:32 AM
To: Consent Based Siting
Subject: Consent-based siting public comment

I support safe disposal of nuclear waste.

Christopher Armerding

24012

Consent-Based Siting

From: Vinod Arora <vinnie48in@gmail.com>
Sent: Tuesday, April 26, 2016 1:03 AM
To: Secretary Moniz; CHAIRMAN Resource
Subject: Summary of Comprehensive Evaluation of Yucca Mountain DOE TSPA and NRC SER - Well Job done by DOE, NRC and all the other players.

To: **Honorable Dr. Moniz**

United States Secretary of Energy

cc: **Yucca Mountain Directorate**

Office of Nuclear Materials and Safeguards, NRC

c/o: Office of NRC Chairman

From: Vinod Arora, PE, SFPE

CEO, AVP Arora International (One man US Approved Public Charity & Professional Engineering Corporation promoting safe nuclear power and disposal of radioactive waste aligned with similar minded organizations and highly educated/experienced engineers)

PE License (California Mechanical Engineering)

M.S. Engineering (with courses in environmental, chemical, mechanical & materials engineering from several universities in USA including Maryland and west Virginia Universities)

B.S in Chemical Engineering

Experience: 45 years in commercial nuclear plants, chemical process industries, corrosion control, industrial wastewater treatment, HVAC, Hazard Barrier Design, Asbestos Management and fire protection Engineering

Relevant Experience: Several short assignments in Yucca Mountain as a fire protection engineer

Subject: Summary of Comprehensive Analysis of DOE evaluation/NRC SER(s) on Yucca Mountain Repository

Special Request to the Secretary to the Office of NRC Chairman: Please forward to NRC Yucca Mountain Directorate and DOE Engineers, if still in existence. They can get in touch me via email for any questions - Thanks. It is my pleasure, public duty and honor to assist DOE, NRC and American Public.

Subject: Comprehensive Evaluation of Yucca Mountain DOE TSPA and NRC SER – 2nd Email - The Honorable President, US Congress, DOE, NRC and EPA should proceed with their commitment to build Yucca Mountain Repository to protect the health and safety of the public and adverse consequences to the environment from potential radiological accidents in thin and unqualified dry casks stored in ISFSI(s) and spend the money wisely being charged to the rate payers instead of collecting rust/dust in Federal Treasury. The state of Nevada and its residents should not fear from the ultra-conservative and technologically safest repository as it will bring prosperity and revenues to Nevada and its residents and in turn help all the states in USA.

Assessment: Based on a review of Swedish, Canadian, American Academy of Sciences, US National Laboratories and Independent Research Papers, U.S. Nuclear Waste Technical Review Board Reports, International Waste Studies and DOE /NRC SER Evaluations, the author concludes, "DOE has demonstrated full compliance with the NRC regulatory requirements for post-closure safety, including, but not limited to, "Performance objectives for the geologic repository after permanent closure" in 10 CFR 63.113, "Requirements for performance assessment" in 10 CFR 63.114, "Requirements for multiple barriers" in 10 CFR 63.115, and "Post-closure Public Health and Environmental Standards" in 10 CFR Part 63, Subpart L and EPA Rule 40 CFR Part 197. In particular, the author predicts that proposed repository at Yucca Mountain would remain geologically stable for millions of years and (1) Multiple Natural and Engineered barriers in oxidizing environment will not cause failure of waste package Alloy 22 outer barrier passive in several million years due to

general corrosion, localized corrosion and stress-corrosion cracking like the Swedish Repository Copper Canister and Bentonite Clay Barriers in reducing environment preventing leakage of radionuclides in the groundwater and biosphere and (2) DOE performance assessment evaluations are fully in compliance with applicable regulatory requirements, 10 CFR Part 63, Subpart L limits for individual protection, human intrusion, and EPA Rule 40 CFR Part 197.

Consent-Based Siting

From: Gary Bailey [mailto:gbailey403@yahoo.com]
Sent: Tuesday, July 26, 2016 2:57 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Why not Arizona?

I attended the Consent-Based Siting public meeting on June 23, 2016 in Tempe, Arizona. There were quite a few interruptions by a group from Texas about not being happy with a site near their town in Texas. That alone will help make my point. In my opinion you need to identify those locations or states that are more or less Nuclear friendly. Take Arizona for instance. Besides the federal government completely failing to take care of its responsibility on the Navajo Reservation, Arizona is nuclear friendly. Arizona is the home of the, still state of the art nuclear generating station called Palo Nuclear Generating Station. It was built in the 70's and has not had any major issues with the NRC or the public. Yes, it has had a few citations but all I think were minor. The desert terrain in and around Palo Verde would make a perfect siting for a "Yucca Mountain in Arizona" just like all the desert land from Tonopah, Arizona along I-10 to Riverside California. Oh, you say that's in the middle of nowhere? I would say to you that so was Page, Arizona before Glen Canyon Dam! There was no Page, Arizona before Glen Canyon Dam. Yes, in my opinion a nuclear waste facility needs to be built in the middle of nowhere to ease the fear of the general population. In our group meetings at the Public Siting meeting I, along with many other participants were of the opinion that the states need to be empowered to take care of their own nuclear waste. Transportation of nuclear waste could be reduced to a minimum with a number of smaller facilities, instead of a few large ones. Yes, I believe that Arizona and California could be convinced into being partners in that endeavor.

Gary Bailey
gbailey403@yahoo.com

Consent-Based Siting

From: Baker-Smith [mailto:egbakersmith@gmail.com]
Sent: Friday, July 15, 2016 5:43 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

We are very concerned about how the disposal of nuclear waste is handled, where it is dumped, and how it gets to where it is dumped.

The only real solution is to stop making it!!
. The only truly safe, sound, just solution for the radioactive waste problem, is to not make it in the first place.
Electricity can be supplied by clean, safe, affordable renewable sources, such as wind and solar, and demand decreased significantly by efficiency,
rather than generating radioactive waste via dirty, dangerous, and expensive nuclear power

De *facto* permanent parking lot dumps for high-level radioactive waste...and permanent burial dumps for high-level radioactive waste on scientifically unsuitable,
socially unacceptable, and/or environmentally unjust (radioactively racist) locations! .....NEED TO BE REJECTED!!

Gerritt and Elizabeth Baker-Smith
338 Braeside
East STroudsburg, PA18301

AMERICA'S NUCLEAR SOLUTION

July 18, 2016

Ernest Moniz, U.S. Secretary of Energy
U.S. Department of Energy
Office of Nuclear Energy
1000 Independence Avenue SW
Washington, D.C. 20585

RE: Response to Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities

Dear Secretary Moniz:

On behalf of the business community in Andrews, Texas, we are pleased to respond to the US Department of Energy's invitation to "join the conversation" about the process of consent-based siting of spent nuclear fuel storage facilities.

The primary question posed by DOE is "What models and experience should the Department use in designing the process?"

We submit that our community of Andrews, Texas could serve as one model of successful consent-based siting. And, we think our experience could be an important contribution to the conversation. The very fact that the Blue Ribbon Commission on America's Nuclear Future recommends ensuring consent-based siting is testament to the fact that community support is a paramount issue for the country's nuclear waste management program to consider.

We believe it is essential to understand that a supportive host community is entirely possible and already in existence.

Our first and most sincere recommendation is that any process for consent-based siting be crafted to accommodate the fact that every community is unique. By definition, consent-based siting must eschew a "one size fits all" model. Flexibility is key, and a potential host state and community should be allowed to express the manner in which, and conditions upon which, it intends to provide consent. The process must be developed through consensus from the bottom-up, rather than the top down. It also doesn't mean that the siting is supported unanimously by the community.

In our case it started when the business community recruited Waste Control Specialists (WCS) in the early 1990's as part of an economic development initiative to diversify our regional economy which relied overwhelmingly on the volatile oil and gas industry.

Some visionary business leaders recognized that our isolated location in an arid part of the state were requisite components for a radioactive waste disposal facility and that it would be a profitable use of the county's land and an opportunity for economic development.

But the community had to be confident that this new industry would prove to be an asset and that it would operate safely. This was accomplished in increments as WCS navigated the multi-year licensing and regulatory process to become the only privately-owned and operated facility in the country licensed to treat, store and dispose of Class A, B and C low-level radioactive waste.

Our elected officials and business leaders demanded that both WCS and the state and federal regulators keep the community informed every step of the way. The fact that all entities have worked diligently to keep that communication going throughout the years is why the current base of support for licensing a consolidated interim storage facility is possible today.

We can state unequivocally that the single most important element of consent-based siting is an open and honest dialogue. There is no substitute and no short-cut. That dialogue takes place in formal meetings at City Hall and County Commissioners Court, it takes place at business and community meetings, it takes place at Friday night football games and at Sunday morning fellowship halls.

Simply put, WCS is not only a member of the community, it is a significant contributing member. According to the most recent figures from December of 2015, we figure that the positive economic impact WCS has had in the region represents over $300 million in fixed asset investments. Consider the following:

- WCS made approximately $200 million in payroll to Andrews and regional (Permian Basin, Lea County, N.M.) employees;
- Invested approximately $50,000 annually in community and charitable endeavors;
- The Andrews ISD Education Foundation payment in 2015 was over $13,000 – payments to date to the Foundation total over $300,000;
- Current employment at the WCS site is approximately 180. The annual payroll at the site is over $16 million;
- The Compact Waste Facility began operations in April 2012; the Federal Waste Facility came online in mid-2013. That's when the company and the community began to see significant revenue. Both Andrews County and the State of Texas receive five (5) percent of the gross revenue of all radioactive waste disposal activities and the State of Texas assess additional twenty (20) percent fee for all out-of-compact waste disposal WCS makes quarterly payments to the state and county;
    - Andrews County received its first direct payment of disposal revenue in September 2012 (The state's fiscal year runs Sept. 1 – Aug. 31);
    - Andrews County has received over $7.8 million in fee revenue since disposal operations began in 2012;

- The state of Texas has received over $36 million in fee revenue since disposal operations began in 2012.

But it was the community of Andrews that made all of this possible. It was the citizens of Andrews who traveled to our state capitol time and again to ask our state legislature to authorize the necessary changes to state law to enable the WCS operations. Consent-based siting, was not yet the term of art it is today, but we made it clear to elected state leadership that WCS had the overwhelming consent of the community.

The state of Texas and our elected representatives have responded positively as evidenced by the support of the state's Radiation Advisory Board, by the bi-partisan support for H.R. 3643 introduced in the U.S. House by Rep. Mike Conaway who represents Andrews County, the recommendation of TCEQ that Texas seriously consider the spent fuel storage mission, among others. We greatly appreciate that response.

We were pleased to note that West Texas and New Mexico were mentioned in the "Window of Opportunity" section of the DOE's Integrated Waste Management Consent-Based Siting Booklet 2016 because of our region's voluntary invitation to host a high-level radioactive waste storage facility. Please note that our mode of consent begins locally and then extends outward. It is a local rather than a Federal initiative. We urge the Federal government to take advantage of the consent as we have developed it here. We also note that a process for the selection of an interim storage site may be very different from the process used to select a permanent disposal site; and where appropriate, the market should dictate site selection, not the Department. Competition is the best driver of price, quality, and safety- all of which must be present to provide the greatest benefit for the taxpayer.

As the signatories of this letter, it should be noted that we are only the latest in a long line of Andrews and WCS leaders who have walked hand-in-hand to bring our community to this point in a joint venture that is almost 30 years old. Other community and WCS leaders will come after us, and we're convinced that as long as the lines of communication remain open, Andrews will continue to be a host community for the treatment, storage and disposal of nuclear materials for decades to come.

Sincerely,

Rod Baltzer
President & CEO
Waste Control Specialists

Wesley R. Burnett, Director of Economic Development
Andrews Economic Development Corporation

Julia Wallace, Executive Director
Andrews Chamber of Commerce

Consent-Based Siting

From: Sarah Barker [mailto:sarahmaebarker@gmail.com]
Sent: Thursday, July 14, 2016 8:38 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: "Response to IPC"

I am writing to inform the DOE that, as an Idahoan, I absolutely do not give my "consent" to allow commercial nuclear waste shipments into my beautiful state. This is an issue that directly affects me and my community. My drinking water comes from the Snake River Aquifer. I'm also a young adult cancer survivor. I'll never know for sure what caused my leukemia (only that it was environmentally caused, not genetics or lifestyle), but I think it is probably in my best interest to avoid exposure to radioactive isotopes as much as possible.

As an alternative to forcing Idahoans to accept becoming the nation's premier nuclear waste dump, how about honoring the Batt agreement by cleaning up the existing mess at INL and building a permanent site for the shipments that have already been sent (and continue to arrive)? Idahoans DO NOT want more nuclear waste, and we've made that clear repeatedly. I hope you are listening to my voice as carefully as you listen to Gov. Otter's and the LINE committee.

Thank you for your consideration. Please do the right thing. Nuclear waste should be stored where it is being generated, not handed off to a rural state with little political clout.

Sincerely,

Sarah Barker
Twin Falls, ID

Consent-Based Siting

From: Donald Barton [mailto:dbarton357@gmail.com]
Sent: Saturday, July 09, 2016 11:55 AM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response To IPC "Consent Base Siting Initiative"

To: DOE Officials

Thank you for this opportunity to respond.

The "Consent Based Siting Initiative" is a total and absolute mistake on a grand scale that only the NRC/DOE could contrive. It is a desperate admission that there is no solution for the environmental mess that they created and preside over. Now the NRC wants to spread this "cheer" with buy in and make tracks to other economically depressed areas where a local entrepreneur has a vision of partnership.

No Initiative should be considered until every last last nuclear assembly in the spent fuel pools across this country is encased in a dry cask!

It reminds me of the joke where a home owner is depressed when a gigantic pile of horse manure is mistakenly dumped on his lawn. His optimistic neighbor who works at the NRC comments, " I'm sure there is a cute pony buried somewhere in that pile".

We have learned there are no cute "nuclear" ponies. Yucca Mountain wasted untold billions of taxpayer dollars. Abject failure and political skullduggery.

The WIPP Site (DOE) in Carlsbad, NM for low level waste (Los Alamos gloves, aprons) had a plutonium release that dusted the employees and town when the wrong kind of kitty litter was mixed in the barrels and exploded. Simple human error. Hundreds of $millions have been spent in reopening the site. Keep in mind this low level waste is play dough compared to toxic nuclear reactor waste. Costs are obscene.

During the construction of WIPP, I was the Carlsbad Regional Hospital Administrator. I was assured that low level waste 1500 feet underground in ancient salt beds was a no brainier. Guess again.

What stunned me was the enormous costs and armies of consultants that perpetuate to this day. Each location is site specific that will take at a minimum 15-20 years to assess. Political turmoil at every level of government becomes the agenda. Is there earthquake risks, are fresh water aquifers nearby, will new highways, new housing be needed and subsidized to access remote locations? New railheads, new fleets of trucks, new generations of transport containers, new security resources. Contract vendors mushroom. DOE even hired special language consultants to formulate survivable picture messages to warn future generations in 10,000 years of the dangers below. Our society cannot afford this venture while our national infrastructure races to decay. Implementing this scheme will be another lethal assault on the dwindling trust in our national institutions.

The "Consent Based Siting Initiative" is simply a generational boondoggle for the nuclear bureaucracy to command new resources and relevancy. The NRC/DOE and failed government have led us to this abyss, while citizens choke on the future costs of redemption and protection.

Shut down all obsolete nuclear plants now and minimize further production of more nuclear waste. Why spread more misery and contamination to new locations? All resources should now be dedicated to secure the spent fuel rods in dry casks and enhanced security from terrorism, until a permanent and final solution is actionable.

Sincerely,

Don Barton
236 Monomoscoy Rd
Mashpee, Ma

Consent-Based Siting

From: Charles Baynton [mailto:cbaynton@gmail.com]
Sent: Saturday, July 30, 2016 4:30 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

I request that contact information provided below not be publicly disclosed, an option discussed in DOE online materials.

Charles G Baynton
1963 Eldridge Ave W
St. Paul, MN 55113

DOE has proposed 5 questions for the public to address. They are good ones, in part because the fifth one (What else should be considered?) is an opening for whatever the first four might have missed. But the first four, if DOE is committed to the values they suggest, indicate a serious effort to get this right. They appear to endorse fairness (question 1), transparency (question 1), inclusiveness (question 3), and environmental justice (question 5). They acknowledge valid concerns that high-level waste may remain in a facility for a much longer term than the facility design intended (question 5).

However, question 1 appears to dismiss reasons that fairness may be impossible. There are several unavoidable impediments to a fair process.

First, fairness would dictate that the burdens associated with storage be borne by those who benefit from generation of waste. That would put high level waste from power generation in urban areas, an absurd choice. Second, because it is clear that deep geologic disposal is the best long-term approach, geologic suitability must govern the choice, a criterion entirely unrelated to fairness. Third, because of the time scale involved, generations unborn will be tied to choices made by remote ancestors. Fourth, under-resourced communities (i. e. Native Americans who haven't gotten wealthy in the casino era) will remain dumping grounds for what no one else wants.

Efforts to mitigate this last concern with DOE funding for "independent" expert assessment done for the potential host community are a partial remedy at best. Few who can claim expertise are free of biases on these questions, and a potential host community would be ill-equipped to pick those few from the crowd.

Question 3, when it brings up withdrawal of consent, similarly passes over the reality that in many circumstances withdrawal of consent will be impossible. Even when it may remain physically possible (no waste placed so that it can't be retrieved), funds spent and design and construction work done may dictate going ahead. Not every case will play out as Yucca Mountain presently seems to, and even that case may not be closed forever.

Question 5 has an obvious aspect not explicitly stated: given history thus far, in the United States and elsewhere, don't we need to ask whether any community at all will consent, either to interim (which clearly means a pretty long time) storage or to disposal?

I raise this question as one who believes that nuclear power generation is a poor choice for many reasons, not least of which is the problem of waste disposal. The precautionary principle dictates that before society commit itself to creation of kilotons more high-level (spent fuel) waste, we show we have a plan that works for waste disposal. But there are other equally large concerns: the cost of nuclear power generation, the potential for on-site stored high level waste to serve as convenient targets for enemies, and the implications for weapons proliferation if humanity at

large continues to make plutonium in fission reactors.

DOE rightly says that arguments against nuclear power generation are not arguments against solving the waste problem, because of the 75 kilotons of high level waste we already have in America. However, here is what I heard at the July 21 Minneapolis public event on consent based storage: there are many who would consent to high level waste storage in their "back yard" if they were contributing to a solution to the problem we already have, but not if they were perpetuating the problem by making it easier to build a new generation of ill-advised nuclear power reactors.

A final comment on process: while DOE appears to support inclusiveness in developing procedures for consent based siting, the recent 8 public meetings raise concern that DOE is going through the motions. Why are 8 meetings enough?

I learned of the Minneapolis meeting only because I had become active on nuclear waste issues in 2015 in Wisconsin, where I then lived. The Wisconsin legislature had taken up repeal of long-standing restrictions on new power reactor construction there. To the best of my knowledge, the Minneapolis meeting did not have any advance coverage in mass media—public radio is the one I had been following during early July. And beyond the 8 cities where meetings were held, what chance is there that the public, or even mayors and such, had any idea that there was an opportunity for public input on consent based siting?

Chuck Baynton
July 30, 2016

Consent-Based Siting

From: Rochelle Becker [mailto:rochellea4nr@gmail.com]
Sent: Tuesday, July 19, 2016 4:44 PM
To: Consent Based Siting
Cc: Mary Woollen; Chip Cameron; Jim Hamilton
Subject: Consent-based siting, comments of the Alliance for Nuclear Responsibility

Please see attached.

--
In Peace

Rochelle Becker, Executive Director
Alliance for Nuclear Responsibility
PO 1328
San Luis Obispo, CA 93406
www.a4nr.org

ALLIANCE FOR NUCLEAR RESPONSIBILITY

PO Box 1328
San Luis Obispo, CA 93406
(858) 337-2703
(805) 704-1810
www.a4nr.org

July 18, 2016

BATTING CLEAN UP: Radioactive Waste and California's Future

Trust is a fragile thing -- Easy to break, easy to lose, and one of the hardest things to ever get back.

As more and more of the nation's fleet of aging nuclear power plants is retired, the problem of "atomic energy" in the 21st Century becomes one of how to handle the vast volume of accumulated and hazardous high-level radioactive waste.

The news that PG&E plans to retire Diablo Canyon in San Luis Obispo no later than 2025 means that all California's nuclear facilities will be shuttered and the Pacific Coast will become a de facto waste site for three of the four former plants. At that point, all California reactor communities, and the state as a whole, will be able to weigh in equally on this issue.

The Department of Energy (DOE) has begun outreach to states across the nation related to the beginning of its "consent-based" citing process for permanent storage of the nation's highly radioactive waste. A goal of the program is to avoid the stalemate created when the Nuclear Waste Policy Act, nearly a quarter of a century ago, chose Yucca Mountain in Nevada as the only site to explore. Politically and scientifically, the gambit failed. To avoid a repeat, the DOE is now looking at models from other nations that have used the "consent-based" process to attract a community willing to host such a facility.

Three out of four nuclear plants in California have prematurely closed (and the closure of the fourth is underway). What is abundantly obvious is that the California coast and its reactor host communities would never pass muster as a site for the long-term storage of high-level radioactive waste.

It is clear from DOE representative James Hamilton's statement at the "consent based" kick-off meeting that the "…the Atomic Energy Commission set some quite strict parameters for the location of facilities like this in a way that hinted at future points of contention limiting them, **for example, to areas which were not prone to earthquakes**."[1] [emphasis added]

[1] An Integrated Waste-Management System and Consent Based Kick=Off Meeting, Jan 20, 2016 page 2

What should be done?

The DOE should start by establishing a separate entity to deal specifically with the radioactive waste situation. The federal Blue Ribbon Commission on the future of radioactive waste (BRC) stated in its report to Energy Secretary Moniz in 2012: "…it will take time, commitment to action, and new authorizing legislation to implement our most important recommendations, **particularly the recommendation to establish a new waste management organization**."[2]

It seems fair to ask why a new agency, unburdened by a half-century of squandered time and resources and the degradation of trust that haunts the DOE's legacy waste storage projects, has *not yet been created*. This new agency should include independent experts whose sole focus is the establishment of a technologically safe offsite waste repository.

Perhaps the problem is that the DOE has yet to shed its role as a proponent of nuclear energy. The Alliance remains skeptical that the DOE can both promote *new reactors* and solve the mounting waste problem pressing California, soon to be a site of *nothing but inactive reactors and still deadly waste*.

Evidence of the DOE's current split personality, and thus unworkable process, is clear in Mr. Hamilton's statement at their Kick-off meeting in Washington, D.C.:

> "So our ability to meet climate goals will depend in no small part on ensuring the continued viability of America's nuclear energy industry…But meeting long-term nuclear waste management needs is an absolutely essential component of ensuring that nuclear power continues to provide the nation with safe, sustainable and responsibly generated electricity."

Here is where California is unique, and as it has done historically in so many arenas, takes a leadership role: With the announcement of the phase-out of Diablo Canyon and its replacement with renewable energy and efficiency, the utility and our state renders moot the DOE's need to "keep nuclear power alive." We are entering the "cleanup phase" in more than a metaphorical sense.

Both Senator Feinstein and Congressman Issa are calling on the federal government to move this waste off of our seismically active coast. Yet the DOE came to California to discuss "consent-based" siting in a state that could never

[2] The Blue Ribbon Commission on America's Nuclear Future Report to the Secretary of Energy On Jan 12, 2012, page 13

possibly host such a facility. What the DOE, or better still, the new agency tasked to deal specifically with waste disposal *should be doing* is holding consent-based meetings in the locations that may have any chance of meeting the criteria and may be considering applying to become consent-based site.

A4NR believes that an inherent flaw in the DOE's process is that rather than focusing on the decades-long problem of a permanent disposal site for highly radioactive waste, the Department is more interested in an interim solution as a panacea that could kick-start *the stillborn* nuclear renaissance. Solving waste storage is needed *now*; if remedying the faltering economics of a nuclear-powered future is the DOE's goal, all the more reason for the creation of a new agency. The DOE's plans for a nuclear renaissance will have no foothold in California, and its failings have already resulted in three California waste storage sites "prone to earthquakes."

The Alliance does not advocate rushing hastily into another ill-considered site for the waste; nor do we wish to see it foisted on a community in a manner that creates an environmental injustice. Nevertheless, the seismic clock ticks onward, and the risks mount with each passing decade.

The DOE should be open and honest about the amount of transparency that is legal within the nuclear process. To blithely claim that any process that addresses storage and transportation of highly radioactive waste will be fully transparent is a disservice to the public, who can easily read of the agencies half-century of failures at their Hanford and Savannah River atomic sites.

A clear sign that the DOE and Congress have taken the recommendations of the Blue Ribbon Commission seriously by forming a new agency to solely focus on a permanent solution to offsite storage of highly radioactive waste is vital to productive engagement of both states and the public at large. California will begin to participate in earnest when transport routes are discussed and approved, and that will no doubt be subject to much contention. One can hope that by the time a site is selected, the knowledge and experience gained in that process can be applied to the transport routes.

That new agency is the resource the federal government needs to regain public trust and move forward on a national repository for commercial nuclear waste.

Californians, their state and local elected officials, and concerned businesses and residents should continue to demand a solution from the federal government.

Consent-Based Siting

From: paul.berland@siliconengines.net [mailto:paul.berland@siliconengines.net]
Sent: Sunday, July 24, 2016 4:52 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: paul.berland@siliconengines.net
Subject: Response to IPC

U.S. Department of Energy,

I do not consent to having nuclear waste dump sites in Illinois until the nuclear energy industry agrees to quit this practice of nuclear energy and go down the path of renewable energy such as solar and wind only.

The waste generated by nuclear energy is a serious problem and whereas we reap some benefits in the present, we kick the problem of nuclear waste down the road to future generations. Please think about the future and end the practice of nuclear energy. The accumulation of nuclear waste is not acceptable any more.

When the nuclear industry agrees to quit the practice of nuclear energy, then we can start down the road of responsible nuclear waste management and I would be willing to show my consent for my share of the responsibility.

The future of the human race is in jeopardy from projects such as nuclear energy. It is only through bold action on the part of the administrators of the law will the human race survive the mounting jeopardy of these technological projects that have too many side effects. Please give the human race a chance and think about the future of our people. The Earth, the people, the culture, and the art we have made has so much beauty and we really need to act with responsibility if we are going to preserve our future.

It has been proven that we can provide all of our energy needs through renewable means such as solar and wind. Let us move into the future and embark on projects that will truly sustain the human race, not get stuck in outdated technology that is endangering us all. We, the people, are counting on officials such as you to commit to bold action to save us from the certain doom of mounting nuclear waste.

Sincerely yours,

Paul Berland
625 Walnut Ave
Elgin, IL 60123

Department of Energy's
Consent-based Siting
Public Meeting
May 24, 2016
By
W. Gale Biggs, Ph.D.

1. The Health Department conducted a study about two and a half decades ago that found that the most dangerous emissions from Rocky Flats were the airborne emissions.

2. But neither CDPHE nor EPA have airborne standards for PU-239.

3. PU-239 when breathed into the body, stays in the body for the rest of a person's life. It tends to concentrate in the lung, liver, brain, bones and reproductive system of the person who inhaled it. With a half-life of 24,110 years, it continuously emits alpha particles into the same area of the body over the life of the person. Eventually it will cause cancer or other ailments. I have seen estimates where a tablespoon of plutonium, evenly spread over Denver, could eventually kill every citizen in Denver. Plutonium is also one of the most toxic metals known.

4. Governor Romer's Scientific Panel, of which I was Chairman of the air committee, found that PU was widely spread over Rocky Flats. The workers were very candid with us when we ask them questions. Due to the poor management, workers would take waste PU and dump it or bury it out in the ground on the site. Workers estimated that from 60% to 90% of Pu coming off the facility was from fugitive sources, i.e. the ground. Governor Romer asked us to tell him the true facts about how bad Rocky Flats really was - we did. The Panel's report was never published.

5. I have been writing letters to EPA for almost a year about the lack of any airborne plutonium-239 standards or air monitoring equipment and asking EPA to establish PU-239 standards and to develop air monitoring devices. They respond by telling me that all the water and soil standards are being met. They never address the airborne emissions - the most dangerous of the emissions. Conducting samples of the soil and/or water will not answer the question of how dangerous the Rocky Flats site is since air sampling is needed for monitoring PU-239. No such air measuring devises currently exist.

6. Fish & Wildlife proposes to turn the site into a family picnic area. My concern is to keep the public, especially children, off of site. Congressman Polis has established a case to try to determine why EPA is not responding to my issues about developing airborne standards and to develop air monitoring technology for Rocky Flats.

Consent-Based Siting

From: Valez & Richard [mailto:richard.valez@gmail.com]
Sent: Thursday, July 14, 2016 6:54 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

To Whom It May Concern:

Please do not consider accepting 75,000 tons of nuclear waste for storage in Idaho. We are a fairly pristine state. Do not risk pollution of our land or our water. We are a state considered likely for earthquakes. How would safe storage be assured.

Let's keep Idaho clean and healthy for us and future generations.

Sincerely,

Valez Bird
Pocatello, IdahO

Consent-Based Siting

From: Robert Blaedel [mailto:machinewayback@hotmail.com]
Sent: Sunday, July 31, 2016 12:11 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Consent-based siting public comment

Get with the program guys!!! Shut down all nuclear facilities now and stop the generation of any more nuclear waste. The present waste on hand then needs to be transferred to the bedrooms of all those who supported nuclear power and weapons programs in the first place. (Just kidding! I wanted to get your attention.)

Seriously though, do you really think that consent-based decisions will matter if the public bases their decision on lies from the DOE and atomic energy corporations?

And will it even matter considering that past, present and future political irresponsibility far outweighs any immediate band aid solutions for a toxic threat that will persist for eons and eons and eons and eons and eons and eons and eons. How does your little band aid hold up against the geological time scale, DOE?

You guys need to abandon nuclear power completely and promote (instead of penalize) reusable energy and you know it! Stop generating the waste now and then address where your going to store the crap that you have built up.

You guys are SO STUPID! Oh, wait maybe I'm wrong. You're just plain EVIL and want to see an end to all life on the planet. Oh, that explains it! Wow! I feel better now that I've identified the cause of the problem. Yeah, you're evil and can't help yourselves from ruining civilization as we presently know it. Good job at being the bad guy in this scenario. You win your little battle and the rest of society loses everything. Insanity reigns supreme.

Robert Blaedel

97089

Consent-Based Siting

From: kevin blanch [mailto:blanchblanch2@gmail.com]
Sent: Tuesday, July 12, 2016 7:52 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: NUCLEAR WASTE SAN ONOFRE FIRST AND FAST;;

kevin D. blanch founder of Post ignorance; AML Leukemia Survivor

Resides in Utah and San Diego California

573 south 4700 west,, Ogden Utah, 84404. 801-452-1908;; blanchblanch2@gmail.com

YUCCA Mountain the best WORST Option;;NOT ON THE BEACH SAN ONOFRE FIRST;; and FAST;;

kevin D. blanch AML Leukemia survivor , he GREATEST FIGHT IN HUMAN HISTORY;; THE Anti-Nuclear energy Post Ignorance Army 801-452-1908

Not on the BEACH San Onofre FIRST ;;; thank you for I believe for the first time in 40 years this is a group that is going to solve the GREAT NUCLEAR WASTE EQUATION;;

Consent-Based Siting

From: bonnie bluestein [mailto:bonniegailblue@gmail.com]
Sent: Sunday, July 31, 2016 11:19 AM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Please add to public comments/consent based sitings/DOE....(Response to IPC)....

I do NOT give consent to creating new radioactive waste dumps, transporting radioactive waste, or increasing amounts of waste at existing sites until....

- The nuclear industry stops making more waste

- DOE fixes all the problems it has already created with waste dumps, contaminated areas, and abandoned uranium mines around the country

- Congress establishes a truly independent process to find and designate a permanent, deep-geological radioactive waste disposal (NOT temporary storage) site. Yucca Mountain, Nevada is not an acceptable site!

- Degraded, delapidated highways and rail infrastructure are reinforced and brought up to safe standards for transporting extra-heavy loads of waste, waste containers are stable and accident-proof, trucks and train cars are reinforced

- Emergency response has been planned to protect the public on route, and the public, as well as local agencies have been informed/educated and involved in all aspects of planning/implementation in a way that is integral to the process.

Bonnie Bluestein, M.A.
Chicago, Illinois

Consent-Based Siting

From: Colleen Bonniwell [mailto:bonniwell.colleen@gmail.com]
Sent: Sunday, July 31, 2016 11:55 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Respnse to IPC

Informed Prior Consent ?
I do not consent your seeking the consent of any to site nuclear waste .
I do not consent to transport of nuclear waste over states boundaries.
I do not consent to allow the making of nuclear waste by any.
I do not consent to uranium mining in any states.

I give my consent to use the military budget to clean up superfund sites and to end war.
I give my consent to award
Servers full honours and compensations.
I give my consent to decentralized renewable smart grids collectively coopertively produced.

Consent-Based Siting

From: Patrick [mailto:bosolds@lisco.com]
Sent: Thursday, July 14, 2016 9:44 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: bosolds@lisco.com
Subject: Response to IPC - Consent-Based Siting proposal for irradiated nuclear fuel

To: U.S. Department of Energy, Office of Nuclear Energy, Response to IPC, 1000 Independence Ave SW., Washington, DC 20585
RE: "Consent-Based Siting" of Radioactive Waste

Dear DOE Office of Nuclear Energy team,

Your proposal for "centralized" or "consolidated interim storage" of irradiated nuclear fuel is a catastrophe waiting to happen if you approve it and high-level radioactive waste starts moving around the US via barge, truck and train shipments, or any other form of transportation.

This proposed scheme is NOT necessary. There is a better, safer way to handle this matter.

The utilities that have generated this waste need to take responsibility for its storage. The safe way to do this is to require them to off-load irradiated nuclear fuel from densely-packed, high-level radioactive waste "wet" storage pools, into Hardened On-Site (dry cask) Storage. This is a well-understood, field tested and shovel-ready answer to the problem of long-term storage of irradiated nuclear waste fuel. The justifications for this approach are many, and you know what they are.

I'm going to keep this simple: do your jobs, protect the American public and future generations. End your consent-based siting plans immediately, and require all entities holding irradiated nuclear fuel to off-load their irradiated nuclear fuel from densely-packed, high-level radioactive waste "wet" storage pools, into Hardened On-Site (dry cask) Storage.

Sincerely,

Patrick Bosold
202 N. 5th St.
Fairfield, IA 52556
Tel. 641-472-1691

Consent-Based Siting

From: Jan Boudart [mailto:janunaj@hotmail.com]
Sent: Sunday, July 24, 2016 8:55 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: I do NOT give consent to more radioactive waste dumps.

> My consent for consolidated interim storage sites for commercially produced High-Level Nuclear Waste is predicated on the mandatory cessation of the production of HLNW. Shut down, decommission and close all nuclear reactors and support clean energy production, mostly in the form of windmills, but also solar, tidal, geologic. I am opposed to the construction of dams and believe hydropower should also be taken down.

DOE needs to fix the massive mess left in mining, milling and processing uranium: the communities where mining has -- without the consent of the people -- spread unspeakable filth in areas where American families are trying to raise healthy children.

Presently existing HLNW should be stored on the site where it was created until such time as it can be moved ONCE and only once to a permanent site. Also, I have little hope that a permanent site can be found; thus it will be necessary to establish a trusted agency to oversee the "tending" of the many, probably about 70, sites where high level waste can be stored until its unlikely disposal.

DOE should stop devoting funds to research on another generation of nuclear reactors. Clean up what is in front of you. Don't think it will go away and we can go on to the next big thing. HLNW is our present big thing and must be taken care of.

Jan Boudart, Rogers Park, Chicago, Nuclear Energy Information Service

Consent-Based Siting

From: Beatrice Brailsford [mailto:bbrailsford@snakeriveralliance.org]
Sent: Sunday, July 31, 2016 6:20 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

SNAKE RIVER ALLIANCE
IDAHO'S NUCLEAR WATCHDOG & CLEAN ENERGY ADVOCATE

July 31, 2016

U.S. Department of Energy, Office of Nuclear Energy
Response to IPC
1000 Independence Ave SW
Washington, DC 20585

To whom it may concern:

The Snake River Alliance is Idaho's grassroots nuclear watchdog and clean energy advocate. Since 1979 the Alliance has focused on nuclear weapons, waste, and power and has particular expertise on issues at the Idaho National Laboratory (INL). On behalf of our members, I submit the following comments to the Department of Energy (DOE) on its proposed consent-based process for siting nuclear waste facilities.

Summary Recommendations

Idaho is a non-consent state and the federal government should not look here for agreement to host commercial spent nuclear fuel.
Nuclear waste should be stored as safely as possible as close as possible to its point of generation until permanent disposal is available.

Idaho's Background

Idaho has been targeted for nuclear waste almost since the Idaho National Laboratory was founded in 1949. We've had to accept massive amounts of plutonium-contaminated waste from the Rocky Flats nuclear weapons plant in Colorado and spent nuclear fuel from all over, including foreign and domestic research reactors, the nuclear Navy, and commercial power reactors. Even the melted core from the Three Mile Island disaster was sent to INL. The waste sent here has polluted Idaho's air, land, and water.

Public officials, private individuals, and public interest groups (including the Snake River Alliance) have resisted waste importation for decades. In 1974, the DOE proposed "interim" storage of commercial spent nuclear fuel at the Hanford Reservation, Washington, the Nevada Test Site, or the Idaho National Laboratory. A Blue Ribbon Study Commission appointed by Idaho's Governor Cecil Andrus held six public meetings on the proposal and advised that Idaho not become a temporary nuclear dump and recommended instead that spent fuel be stored at the reactors where it is produced until it can be sent directly to a permanent deep geologic disposal site.

In 1995, the State of Idaho and federal government agreed that, though INL can still accept spent fuel from the nuclear Navy and very small amounts from research reactors, most of the nuclear waste in the United States will

never come here. The ban, ratified by the voters in a 1996 statewide ballot initiative, explicitly covers commercial spent nuclear fuel, an intensely radioactive, large, and growing waste stream.

Recommendations

The Department of Energy should not be in charge of the spent fuel and high-level waste programs any longer. Following the recommendation of the Blue Ribbon Commission on America's Nuclear Future, a new agency should be formed. Any efforts to lay new groundwork for nuclear waste management should be undertaken by the new entity. We are concerned that the DOE's current efforts will end up irreparably damaged by the deep distrust the DOE has earned from most of those concerned about nuclear waste in this country.

The framework for any new nuclear waste management program should be fully developed and have the force of law *before* any attempt is made to seek consent to host a nuclear waste facility. A fundamental first step is to provide for state regulatory authority over nuclear waste storage and disposal. The underpinning of the new plan – consent – must be part of a legal framework. Until radiation and environmental protection standards are in place, any efforts to seek siting consent are premature. Both the Department of Energy and Congress surely recognize that the spectacle of selecting Yucca Mountain first and then tailoring environmental standards to fit that site helped make the whole project unworkable.

Despite the failure of Yucca Mountain, there is still broad consensus that spent nuclear fuel must be permanently isolated from the human biosphere and equally broad agreement that the most effective way to accomplish that is disposal in a deep geologic repository. In contrast, there is not broad consensus on the effectiveness of or need for consolidating spent fuel in temporary storage facilities. Nuclear waste should be stored as safely as possible as close as possible to its point of generation. That's what happens now. Spent fuel is stored on an interim basis at reactor sites, primarily east of the 100^{th} meridian, near large metropolitan areas, and on the west coast. It is stored in facilities licensed by the Nuclear Regulatory Commission. Consolidating it somewhere else doesn't solve an environmental problem. In fact, each time we move nuclear waste adds costs and risks. If nuclear waste is moved, the problem its movement would solve must be identified.

The greatest risk of all and, frankly, a very likely occurrence, is we will move nuclear waste once and never move it again. That means spent nuclear fuel will end up stored for extended periods of time in inappropriate places. We've seen that in Idaho. We've received every scrap of the nuclear navy's spent fuel since the USS Nautilus was launched. The spent fuel consolidated here is not a millimeter closer to final disposal than any other waste stream.

For decades, the US nuclear waste program has been crippled by repeated attempts to force a burden as heavy as nuclear waste on the unwilling. But someday someone will have to consent to living near a disposal site to ensure this material is removed from the human biosphere. Consent to host a nuclear waste facility must be achieved in an open and transparent fashion and must be free, prior, and informed.

Sustained consent cannot be reached in a backroom deal. It can't be based on a wink and a nod. It can't be reached with bribes or threats. Legitimate consent can't be granted halfway through the process, after core decisions have been made. In the current process, it is unclear if the federal government will be seeking consent for a pilot facility, a consolidated facility, or a permanent repository. The amount of spent fuel is unspecified, though growing. The length of storage time will always be uncertain. There's no legal framework, no environmental standards. It's not clear how a consent agreement would be enforced. There is no state regulatory authority. In other words, we don't know who is being asked to do what or with what protections. Under these circumstances, *informed* consent is not possible.

An important part of obtaining consent is recognizing and respecting non-consent. In no small part because of Idaho's nuclear waste history outlined above, **IDAHO IS A NON-CONSENT STATE**. The federal government should not look to Idaho for any agreement to host commercial spent nuclear fuel.

Conclusion

In the current nuclear waste discussion, there's little acknowledgement of past mistakes. Despite the DOE's bare chronology, the whole discussion seems ahistorical. It's as if the Blue Ribbon Commission on America's Nuclear Future invented nuclear waste, or at least was the first to notice it. But the nuclear waste experience is already multi-generational, and most Americans alive today were born after the first spent fuel was produced. The Snake River Alliance appreciates the Department of Energy's desire to try to move towards a durable response to nuclear waste. But the current effort will almost certainly not help. The federal government should take a first, careful look at our own experiences when mapping a path forward.

Respectfully submitted,

Nuclear program director

Consent-Based Siting

From: Sam Brinton [mailto:sbrinton@bipartisanpolicy.org]
Sent: Saturday, July 30, 2016 3:13 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: Tracy Terry <TTerry@bipartisanpolicy.org>
Subject: Response to the Invitation for Public Comment

Thank you for the opportunity to respond to the Invitation for Public Comment concerning consent-based siting of nuclear waste. Please find the comments of the staff of the Bipartisan Policy Center attached.

Sincerely,

Samuel Brinton
Senior Policy Analyst
Bipartisan Policy Center

Department of Energy
1000 Independence Ave SW
Washington, DC 20585

RE: Invitation for Public Comment on Consent-Based Siting

To Whom It May Concern,

The enclosed materials from the staff of the Bipartisan Policy Center (BPC) respond to the Department of Energy's request for public and stakeholder input on the design of a consent-based process for siting nuclear waste facilities. It is important to emphasize that the views expressed in this cover letter and in the accompanying documents are those of BPC staff; they are not being provided on behalf of, nor have they been endorsed by, the Nuclear Waste Council as a whole or by any individual council member.

BPC staff welcomes the Department's efforts to solicit a broad range of views concerning the design of a consent-based siting process for future nuclear waste facilities. In the course of our own nuclear waste policy work over the last two years, BPC staff repeatedly engaged with many of the same questions that DOE has identified as critical to moving forward in a consent-based fashion:

- How can the Department ensure that the process for selecting a site is fair?
- What models and experience should the Department use in designing the process?
- Who should be involved in the process for selecting a site, and what is their role?
- What information and resources do you think would facilitate your participation?
- What else should be considered?

Since the 1980s, the process by which noxious facilities are sited has become highly controversial, rarely resulting in the installation and permitting of proposed facilities. These failed outcomes, a direct result of traditional "Decide, Announce, Defend" siting policies, are now common occurrences for a wide range of such facilities, ranging from liquefied natural gas terminals to hazardous waste incinerators. Nuclear waste management installations are no exception.

Over the past 25 years, our command of science and technology has grown exponentially. Our wrists are now adorned with computers that were once the size of office cubicles. Yet we remain hamstrung by decades-old facility siting strategies that fail to produce positive results. In the nuclear waste arena in particular, our reluctance to adapt and seek new approaches to facility siting has exposed us to increasing costs while we fail in our moral obligation to solve this national problem and not transfer these risks to future generations.

There are however, promising strategies to help solve our current paralysis, one of which is termed "consent-based" siting. While this concept has gained the attention of national policy makers in the nuclear arena, the mechanics and underlying principles behind consent-based siting

remain unclear to many. In 1990, however, a national collaboration involving academic researchers, public officials, and private-sector representatives, all of whom had experience with siting controversial projects, developed a "Facility Siting Credo" designed to address many of the issues and controversies that had derailed past efforts to site noxious or locally unwanted facilities. The Credo includes 14 elements in total: the first seven of these elements describe procedural steps in the siting process; the remaining seven elements describe desired outcomes of the siting process.

Elements of the Facility Siting Credo include:

Procedural Steps
(1) Institute a broad based participatory process
(2) Seek consensus
(3) Work to develop trust
(4) Seek acceptable sites through a volunteer process
(5) Set realistic timetables
(6) Consider a competitive siting process
(7) Keep multiple options open at all times

Desired Outcomes
(8) Achieve agreement that the status quo is unacceptable
(9) Choose the solution that best addresses the problem
(10) Guarantee that strong safety standards will be met
(11) Use contingent agreements
(12) Work for geographic fairness
(13) Fully address all negative aspects of the facility
(14) Make the host community better off

As with any noxious installation, there is the risk that a facility will not be sited; however, by following the principles outlined in the Facility Siting Credo, the likelihood of siting success is maximized. The Facility Siting Credo represents a journey shared between all stakeholders requiring sustained degrees of transparency and collective problem solving in the face of uncertainty. This is a process for which project proponents need to be sufficiently prepared: both in temperament and skillset. Accordingly, implementation of consent-based siting calls for project leadership that is flexible, adaptive and that thrives in the nuanced world of conflict resolution, interest alignment and stakeholder engagement.

The siting of Louisiana Energy Services' uranium enrichment plant in New Mexico provides a good example of how the Facility Siting Credo can be used to successfully site a facility. BPC commissioned a case study of the siting process (written by Marshall Cohen and attached to this cover letter) to address the question of who should be involved in selecting a site and how to define their role. Specifically, this case study emphasizes the importance of public and political engagement, and the critical role of outreach and community education. It shows how Louisiana

Energy Services' success in siting a uranium enrichment facility depended, in part, on the development of a clear, specific and thorough plan to secure public and political support.

The second document we are submitting, "Major Themes from the Bipartisan Policy Center Regional Nuclear Waste Stakeholder Meetings," is from a primer series on nuclear waste prepared by BPC staff in 2015. This document summarizes key takeaways from a series of meetings, held in Boston, Massachusetts; Atlanta, Georgia; Chicago, Illinois; San Juan Capistrano, California; and Richland, Washington, to explore different regional perspectives on how to move the nation's nuclear waste management program forward.

In closing, we'd like to again emphasize that these materials were prepared by BPC staff only and do not necessarily represent the views of the Nuclear Waste Council which is preparing a separate report with recommendations. We will share the council's report with DOE as soon as possible. In the meantime, we hope the enclosed documents are helpful to the Department as it seeks to identify the central challenges to designing a more successful nuclear waste management program for the future.

Tracy Terry
Energy Project Director
Bipartisan Policy Center

Samuel Brinton
Senior Policy Analyst
Bipartisan Policy Center

Louisiana Energy Services

A Case Study in Public and Political Engagement in the Siting of Nuclear Facilities

By: Public Affairs Strategies LLC
February 29, 2016

In 1596-97 an attempt was made to purchase and refurbish the old Blackfriars Monastery, in the City of London, with the intention of turning it into a theatre. "Unfortunately the residents of the neighborhood had successfully petitioned to stop this plan."

Bill Bryson, Shakespeare: The World as Stage, 2007

Residents of a North Dakota county that could soon be the site of a U.S. Department of Energy project that would research the possibility of storing nuclear waste in rock thousands of feet underground are working to stop the $35 million project, according to an online petition.

Law360, "ND Residents Fight $35M DOE Nuclear Waste Research Project," February 2016

Plus ca Change, plus c'est la meme chose.

Table of Contents

Summary & History

This is a report of the years-long effort to site a nuclear fuel cycle facility, uranium enrichment, in the United States, an effort that began in Louisiana in 1989 and ended in New Mexico—with an unsuccessful stop in Tennessee— in 2006 with the award of a license by the Nuclear Regulatory Commission (NRC), the first such nuclear facility build award in 30 years.

The facility is owned and operated, and was built by, Louisiana Energy Services (LES), now called Urenco USA, a subsidiary of Urenco, a European conglomerate comprised of the governments of the United Kingdom and the Netherlands and 2 German Utilities, designated by Germany to be its representative in the 3 nation conglomerate. Urenco was created by the Treaty of Almelo in 1970.

In April of 1990, the United States signed onto an agreement with the three governments behind Urenco, formally enabling Urenco to begin pursuing the development of an enrichment facility in the U.S. (A fuller agreement would follow in July of 1992.). The International Agreement specifies the name of the US entity to be "Louisiana Energy Services."

This report is primarily a detailed description of the siting success in New Mexico. There is a brief description of the failures in Louisiana and Tennessee, but it is clear that the absence, in Louisiana and Tennessee, of the factors that created the success in New Mexico is the determinative difference of the siting approaches that were taken.

It was not easy.

To build any project involving nuclear power or radioactive materials in the United States requires myriad approvals —public, political and agencies—at the federal, state and local levels. Louisiana Energy Services had twice attempted to site the facility before it had success in New Mexico.

Failure 1

From 1989-1998 LES engaged in an effort to site and license its US uranium enrichment facility in Claiborne Parish Louisiana. After 9 years of effort the company withdrew its application. A quick summation of the issues it encountered before and after it filed its application to the NRC:

- Organized citizen opposition—Citizens Against Nuclear Trash (CANT)
- Environmental Justice claims filed against LES
- Opposition called into question LES's plans for waste storage and decommissioning of the plant
- Varying NRC rulings regarding opposition claims, creating costly delays
- Pressure on partner utilities to withdraw or refund LES related costs to customers

LES withdrew their application in 1998.

Failure 2

In 2002 Urenco, under new management, selected a site in Hartsville, Tennessee to again secure a license to build and operate its uranium enrichment facility.

Unfortunately, the project suffered from a lack of due diligence

- Tennessee's tax structure made the project costly
- LES couldn't obtain a suitable piece of property with correct zoning
- LES had underestimated the negative local public sentiment toward nuclear projects around Hartsville

The consortium was not proactive in informing and gaining the support of the public, which opened LES to accusations that they were trying to hide something. The company proposed excluding certain issues from NRC review and delayed submitting their license application for several weeks. They made public promises to the community which were not kept. When LES did communicate, the messages were poorly thought out and confusing; LES had to walk back some misstated claims about water and air emissions from the plant.

In March of 2003, the Nashville Tennessean wrote a editorial questioning LES's credibility:

26A Sunday, March 23, 2003 THE TENNESSEAN

LES must overcome a credibility problem

Trust is earned, not granted. That is a crucial lesson that Louisiana Energy Services should take to heart.

LES wants to build a uranium enrichment plant in Trousdale County. It has launched a public information campaign intended to let area citizens know what to expect should the plant be approved. It made strides in that regard and won the support of many people.

But LES has begun to waffle on some of the assurances it has given about radiation emissions. For example, LES first said its plant would release no radiation at all. It also said that not only would water released into the Cumberland River contain no radiation, it would be even cleaner when it is released than when the plant takes it in.

The company now tells things differently. It says small amounts of radioactive particles would indeed be released into the air and into the Cumberland River.

LES now says that the amount of radioactive uranium released into the air would be equal to the weight of 10 $1 bills. On the water issue, radiation is measured by picocuries per liter. Tennessee allows up to 15 picocuries of radiation per liter. Tests of river water from Hartsville show it has levels between .69 and .8 picocuries per liter of water. Some of the plant water LES would discharge would contain radiation estimated at 11 picocuries per liter.

Information given now doesn't match previous claims

While the estimates are well below the allowable rate, the issue now isn't the discharge but the credibility of LES officials. If the plant will fudge on facts about radiation releases, what else has it told citizens that may not quite be true?

From the inception of the LES proposal, public officials and citizens in this region have had to become educated about uranium enrichment in order to make informed decisions about the plant.

But LES should know that people in the region already understand the principles of truth and candor. LES will need plenty of both if it wants to restore its standing and continue the planning for this project.

In June of 2003, LES publicly announced it was terminating its Tennessee effort.

Success

On June 26, 2006 LES was awarded a combined construction and operating license by the Nuclear Regulatory Commission for a facility to be located in Lea County, New Mexico. In September of 2006 ground was broken, and on June 2, 2010 the ribbon was cut, and operations began. LES now produces over 5 million Separative Work Units (SWU) of enriched uranium annually for the US and world market. It is the only facility of its kind in North or South America.

79th year, No. 68 TUESDAY March 7, 2006 50 cents

News-Sun

Vote today Municipal elections

JAL EUNICE HOBBS LOVINGTON TATUM SEMINOLE DENVER CITY

ATOMIC SAFETY AND LICENSING BOARD HEARING

LES gets public backing

RICHARD TROUT
MICHELLE FOX
NEWS-SUN

The Atomic Safety and Licensing Board got swamped with so many requests to speak from local residents that the board had to limit the speaking time from five minutes to two minutes.

On Sunday about 40 people spoke to the board from 3-5 p.m. There were about 10 no-shows and only one person had negative remarks about Louisiana Energy Services, which has proposed a $1.4 billion uranium enrichment plant near Eunice.

On Monday night 36 people addressed the board following its mandatory hearing. Many of the evening's speakers were local elected officials including Rep. Don Bratton, R-Hobbs, Senators Carroll Leavell, R-Jal, and Gay Kernan, R-Hobbs, all five county commissioners and the mayors of Jal and Andrews.

For all but one of the speakers, the theme was economic diversity and jobs the LES plant would bring to Lea County, and the faith the county has in the safety of the uranium enrichment facility.

"The people here are the absolute most intelligent, strong-willed people you will ever meet in your life," said Bethe Cunningham, executive director of the Economic Development Corporation of Lea County. "We know a good thing when we see it. We know a bad thing when we see it and will send it packing. We are looking forward to the National Enrichment Facility and to see-

SEE LES, Page 3

Judge Paul Bollwerk of the Atomic Safety and Licensing Board speaks Monday during a mandatory hearing. For more, please see Page 3.

KIMBERLY RYAN/ NEWS-SUN

Philosophy & Strategy

The new LES management, working with its new US partner, Westinghouse, put an emphasis on the critical importance of public and political engagement, outreach and community education. This included development of a clear, specific and thorough plan to secure public and political support. Such a plan had been absent in both Louisiana and Tennessee.

The new management first developed a careful, and respectful, strategy for exiting Tennessee, and a proactive and inclusive strategy for introducing the project to Southeast New Mexico and West Texas, and to local, state and federal officials in New Mexico and Texas.

Underlying these strategies were the following Operating Principles the Company adopted upon entering New Mexico:

- We will at all times be open, honest and transparent
- We will treat our communities, customers, employees, the public and the government with respect
- We will be a good, credible, corporate citizen
- We will meet with (and brief) anyone, including those who may oppose our project
- We will use affirmative, pro-active strategies and tactics
- We will communicate
- We will seek and use the power of 3rd party support
- We will engage in rapid and factual response to criticism and attacks and misinformation
- We must recognize this is a long-term project
- We must recognize the size and impact of this project
- We will apply these principles everyday, to all operations, strategies and tactics
- Government relations and communications programs must be combined, coordinated and integrated into all strategies and tactics

Key outreach strategies that were deployed

- Always apply the Operating Principles
- Identify key constituencies for public briefings, education and relations communications
- Identify key issues likely to be encountered or critical to the project and credibly brief and educate the constituencies
- Implement a Communications Plan that covered the critical issues
    - Reach all target constituencies and communities
    - Adhere to the Operating Principles
    - Be proactive and responsive

    - Communications must be sustained for the long-term
- Prepare for the possibility—which became a reality—of a settlement agreement with New Mexico officials
- Consider strategies for dealing with NRC license proceeding intervenors—national responses for media and other tactics as necessary

Tactics

Key Issues

- Several Key Issues were identified as relevant to the project:
    - LES Credibility – "The Tennessee history will find its way to New Mexico"
    - Public education regarding uranium enrichment
    - Urenco's foreign ownership and past proliferation issues
    - Economic need for the project
    - Jobs and economic development
    - Storage and disposal of byproduct
    - Safety
        - Community
        - Employees
    - Water
        - Usage
        - Contamination?
    - The role of the DOE
    - The role of the NRC
    - The role of the state

It is important to note here that the "waste issue" was the principle point of contention on the LES project in New Mexico—what it was composed of; how much would be produced; how it would be managed, stored and/or disposed of; how safe it was; and who had regulatory authority over it. The majority of the issues in the Settlement Agreement with the State of New Mexico dealt with these issues as did the majority of contentions and opposition raised by anti-LES intervenors in the NRC licensing process.

While the enrichment byproduct of uranium enrichment is not "high-level waste", any nuclear project will inevitably draw the most attention, concern and opposition to the "waste" produced. Even when the "waste" has potential energy and related value.

Target Groups Constituencies

- State of New Mexico, Governor, legislative committees, agencies
- Lea County citizens, organizations, elected officials
- Neighboring communities and elected officials
- Federal officials
- Nearby Texas communities and officials
- Media, local, state, national
- Community organizations

- Environmental groups as interested

A strategy of communicating with all relevant parties meant reaching out even to opponents to the project. One of the earliest recipients of a copy the LES NRC License Applications was the leading anti-nuclear organization in New Mexico, an organization that led the opposition to the WIPP project for many years. LES provided them the Application and a meeting to discuss and answer their questions. That organization chose not to intervene in the NRC Licensing process.

Specific Methods

With target constituencies and key issues identified, LES developed tactics for reaching out to each of them and identified what resources would be needed, and to adhere to the importance of keeping all government relations and public communications integrated and coordinated.

Key Tactics

- For the community:
  - Public information meetings with Q & A
    - In every town in the region, and in neighboring Texas towns
  - Briefings organizations including Hispanic groups, the local NAACP chapter, business organizations, seniors, students, churches, etc. Trips to the Netherlands to show the community what the Lea County facility would look like, talk to local citizens there, etc.
  - Q & A advertisements, putting forth specific questions and answers about enrichment, facility operations, licensing process and public safety
  - Bilingual information pieces, radio ads, radio station visits
  - Bilingual job information line
  - Community charity support
  - Establish a community foundation with the majority of the board being community leaders
  - An e-mail distribution system for information, alerts, Q & A, etc.
  - Two local community walk-in offices with information and staff
  - Availability of scientific and engineering resources for briefings, and to answer questions, etc.

- For Elected and Government Officials
  - Detailed briefings, including for staff, legislative committees, agencies.

        - Special efforts were undertaken to ensure local legislators and county and city officials were well-briefed on the project
        - As LES earned their support, that support was continually communicated to the Governor and Congressional delegation
    - Visits to the Urenco facility in Netherlands, a model for LES operations in New Mexico
    - Provided notebooks of support materials such as resolutions, petitions, letters, etc.
    - Repeat visits to maintain support, further education, and identify new issues, questions or concerns
    - Political participation and contributions as appropriate

Anecdote:

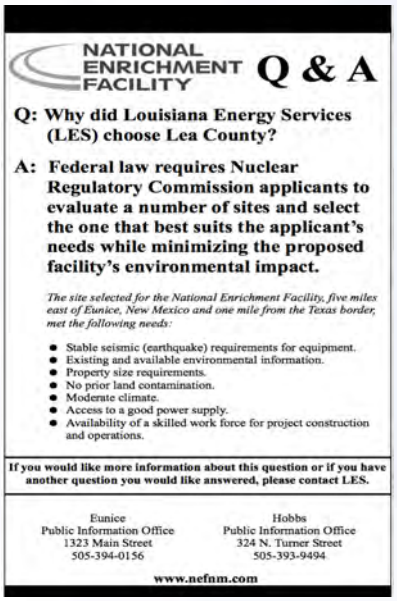
At one Washington briefing, a New Mexico US Senator commented that he had been in Southern New Mexico, where LES hoped to build, and had heard from a local state representative who commented on how well LES was working to brief the community, keep them informed and remain open to answering any questions. The Senator said he appreciated that effort very much and subsequently made very favorable comments in public forums, including NRC hearings, about how well and responsibly the Company was performing. This demonstrates the links, and critical means, albeit informal, of communications between local community and national policymakers.

- For the media
    - Offer regular licensing and engineering briefings to all media, print and broadcast
    - Visit editorial boards
    - Provide support letters and resolutions to them, demonstrating community support
    - Respond rapidly to any and all articles and/or attacks or questions posed publicly
    - Prepare and secure Op-Eds as necessary
    - Emphasize the international scope and benefits of the project, make sure they have the entire picture
    - Use paid media, through information ads, promo ads
    - Do regular radio interviews - providing updates and information – with both English and Spanish language stations

Almelo Trips

LES organized trips to visit its plant in the Netherlands located in the city of Almelo, enabling members of the community to see an operating plant similar to what LES planned to build. This was an opportunity to independently confirm that the plant's neighbors were comfortable with it and their community thriving, and even to hear some of the residents admitting they had initial fears that turned out to be unfounded. Community people also learned about uranium byproduct cylinders and their safe management and storage. Trips were organized for New Mexico state officials, community leaders and local media, and some Washington policymakers and staff..

Paid Media



NATIONAL ENRICHMENT FACILITY Q & A

Q: Why did Louisiana Energy Services (LES) choose Lea County?

A: Federal law requires Nuclear Regulatory Commission applicants to evaluate a number of sites and select the one that best suits the applicant's needs while minimizing the proposed facility's environmental impact.

The site selected for the National Enrichment Facility, five miles east of Eunice, New Mexico and one mile from the Texas border, met the following needs:

- Stable seismic (earthquake) requirements for equipment.
- Existing and available environmental information.
- Property size requirements.
- No prior land contamination.
- Moderate climate.
- Access to a good power supply.
- Availability of a skilled work force for project construction and operations.

If you would like more information about this question or if you have another question you would like answered, please contact LES.

Eunice
Public Information Office
1323 Main Street
505-394-0156

Hobbs
Public Information Office
324 N. Turner Street
505-393-9494

www.nefnm.com

As mentioned above, LES invested in paid media, in print and broadcast in English and Spanish, to answer common questions about the project and give the project a positive standing with target audiences. One "Q&A" ad, for example, explained to the area residents what made the proposed site ideally suited for a uranium enrichment facility. Another used facts from the Lea County's Regional Water Plan to show that the NEF would not use an inordinate amount of water, and it quoted a supportive letter from the Lea County Water Users Association. This answered a common opposition talking point. Targeted ads encouraged anyone with more questions to directly contact LES by phone, email, mail, or even at its local offices – which maintained an open-door policy inviting anyone to come in for information or to ask questions. These ads ran twice a month for two years.

In addition to detailed estimates of economic impact, taxes to be paid, local purchases to be made during the life of the plant, infusion of foreign senior staff and families, LES provided a strong commitment to hiring and training local workers for the several hundred jobs that would be available. The Company

coordinated with local colleges on educational programs that would train local citizens for jobs at the plant.

More examples of our work are included in the Appendices.

Results

- A full construction and operating license was granted within 30 months.
- The President of the Licensing Board, at the final NRC licensing public hearing in Eunice, NM, stated, “We’ve never seen such public and political support for a nuclear facility”.
- A Settlement Agreement with the State of New Mexico, negotiated with both the Governor and the Attorney General, which set conditions and limits on waste storage and created opportunities for State inspections and participation as the facility was built and as during operations. Upon signing of the Agreement both the Attorney General and New Mexico Department of Environmental Quality withdrew as Intervenors in the NRC process. See Appendix 6
- Resolutions of support from every town in Lea County. See Appendix 2
- Resolutions from the State Legislature in support.
- Hundreds of individual letters of support.
- Petitions in support Appendix 4
- 200 + community and political figures testifying in support of the facility at every NRC hearing in Lea County, including college presidents, legislators, business leaders, Hispanic and African-American community leaders.
- Congressional statements of support. See Appendix 4

All of the above mentioned documents are in the Appendices to this Report.

Broad Approval

Following the first Almelo visit, with public and political community leaders. LES was able to secure resolutions of support from the main cities and towns in the county, and within a short time after the formal announcement that the Company had selected the New Mexico site, many civic organizations joined them. Statewide officials and US Representative Pearce were on board. Senators Domenici (R-NM) and Bingaman (D-NM) were early supporters—and between them they would chair the Senate Energy and Natural Resources Committee from 2001 to 2013. Eventually Support extended across the border to local, state, and federal representatives of West Texas, including the Speaker of the Texas House of Representatives in Austin. Equally important and critical was the breadth and depth of the public support that came out, which the political leadership recognized and respected.

LES's proactive approach gave the opposition little opportunity to gain a foothold, and successfully built a diverse population of enthusiastic supporters who responded when asked to lend their voice; within months the media made note of this and by early 2005 reported that LES didn't really need to even ask supporters to show up to local meetings anymore. There was a large public turnout to the NRC hearings, and supporters ultimately sent hundreds of letters and provided thousands of petition signatures. In contrast with the claims of environmental racism brought by the self-proclaimed "multi-racial" group CANT in Louisiana, in New Mexico LES had the support of the NAACP and the Hispanic Awareness Council.

The proactive and open approach was also effective for working with the media, with regular positive local media coverage at the local and state levels throughout the approval process and beyond. The *Albuquerque Journal* ran some critical stories in January of 2004, a relatively balanced piece about disagreements between scientists in the industry and scientists critical of the industry at the end of February, and days later ran an editorial clearly showing they were educated on the issues: they were not impressed by the most prominent industry critics, rationally evaluated the radiation risks by comparison with dental x-rays and coal plant emissions, pointed out that there is no hysteria or opposition in Almelo, and suggested that the few issues of risk aside from waste disposal should be left up to the locals. And on that count, eleven months later the *New York Times* would observe, "local sentiment seems favorable."

When negative and skeptical stories did run, LES and allies responded quickly. When an editorial seized on the redaction of material in the NRC license application, LES responded immediately with a letter to the editor refuting the claims in detail and noting that the consortium was so strenuously transparent that it had "voluntarily sent a copy of our license application to New Mexico's leading anti-nuclear activist […] before most other people had it." LES and allies also responded to early concerns about the possibility that waste might be kept in

New Mexico and that the plant would require a great deal of scarce water. Governor Richardson, in particular, publicly conditioned his support of the project on the waste not staying in the state, and gradually demanded stronger reassurances and added some concerns about proliferation. The Sierra Club tried to get their members to contact Congress on proliferation worries relatively late in the NRC safety review process, in late April of 2005. In early June, LES came to a separate agreement addressing the state's waste and proliferation concerns with the governor, the attorney general, and the state Environment Department, which withdrew its concerns from NRC review.

The proactive communication, policy of transparency, and ongoing community engagement made the critical difference between the successful application and construction of the facility, and what otherwise may well have been a third unsuccessful effort.

Lessons Learned

- Entities seeking nuclear facility siting need to recognize their accountability and responsibility for the promises they make to a community
- The Operating Principles LES adopted can serve well for any siting project.
- Community commitments cannot end after a license or permit is secured--they must be sustained through construction and operations.
- Communities recognize when they are or are not, being respected, and will respond accordingly.
- Communities respect honesty—they want the truth, even if it might be seen as harmful.
- Interaction is constant between local communities and their leaders, elected and otherwise, at all levels of government.
- Its not really possible to compel a community to accept a site or simply brush off community concerns in this day of instant communication and social media, whether it be a government agency or private company looking at siting a facility.
- Federal agencies cannot ignore transparency or accountability to make them gain public trust. Recent events in North Dakota that now confront DOE suggest a failure to recognize this. Public consent, for public or private sector facilities, must be earned, and once lost, will be very difficult to win back. For that reason, Urenco continues, 10 years later, to follow the Operating Principles that made the facility a reality.
- Talk to people

A Brief Note about Several Other Nuclear Waste Related Facility Endeavors

Waste Isolation Pilot Project—WIPP, Carlsbad, New Mexico

In the early 1980s, when the federal government began exploratory construction of WIPP on land owned by the U.S. Department of the Interior (DOI), New Mexico's then-Attorney General, Jeff Bingaman, filed suit against DOI and the U.S. Department of Energy (DOE). New Mexico would secure agreements with the federal government ensuring communication with the state, more study, emergency response, highway improvements, and Environmental Protection Agency (EPA) regulations on WIPP and the transuranic wastes it handles. In 1991, the new Attorney General, Tom Udall, sued DOI and DOE again for withdrawing the land for public use for WIPP testing, and the suit was then joined to another suit that environmentalist groups challenging the legal status WIPP used to handle hazardous waste. The next year the suit succeeded in bringing a federal injunction, and a bill that restricted WIPP in accordance with the state's concerns and set conditions for WIPP's approval, introduced by U.S. Senator Pete Domenici of New Mexico, was signed into law. Not until 1999 was the federal injunction lifted, against the protests of activist groups, and WIPP certified and opened to handle hazardous waste.

Activists kept up pressure on WIPP, complaining about its costs relative to the small percentage of the nation's waste it would handle, calling out problems other facilities had in shipping waste to WIPP, warning that the site was unstable, and of course noting the long period of time that the radioactive materials remain hazardous. These groups warned that WIPP was gradually handling waste in ways for which it wasn't designed. They pounced on accidents at the site, particularly an accident in February 2014 that forced WIPP's to suspend operations until late 2016 and led to DOE paying out $74 million in settlements to New Mexico in early 2016.

Notwithstanding the issues, WIPP operated quite successfully for 15 years, with strong community support and backing. The City and community of Carlsbad has been long urging the federal government to locate used fuel facilities at or near WIPP. Even when the operational problems occurred in recent years, public support has essentially been constant. WIPP has been very active in its local interactions.

Yucca Mountain High Level Waste Repository, Nye County, Nevada

The Nuclear Waste Policy Act in 1982 called for two permanent high-level-waste repositories, one in the western states and one in the eastern for regional fairness, but eastern state governments were so opposed that plans were scaled back to one western site.

The Federal government did not seek local consent for its high level waste repository location. While the State of Nevada was granted veto authority over the federal action, Congress was grated veto override authority and exercised that. There was no consent siting process. It appears there was very little if any, public education process as well, prior to Yucca Mountain being designated.

Opponents of the Yucca Mountain (Nevada) location—including activists, native tribes, and politicians at the state and federal level—delayed construction by suing various parts of the federal government, restricting funding, and blocking transportation options to carry waste to the facility. Though the project had enough support in Congress to override the 2002 veto of Nevada's governor, and most of the lawsuits against the project were thrown out, in 2004 the D.C. Circuit Court of Appeals forced the EPA to revisit its 10,000-year radiation standard, thereby also requiring the NRC to reissue its licensing rule. By the time DOE was ready to submit its application to the NRC in 2007, there was a new Democratic U.S. Senate majority led by Nevada's Harry Reid, an opponent of the project, and funding for Yucca Mountain was slashed deeply. Barack Obama opposed the project during his presidential campaign, and his DOE swiftly turned against the project, so that Yucca Mountain proponents had to sue for years to get the administration to recommence the legally obligated process of seeking approval.

Private Fuel Storage (PFS)

The unique nature of the proposed locations for PFS—to be sited on native american tribal lands, first proposed in New Mexico then proposed in Idaho, present a different perspective o the concept of consent-based siting. There was a very defined and contained community for each of these, with a range of political issues and internal matters that ultimately weighed greatly on any outcome.

Many of the same obstacles to Yucca Mountain also plagued the effort to build an interim storage facility, in large part because there were questions as to whether the interim facility would become a *de facto* permanent depository if the proposed permanent depository didn't pan out. Initial federal plans to build in Tennessee, preferably the city of Oak Ridge with its long nuclear pedigree, had local support but opposition from the state, and a subsequent solicitation for states, counties, or tribes who would voluntarily host the facility produced few options. When Congress ceased the effort in 1993, a consortium of 33 nuclear utilities quickly approached the Native American tribes that had been furthest along in negotiations, but negotiations with the Mescalero Apache leadership were sapped by inconsistent support from the rest of the tribe (including some activist opposition headed by a member of the tribe) and a cool reception by New Mexico since the state had already been chosen to host WIPP. The consortium itself grew more divided on the need to support a private interim facility, and utilities began seeking congressional approval of a backup federal option near

Yucca Mountain (which was regularly submitted to Congress before being vetoed by President Clinton in 2000).

When negotiations with the Mescalero Apache broke down, eight of the utilities organized a new consortium, Private Fuel Storage (PFS), which approached the other tribe that had advanced furthest with the federal government, the Skull Valley Goshute in Utah. But the Skull Valley Goshute leaders were embattled within their own tribe, PFS had to reach a separate settlement with local ranchers to get them to drop their contentions before the NRC, and Utah legislators opposed the project (though a few proposed having the state build its own facility, gaining oversight and revenue in the process). What's more, federal agencies delayed PFS for years at a time by bringing up new concerns: in 2003 the NRC's Atomic Safety and Licensing Board worried about planes from a nearby Air Force base crashing on the site, and even after PFS got the NRC license two-and-a-half years later, DOI denied rail access over their lands and decided that the 1997 lease approval was not final, so PFS had to address a bevy of new concerns that had emerged after the 2001 environmental impact statement. A court overturned DOI's decisions and sent them back to be reconsidered, but by late 2012 the delays were costing PFS too much, and they gave up on the project.

Summary

The above three siting efforts demonstrate clearly that nuclear facility siting projects are each unique in terms of publics that may be involved, entities seeking the consent, details of the proposed facilities, and approach taken by these entities.

However, we believe the lessons of this entire report demonstrate in a very definitive manner, that while a number of characteristics of the siting effort may and will vary, the clear lesson learned is if strong, transparent pro-active public and political engagement and education are not part of any process, failure is likely.

That is as clear today as it was in 1596 when the siting of the Blackfriars Theatre failed due to citizen opposition.

October 2015

Major Themes from the Bipartisan Policy Center Regional Nuclear Waste Stakeholder Meetings

The Bipartisan Policy Center (BPC) launched its Nuclear Waste Council in January 2014 to expand the national and regional conversation about nuclear waste and to develop policy options that could lead to an implementable and enduring nuclear waste strategy for the nation.

As part of an effort to reinvigorate the national discussion on nuclear waste disposal, the Council convened five regional meetings across the United States. Each meeting included two components: a private discussion among key stakeholders, chosen for their broad representation and varying perspectives on the nuclear waste issue, and a public meeting that covered matters relevant to the national issue of nuclear waste disposal and that also provided an opportunity to hear local and regional concerns. The objective at all of the meetings was to identify barriers to solving the nuclear waste problem and to explore options for removing or reducing those barriers. Meetings were held in Boston, Massachusetts; Atlanta, Georgia; Chicago, Illinois; San Juan Capistrano, California; and Richland, Washington.

This issue brief, one in a BPC series of primers on the topic, summarizes key takeaways from the regional meetings. It identifies major themes that emerged at the meetings, as well as some of the specific issues that are important to stakeholders in each region. It is important to emphasize at the outset that this summary does not attempt to capture every view or opinion expressed at the regional meetings, nor do we claim to have captured—even in general terms—the full range of views or opinions that exists on any of these issues.

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Key Themes

Past efforts to site and develop a permanent disposal facility for spent nuclear fuel and high-level radioactive waste in the United States have generated decades of controversy and opposition. Today, more than 30 years after Congress first attempted to define a path for the long-term disposition of nuclear waste in the 1982 Nuclear Waste Policy Act, the future of the federal government's nuclear waste management program remains uncertain. Against this backdrop, it was not surprising to hear a wide range of strongly held and sometimes sharply divergent views at the Nuclear Waste Council's regional meetings. But the meetings also provided a useful reminder that despite the apparent intractability of the nuclear waste issue, a substantial and even broad-based consensus exists about the need to address the problem and even about the core elements of a durable solution. There is broad agreement, for example, that disposal in a deep geologic repository is the best practical option for isolating spent nuclear fuel and high-level radioactive waste over the timescales needed to ensure that these materials do not pose a threat to public health and safety or the environment. Further, there is broad agreement that states, tribes, and local communities must have a voice in deciding where to locate nuclear waste facilities and must have confidence that the safety of their citizens will be protected. Finally, there is broad agreement from multiple perspectives that an indefinite continuation of the current stalemate is unacceptable: not least because it leaves some states and communities to bear the involuntary risks and burdens of hosting long-term nuclear waste storage sites while also leaving the U.S. government—and ultimately American taxpayers—exposed to mounting financial liabilities. Moreover, there was unanimous agreement that these wastes—which were created for defense and commercial purposes that benefited current and previous generations—should not be left to the next generation to clean up.

How one might build on these points of agreement to get the U.S. waste management program on track and moving forward is, of course, is another question—one that generated considerably more disagreement and debate at the regional meetings. Another major point of debate concerned what should be done with existing waste and with new or existing nuclear power plants in the meantime. The remainder of this section summarizes key points of general agreement and key points of disagreement based on views expressed at the regional meetings.[1]

Areas of General Agreement

- The best option for certain types of nuclear waste is disposal in a deep geological repository to achieve maximum isolation from the environment.
- There is no technical basis for requiring commercial and defense wastes to be disposed of in the same facility.
- Developing a national strategy is more of a political problem than a technical one.
- The history of the U.S. waste management program has seriously eroded trust and confidence in the ability of the federal government—and particularly the U.S. Department of Energy (DOE)—to meet its statutory obligation to effectively manage and dispose of nuclear waste.
- An independent agency of some type should be established to assume responsibility for the nuclear waste program; that agency should be insulated from Congress and from political influence and should enjoy continuity of management and access to funding.

[1] IWe note that many of the major themes and issues that arose at the regional meetings and that are summarized here are also prominent in the final report and recommendations of the Blue Ribbon Commission on America's Nuclear Future.

- Consolidated storage is not a final solution; thus, progress must be made toward siting one or more final repositories by taking an integrated approach to storage and disposal.
- At present, no working definition exists for what a consent-based agreement would be. There was consensus that the process for generating such an agreement cannot be top-down. Almost all participants in BPC's regional meetings described a process in which host communities and tribal governments are invited to participate in a forum where the opportunities and risks are clearly defined and where participants agree on what defines consent and agree on an end point for opting out.
- The issue of working with corridor communities through which waste will transit and gaining their trust and cooperation will be a significant one and may prove as challenging as siting a facility.
- Resolving issues related to cask design and transport will require significant research and resources.
- The current radioactive waste classification system is inadequate and would benefit from a more risk-informed approach.

Areas of Disagreement and Continued Discussion

- There is a range of views on whether spent fuel from decommissioned sites should be moved to consolidated storage or remain on site until it can be moved to a permanent disposal facility.
- Stakeholders disagree about whether the spent fuel that has been removed from pools and located in dry-cask storage on site is safe as it is or whether it should be reconfigured to meet specifications for so-called hardened on-site storage (HOSS).
- There is disagreement about whether waste should be reprocessed or used as a future fuel source; this disagreement reflects widely divergent views about the economic viability and real or perceived risks, in terms of nuclear security and weapons proliferation, associated with reprocessing.
- Stakeholders have different views about whether or not nuclear power plants should be allowed to continue to operate until the waste problem is resolved.
- There is disagreement about whether or not the transportation of nuclear waste is safe. The safety record is sound for transportation on the scale that has been achieved to date, but public perception and confidence are very low.
- There is strong disagreement about whether Yucca Mountain is a technically suitable site for nuclear waste disposal.
- Stakeholders have different views about whether the government should amend the portion of the Atomic Energy Act that would increase states' authorities with respect to regulating nuclear materials.
- Finally, there is disagreement about whether the Nuclear Waste Fund should be restricted to waste-disposal activities only.

Regional Issues

The regional meetings also revealed notable differences in views of the nuclear waste issue and attitudes toward nuclear power more generally in different parts of the county. At some meetings, participants appeared more supportive of nuclear energy in principle and saw a resolution of the waste issue as important for the industry's future. At other meetings, participants expressed views that were more agnostic or negative toward nuclear energy but shared a sense of urgency about removing and disposing of spent nuclear fuel and high-level waste, particularly from decommissioned commercial reactors and DOE sites. Some differences of nuance or emphasis reflected differences in geography and past patterns of nuclear technology development. For example, at the Boston meeting, participants underscored the need to expedite the transfer of spent fuel from pools to dry storage; in California, there was concern about assuring safe storage in locations that may be vulnerable to risks from events like earthquakes or tsunamis; and in Washington state, many participants were focused on the cleanup of atomic-era legacy waste at DOE's Hanford Site. In the Southeast, where nuclear energy plays a larger role in the regional energy mix and where plans to construct new plants have gone forward, there was more discussion about the impacts of different policies on nuclear utility ratepayers. And in Chicago, participants debated options for advancing a consent-based solution to the challenge of siting a disposal facility and emphasized the importance of regional approaches to transportation and planning issues.

Obviously many more issues were raised at the regional meetings than we have mentioned here. Moreover, it must be emphasized that even within each meeting, BPC heard a range of views on specific issues, whether the topic was the desirability of developing consolidated interim storage or the feasibility of pursuing state-led or private waste management options. The more important point for the purposes of this summary is that regional differences exist that could have important implications for future waste management efforts and that should not be overlooked in national-level discussions about the future of the U.S. waste management program.

Conclusion

BPC's primary motivation in launching the Nuclear Waste Council was to renew a national dialogue on resolving barriers to the safe storage and disposal of nuclear waste. The first phase of this work has helped to bring into focus major areas of consensus and disagreement, while also identifying notable regional differences in stakeholders' views of the nuclear waste management challenge. Taken together, these points offer insights that can help all parties strategically link and act on critical issues and address areas of regional- and national-level concern. More broadly, we believe that only an approach that considers all of these points holds promise for eventually reaching a national consensus on how to proceed. The next phase of the Nuclear Waste Council will build on these insights and on the knowledge-sharing that occurred at these meetings to develop recommendations for achieving a resolution of the nuclear waste problem—a resolution that, in many ways, already has broad support and that many stakeholders and experts still believe is well within reach.

BIPARTISAN POLICY CENTER

Founded in 2007 by former Senate Majority Leaders Howard Baker, Tom Daschle, Bob Dole and George Mitchell, the Bipartisan Policy Center (BPC) is a non-profit organization that drives principled solutions through rigorous analysis, reasoned negotiation and respectful dialogue. With projects in multiple issue areas, BPC combines politically balanced policymaking with strong, proactive advocacy and outreach.

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From: Steve Brittle [mailto:smbrittle@yahoo.com]
Sent: Saturday, June 25, 2016 1:09 PM
To: Howard, Rob L.
Subject: DOE environmental justice

I appreciate the link you wrote down on your card regarding EJ policies at DOE. You indicated there was more you could provide if I emailed you.

In what you will provide, could you also show what the complaint process is at DOE when someone wants to complain about the agency's environmental injustice or violations of people's civil rights?

For example, EPA has an office of civil rights where complaints can be filed

I have reviewed the materials at the link you provided. It is illuminating that the DOE purports to deal with what EJ comprises, i.e. Discriminatory impact on minority, low-income, and tribal populations; and promises "Meaningful public participation." From what I clearly saw at the meeting, this current effort does not prevent discriminatory impact on minority, low-income, and tribal populations; rather it institutionalizes them. Nor is this process allowing meaningful public participation.

.

Thanks,

Steve Brittle
Don't Waste Arizona

Consent-Based Siting

From: George Buehler [mailto:george_buehler@yahoo.com]
Sent: Tuesday, July 19, 2016 2:34 AM
To: Consent Based Siting
Subject: Response to IPC

Dear Department of Energy,

"It's said the definition of insanity is doing the same thing over and over, while hoping for different results. Those in denial about the U.S. Department of Energy's (DOE) decades of mismanagement of nuclear waste in Idaho have become the personification of that old truism."

Cecil Andrus

I agree with Cecil. The Batt Agreement made it clear in 1995 that Idaho would not become a nuclear waste repository, certainly not while decades worth of waste was <and still is> leaking into the Snake River aquifer. Despite what the boosters for INL may try to tell you, Idahoans are not interested in becoming the defacto waste storage for the nation. The Batt Agreement is still the law and I expect it to be enforced.

Sincerely,

George Buehler
Pocatello, ID

PS
The opening quote is from a recent op-ed by Mr Andrus. A link to the full text is here:
DOE has legacy of broken promises on Idaho nuclear waste cleanup

DOE has legacy of broken promises on Idaho nuclear waste cleanup

It’s said the definition of insanity is doing the same thing over and over, while hoping for different results. ...

Read more here: DOE has legacy of broken promises on Idaho nuclear waste cleanup

DOE has legacy of broken promises on Idaho nuclear waste cleanup

It’s said the definition of insanity is doing the same thing over and over, while hoping for different results. ...

July 29, 2016

U.S. Department of Energy, Office of Nuclear Energy
1000 Independence Ave SW
Washington, DC 20585

Submitted by email to consentbasedsiting@hq.doe.gov.

Regarding Invitation for Public Comment on Consent-Based Siting

As a former Texas State Representative of District 90 in Ft. Worth, I would like to submit the following comments on DOE's Consent-Based Siting Process.

The plan to transport the nation's deadly nuclear reactor waste for consolidated storage in Texas or nearby in New Mexico raises grave concerns about long-term risks to health and state finances. Risks from radioactive contamination from leaks, accidents or terrorist attacks could threaten our health, land and aquifers. In 2014 the Texas Commission on Environmental Quality studied this issue. In their "Assessment of Texas' High Level Radioactive Waste Storage Options the agency issued two dire warnings; Texas could unintentionally become a de facto permanent radioactive waste repository and terrorism risks would be increased by transport of this waste. These warnings should be taken seriously since exposure to radioactivity can cause cancer, birth defects and death. A single train carload of high-level radioactive waste would contain as much plutonium as the bomb that devastated Nagasaki. Plutonium 239 in radioactive waste must remain isolated for over 240,000 years and some radioactive materials require even longer periods of isolation, up to a million years. Decisions involving this waste are no small matter.

Waste Control Specialists (WCS) applied to the Nuclear Regulatory Commission in April 2016 for a consolidated storage license that would allow them to store high-level radioactive waste in dry casks on a big concrete slab for forty years at their site on the Texas/ New Mexico border. This fall the Eddy Lea Energy Alliance is expected to apply for a license for a site just across the border in New Mexico. This means much of the nations' high-level waste would be transported through Texas. In previous analysis, the DOE estimated that more than 10,000 train shipments would be needed. This would place many of our largest cities at risk, with shipments that would last for over 20 years.

The federal government acknowledges that no one wants radioactive waste in their backyard, so there has been an effort to find communities to "volunteer" to take it and now the DOE is seeking comment on what constitutes "consent." While claims have been made that no site has been selected, it has been clear since 2012 and the work of the Blue Ribbon Commission that the Texas/ New Mexico region is being targeted. Any "consent" discussions must keep this consideration in mind.

The discussion on what "consent" means and what should constitute consent is premature. Despite the fact that an active NRC license application is being reviewed for a site in our state, many key decisions are yet to be made and a huge amount of information is lacking. How can there be consent if people don't know what they're consenting to?

- We can only guess at what the transportation routes would be since they would not be determined until 2022 or later.
- There has been no decision on a final permanent repository since Yucca Mountain efforts have been halted. Until a site is permitted and constructed we must assume that any high-level radioactive waste "stored" here is likely to stay in Texas, creating a de facto permanent disposal site. Would "consent" to storage become consent to a permanent repository, adding a whole additional level of risk? Thorough review using the best science available is needed to know whether WCS' or any such site could safely isolate waste for thousands of years. Decisions on where to store or dispose of radioactive waste should be based on full scientific analysis, not political pressure or assurances from corporate promoters.
- No Environmental Impact statement has been completed for high-level waste storage at the WCS site.
- The NRC found numerous significant deficiencies in the license application, including lack of engineering analysis for transfer casks that would be used, information about how shielding would be accomplished, and the design of the concrete pads. There was inadequate information about how water contamination would be prevented, radiation monitoring, worker dose rates and cumulative impacts from this site combined with low-level radioactive waste at the site and other nearby nuclear facilities.

While the U.S. Department of Energy held eight "consent-based siting" meetings around the country, the agency failed to schedule a single one in Texas or New Mexico, the states targeted as ground zero for storing the nation's high-level radioactive waste. Instead, they held eight meetings elsewhere around the country - in Boston, Denver, Sacramento, Atlanta, Chicago, Boise, Minneapolis and Tempe. Texas and New Mexico are the first places the DOE should have gone, and the oversight is glaring and perhaps it was intentional. Instead the DOE has been asking other states how they feel about getting radioactive waste out of their backyard, knowing full well that this means dumping on Texas/ New Mexico.

Those most likely to be impacted were not being asked for their thoughts. Rules based on this process and these meetings are likely to continue to be unfair and inappropriate.

Texas has been portrayed as wanting radioactive waste storage based on a vote by Commissioners in Andrews County, Texas. But there was no real public debate, or broad discussion, just a routine vote that most people didn't even know about. Commissioners were no doubt looking at potential county revenues. Many local people are opposed to having high-level radioactive waste in their backyard. They were never given a chance to vote.

Dumping radioactive waste on largely Hispanic communities with few resources to fight back would be extreme environmental injustice. Local people have only recently become aware of the plans to dump radioactive waste on them and are beginning to fight back. Many people in Texas and New Mexico have signed petitions saying that they do not consent to having radioactive waste from the nation's nuclear reactors stored in or transported through their communities.

A “No Consent to High-Level Radioactive Waste” resolution became the number one Democratic Party resolution this year, passing in 29 County and District Democratic Conventions. As a result, the 2016 Texas Democratic Party Platform includes the following: “We support… halting the plan to import high-level radioactive waste for consolidated storage in Texas due to risks of water contamination, security concerns and transportation accidents, and we oppose transport of high-level radioactive waste on our highways or railways.”

If the plan to transport radioactive waste for consolidated storage moves forward, every “affected” citizen in Texas, New Mexico and other states, should have the right to vote on whether or not to “consent,” in a normal election process. Those who should be asked for their consent include those most likely to be exposed including: people in any host county or county through which radioactive waste would be transported: those who live within 50 miles of a proposed storage site, and those who use an aquifer that might be contaminated. A simple vote by a County Commission should not constitute “consent.” A vote should be required in each of the potentially impacted communities. The use of funds to influence the election should be prohibited, including funds from the applicant, contractors, shippers, utilities, or other interests that could benefit financially.

It is important to note that there is no need to move radioactive waste for consolidated storage or to transport it across the country when there is no permanent disposal site. The Nuclear Regulatory Commission has previously said that the least risky option is to keep the waste stored securely at or close to the site where it was generated, and most reactor sites are already licensed to do so.

Decisions on whether or not to “consent” should be determined only after key rules on transportation have been finalized, transportation routes proposed, after engineering and environmental impact studies have been completed, and after vigorous debate at a series of local hearings in host counties, counties through which the waste could be transported, as well as counties that could be impacted by aquifer contamination.

The plan to ship the nation’s deadly nuclear reactor waste to Texas / New Mexico should be halted immediately due to the risks of radioactive contamination from leaks, accidents or terrorist attacks and the threats they pose to our health, land and aquifers. The DOE must not use the “consent-based siting” process to further efforts to target Texas and New Mexico as radioactive waste sites.

I would like to be clear that Texas is not a wasteland. We are not a dumping ground. We do not consent to accepting high-level radioactive waste for storage in Texas or to transporting it through our state for this purpose. We urge the DOE to delay the “consent” process until such time as citizens have enough information to make their decision knowing the full magnitude of what is under consideration. This requires a legitimate, lengthy, fully-informed discussion of the risks involved and a vote of all communities where people are most at risk for impacts.

Sincerely,

WINDHAM
REGIONAL
COMMISSION

Engaging Nuclear Plant Host Communities to Inform Multiple Federal Agencies across Interrelated Policy Issues Concerning Nuclear Plant Closure, Decommissioning, and Spent Fuel and Waste Management

Multiple federal agencies would benefit from having an organized group of nuclear host local communities to provide local government stakeholder input on policy matters related to spent nuclear fuel, nuclear waste, and nuclear plant closures and decommissioning. Specific issues include integrated waste management and consent-based siting of spent fuel and high-level radioactive waste, spent fuel transport, and decommissioning rulemaking discussions. Relevant agencies include the Department of Energy, the Environmental Protection Agency, and the Nuclear Regulatory Commission, but also the Economic Development Administration and Department of Agriculture as communities – especially rural communities – plan for socioeconomic impact mitigation in the wake of the closure of a major contributor to employment, household income, and local taxes. This need will become all the more relevant as the current wave of nuclear plant closures continues.

Engaging host local governments in the consideration of multiple interrelated nuclear plant closure, decommissioning and waste policy matters would establish a cadre of well-informed local stakeholders who are most directly affected by plant closures to advise multiple federal agencies. Communities that host nuclear power plants should be actively and substantively engaged in policy deliberations from the outset. The Nuclear Energy Institute serves as a unified industry voice and has formed a Decommissioning Task Force to advise the NRC and other federal agencies. We believe it is in the best interest of the public, the federal government and the industry to have host communities similarly engaged. It would also create a core group of nuclear plant host community stakeholders which could engage with potential consenting waste-receiving communities.

An organization such as the National Association of Development Organizations should be supported to convene host local governments. At issue is the mitigation of local impacts of nuclear plant closures, orderly redevelopment, and the relationship of these goals to federal policy. An entity like NADO could convene host governments to 1) document the local experience of past closures and decommissionings including economic, fiscal, employment, and environmental impacts; 2) assess host community costs, benefits and risks of different closure, decommissioning and fuel and waste management scenarios; and 3) forming a Host Community Closure, Decommissioning, Fuel and Waste Policy Task Force to solicit input from the larger group of affected communities to provide local government stakeholder insight for multiple federal agencies across a range of interrelated policy issues. This would be similar to NADO's work funded by the Economic Development Administration to document local resilience responses to multiple disasters in the 2011-2012 timeframe.

Contact:
Chris Campany, Executive Director
Windham Regional Commission
139 Main Street Suite 505 Brattleboro, VT 05345
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www.windhamregional.org

Consent-Based Siting

From: Chris Campany [mailto:ccampany@windhamregional.org]
Sent: Friday, July 22, 2016 2:07 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Comments of the Windham Regional Commission, Vermont

Comments on Consent-Based Siting of Spent Nuclear Fuel and High-Level Radioactive Waste
July 22, 2016

The following comments are offered on behalf of the Windham Regional Commission (WRC). The WRC serves 27 towns in Windham, Bennington and Windsor counties in southeastern Vermont, and includes the Town of Vernon, which is home to the Vermont Yankee Nuclear Power Station. In the absence of county government, we provide the essential link between local, state and federal government. Our mission is to assist towns in southeastern Vermont to provide effective local government and work cooperatively with them to address regional issues.

The WRC has not yet deliberated upon or taken a position on consent-based siting of spent nuclear fuel and high-level radioactive waste, but I have been authorized by our Executive Board to comment on the fairness and transparency of the process. We offer the following comments.

- Rather than dictate a specific public engagement process for all potential nuclear waste host communities, the federal government should instead consider defining performance measures that would establish community outreach, inclusion, and transparent decision-making outcomes with an emphasis on the identification of environmental and socioeconomic justice concerns from the outset. That would allow local jurisdictions and states to design their processes around established rules and procedures while also establishing a clear, high bar by which everyone involved understands that consent is to be broad and deep and arrived at through inclusive and transparent community engagement and decision-making.
- This would be coupled with performance measures for the site itself (geology, hydrology, security, transportation access, etc.).
- The siting of the facility must be evaluated within a cumulative and aggregate framework, not only in terms of human health exposures but also socioeconomic impacts.

- The communities that consent to host these spent fuel and waste facilities are providing a valuable service to the nation as a whole. All segments of the population must be better off as a result of the siting decision by a number of measures, including:
  - ✓ Socioeconomic well-being and household income security.
  - ✓ Cultural security.
  - ✓ Physical and mental health and wellness.
  - ✓ Food security.
  - ✓ Educational opportunity.
  - ✓ Employment opportunity.

  While measures such as area GDP, tax revenue and employment are important, they are not sufficient indicators of community well-being and should not form the basis for evaluating such.
- Communities that opt to consider becoming a host site for spent fuel and high-level nuclear waste storage should be provided with the resources necessary to hire their own experts rather than rely upon those that might be provided by commercial, state or federal entities involved in the siting process. This will empower the communities to develop their own knowledge base and reach their own conclusions.
- Citizen advisory panels should be community-based and function independently of any potential site operator. Structure and membership should be set up to advise state and federal officials as well as the site operator, and the panel should be provided resources in order for it to independently consider the facts and information presented. This ties back to providing the community with resources to hire their own experts to make sense of the information they are provided and to pursue information they feel is needed to inform their decisions.
- Given the decades of failure of federal policymakers to establish a permanent repository, sites that are intended to be interim storage facilities should be evaluated for their capacity to serve as a permanent repository should history continue to repeat itself.

We also offer the following proposal as a means of organizing meaningful local input into the many federal initiatives underway to address issues related to nuclear decommissioning, spent fuel, and radioactive waste.

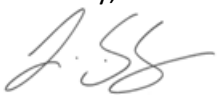
Engaging Nuclear Plant Host Communities to Inform Multiple Federal Agencies across Interrelated Policy Issues Concerning Nuclear Plant Closure, Decommissioning, and Spent Fuel and Waste Management

- *Multiple federal agencies would benefit from having an organized group of nuclear host local communities to provide local government stakeholder input on policy matters related to spent nuclear fuel, nuclear waste, and nuclear plant closures and decommissioning.* Specific issues include integrated waste management and consent-based siting of spent fuel and high-level radioactive waste, spent fuel transport, and decommissioning rulemaking discussions**.** Relevant agencies include the Department of Energy, the Environmental Protection Agency, and the Nuclear Regulatory Commission, but also the Economic Development Administration and Department of Agriculture as communities – especially rural communities – plan for socioeconomic impact mitigation in the wake of the closure of a major contributor to employment, household income, and local taxes. This need will become all the more relevant as the current wave of nuclear plant closures continues.
- *Engaging host local governments in the consideration of multiple interrelated nuclear plant closure, decommissioning and waste policy matters would establish a cadre of well-informed local stakeholders who are most directly affected by plant closures to advise multiple federal agencies.* Communities that host nuclear power plants should be actively and substantively engaged in policy deliberations from the outset. The Nuclear Energy Institute serves as a unified industry voice and has formed a Decommissioning Task Force to advise the NRC and other federal agencies. We believe it is in the best interest of the public, the federal government and the industry to have host communities similarly engaged. <u>It would also create a core group of nuclear plant host community stakeholders which could engage with potential consenting waste-receiving communities.</u>

- *An organization such as the National Association of Development Organizations should be supported to convene host local governments.* At issue is the mitigation of local impacts of nuclear plant closures, orderly redevelopment, and the relationship of these goals to federal policy. An entity like NADO could convene host governments to 1) document the local experience of past closures and decommissionings including economic, fiscal, employment, and environmental impacts; 2) assess host community costs, benefits and risks of different closure, decommissioning and fuel and waste management scenarios; and 3) forming a Host Community Closure, Decommissioning, Fuel and Waste Policy Task Force to solicit input from the larger group of affected communities to provide local government stakeholder insight for multiple federal agencies across a range of interrelated policy issues. This would be similar to NADO's work funded by the Economic Development Administration to document local resilience responses to multiple disasters in the 2011-2012 timeframe.

Thank you for your consideration of these comments.

Sincerely,



Chris Campany,
Executive Director

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Consent-Based Siting

From: Japopopo [mailto:japopopo@verizon.net]
Sent: Sunday, July 31, 2016 10:40 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

George Campion
18 Clipper Ct.
Newark,DE 19702

Hello, regarding the handling of the radioactive waste that has been accumulating since day one of the nuclear era (error), I would like to submit the following comments as urgent requests. Stop producing it, transfer it in a safe manner directly to a suitable, well thought out, storage site, store them in HOSS dry casks and insure that the facility is maintained from now on.

I can remember the public being assured in the early 70's that a solution to the nuclear waste problem was just around the corner. That was then and now all we seem to have are half backed willy- nilly proposals. The nuclear industry has not been straight with the public from the git go. Half truths at best which to some are worse than all out lies. We live across the river from hope creek facility in southern new jersey and have attended 2 local NRC public meeting and one meeting at NRC Headquarters in DC regarding the environmental impact study. Rubber stamp while the plant was under some restriction for excessive safety violations. Don't let me commence!

My main request is that the sincere people at the regulatory and decision making levels proceed with their work with a respect for our ancestors who proceeded us and respect for our descendants seven generations down the line, and proceed in manner that will allow our descendants to pass a livable environment down to their children. We all need to be stewarts and good citizens of this planet. Thank you for your time.

George Campion for himself and his wife Mary Beth

Sent from my iPad

Consent-Based Siting

From: Rebecca Casper [mailto:rlncasper@cableone.net]
Sent: Sunday, July 31, 2016 11:31 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: Casper Rebecca L Noah <rcasper@idahofallsidaho.gov>
Subject: Invitation for Public Comment

Please accept the attached document as my my response to the invitation for public comment.

Sincerely,
Rebecca Casper
Mayor, City of Idaho Falls

Comments submitted to the U.S. Department of Energy
Rebecca Casper, Ph.D.
Mayor, City of Idaho Falls
rcasper@idahofallsidaho.gov

Invitation for Public Comment
On the Design of a Consent-based Siting Process
14 July 2014

Introduction

As mayor of the City of Idaho Falls ID, I represent a community that is highly experienced with nuclear research and innovation, SNF and Legacy Waste.

We are here at this moment in US nuclear history because of both practical and political failings. We haven't built a repository. We have not created certainty for legacy and commercial waste streams. We have not secured sufficient funding. We have not made progress on untangling what amounts to a vicious cycle of commitments, shortcomings, lawsuits and recriminations. And in our haste to blame the federal government for these shortcomings, I fear that we in the larger nuclear community are also complicit for we have failed to educate, to inspire, and to fully grasp the bigger national and global scope of the problems we must solve.

Consent Based Siting Principles

As we restart the conversation with a dialogue about how we shall define consent, I appreciate the opportunity to weigh in. My own opinion tends toward a model that recognizes our federal system and that respects the role of the states. As a local elected official, I'd also like to advocate for a CBS model that respects that it is local citizens who will live with the consequences—good and bad—of being waste storage (interim or permanent) site

I also hope we can find a siting methodology that does not unduly empower a single individual. The damage—financial and otherwise—that a single, visionless individual can create is staggering. . I personally have seen those who are overzealous in advocating for their views resort to fear and obfuscation when trying to persuade the public—pro or con. We do not need a model for unanimous consent. It is rarely possible in a representative democracy consisting of millions of voices.

Finally, we must design a siting model that offers checks and balances in the form of a way to override a single or narrow veto when the will of the state and local majority is clear.

- I believe we have sufficient scientific data and storage technology right now to safely and adequately address the waste storage problem.
- I believe the challenges we face are almost entirely political in nature.

- I absolutely believe a nation like ours with a highly educated citizenry and high degree of resolve can solve any problem.
- I believe that the implementation of a consent-based path forward could free up the billions of dollars that are currently allocated to fines and legal costs and allow them to be directed at research and siting incentives.
- I believe that with tailored incentive packages, many localities will step up with a majority of citizens and officials at all levels who are willing to diog in a respectful manner about siting possibilities. The current state of affairs with respect to the availability of state and local tax resources for critical education and infrastructure is dire in most states. This makes it nearly a certainty that any incentives offered in a siting program that address these kinds of state and local concerns will invite a more creative approach.

Education and Informing Public Responsibility

As an educator by profession and as an elected official who works with citizens and citizen education every day, I am very confident that with education and coordination between the local, state and federal governments, and with outreach efforts into the community, we can improve levels of public acceptance once a siting decision is made. I firmly believe that once armed with facts and not fear, people can feel safe and even recognize the remarkable opportunities that might come with having a premier federal storage facility in their backyard.

I am equally confident that the many benefits to universities located near an official storage site will result in still more innovation and opportunity—particularly for young people. Better science, more correct data, and appropriate policy will flow from those collaborations. A few years ago, my own city sent a youth delegation to France to tour waste processing sites and to study waste storage. These young people returned more informed and even enthused for the possibilities inherent in having a more robust nuclear program in our country.

Therefore, the time has come when we citizens must collectively roll up our sleeves and agree to find a storage solution for commercial nuclear waste and the defense waste left in communities that did their part under the Manhattan Project to keep our nation safe. Passing this off year after year, decade after decade, onto a beleaguered federal agency is a most non-productive choice.

Leadership

It behooves the next administration to lead boldly and not shy away from this responsibility. I say responsibility, but it is also an opportunity to remove procedural the obstacles that are hindering our nation's global competitiveness in the nuclear arena.

Will our nation be any more inherently safe, secure, and competitive 10 years from now if we continue on our present path? I do not believe it will be. Will our obstinate refusal to problem-

solve and our willingness to allow anger and frustration to prevent progress result in us passing on this relatively easy science problem on to our children? That would be embarrassing. It is on us to move from what was done wrong in the past and to determine how we can do better in the future.

I encourage the DOE to fashion a solution for the siting piece using principles that respect localities just as the ECA and other local leaders have recommended. I also commend the principles outlined in the Idaho LINE Commission's submitted testimony I believe you have plenty of data and input to hit on an innovative definition of consent that is inclusive, *incentive based*, *check-and-balance oriented*, and which *honors the will of the majority*. That is the DOE task.

But what is far more important is what the rest of us will choose to do. What is our task? What will we do with the proposals DOE proffers? Again, this is where leadership and direction are needed. And this must come from the top levels of government. It is my hope that our federal-level elected officials listen and act decisively to facilitate progress.

Respectfully submitted,

Rebecca Casper
Mayor, City of Idaho Falls, ID

Consent-Based Siting

From: Susan Caswell, PhD [mailto:jsusie23@hawaii.rr.com]
Sent: Friday, July 29, 2016 1:34 AM
To: Consent Based Siting
Subject: Consent-based siting public comment

STOP DUMPING ON RESERVATIONS--- RACIST ENVIRONMENTAL GENOCIDE, NO MATTER WHERE. WHEN ARE WE GOING TO STOP THE RADIATION GUSHING AT FUKASHIMA????? NUCLEAR PLANTS OVER FAULT LINES-- DO WE HAVE MANICS RUNNING THE WORLD-- CRAZY. STOP ALL NUCLEAR PLANTS NOW

Sincerely,

Thank you for your consideration.

Susan Caswell, PhD

96776

Consent-Based Siting

From: Peter and Sharron Childs [mailto:poc@asis.com]
Sent: Monday, July 11, 2016 7:46 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Nuclear Sanity

Nuclear waste is a Frankensteinian monster. It is terribly dangerous and will remain so for tens of thousands of years. We have ignored that compelling fact because we like what nuclear fission can do for us, and for that reason we have allowed this dangerous material to proliferate (e.g. what are your plans for dealing with the plume that's been spreading underground for decades toward the Columbia River at Hanford?). Now we say "Gee, we'd better find some place to put this stuff", and we seek to persuade communities that their land will be a good place to do so. Right. Many communities can probably be persuaded, just as many people were persuaded that nuclear-produced electricity would be "too cheap to meter".

Not in my community, thank you very much. I don't know what to suggest that you do with this stuff (that would be practical); you should never have created it. Good luck. Peter O. Childs

Consent-Based Siting

From: Bill Chisholm [mailto:chisholm3@mindspring.com]
Sent: Thursday, July 14, 2016 4:18 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

For the Record on Consent Based Siting
From: Bill Chisholm
19073E Hwy 30
Buhl, Idaho 83316
chisholm3@mindspring.com
208-543-4418

We, the people of Idaho, have been through this dance too many times.
The Department of Energy seems not to listen. You do not have our "consent" to bring more nuclear waste into Idaho. The DOE has a miserable record of living up to its agreements, of always trying to play some new trick to get "its way" over the will of the people. Time and time again we have said No More Waste. We mean it. You do not, you will not get our consent.

I myself have been arrested a couple of times over DOE's attempt to turn Idaho into the nation's nuclear waste dump. I went to jail in 1996, trying to get Governor Batt to see the shortcomings in his Agreement with DOE, because I knew DOE to be without honor.

Out of sight, out of mind, doesn't solve the problem. Transporting waste all over the country only increases the risk of accident. So called "temporary storage", means for ever. Pretense at the need for "research" is only the guise for opening the floodgates of waste coming to Idaho, of Idaho becoming the nation's de facto nuclear waste dump.

The risks to Idaho, to the Snake River Aquifer are too great.

I'm sick and tired of DOE's never ending push to bring more waste to Idaho.

Bill Chisholm

Consent-Based Siting

From: Loren Clift [mailto:nitsuait@gmail.com]
Sent: Friday, July 29, 2016 10:22 AM
To: Consent Based Siting
Subject: Consent-based siting public comment

no new nuclear, there is no need

Loren Clift

48910

Consent-Based Siting

From: Cochran, Justin@Energy [mailto:Justin.Cochran@energy.ca.gov]
Sent: Friday, July 29, 2016 10:23 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: Weisenmiller, Robert@Energy <Robert.Weisenmiller@energy.ca.gov>; Oglesby, Rob@Energy <Rob.Oglesby@energy.ca.gov>; Barker, Kevin@Energy <Kevin.Barker@energy.ca.gov>
Subject: Response to IPC

Dear Department of Energy Representative:

The attached letter provides the formal comments of the California State Energy Resources Conservation and Development Commission (California Energy Commission) on the Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuckear Waste Storage and Disposal Facilities posted in the *Federal Register* by the Department of Energy, Docket 2015-32346.

We applaud the DOE's invitation for public comment on this critical issue and appreciate the opportunity to submit comments on this important subject.

Please send any future notices, correspondence, and documents related to these comments to Justin Cochran, Ph.D., Senior Nuclear Policy Advisor, California Energy Commission, MS-36, 1516 Ninth Street, Sacramento, CA, 95814-5512, or via email at Justin.Cochran@energy.ca.gov.

Best regards,

Justin Cochran, Ph.D.

Senior Nuclear Policy Advisor

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY
CALIFORNIA ENERGY COMMISSION
ROBERT B. WEISENMILLER, CHAIR
1516 NINTH STREET, MS 33
SACRAMENTO, CA 95814-5512
(916) 654-5036
FAX (916) 653-9040

EDMUND G. BROWN JR., *Governor*

July 29, 2016

United States Department of Energy
Office of Nuclear Energy
Response to IPC
1000 Independence Ave SW
Washington, D.C. 20585

RE: Response to IPC – Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities [FR Doc. 2015-32346]

Dear Department of Energy Representative:

This letter provides the formal comments of the California State Energy Resources Conservation and Development Commission (California Energy Commission) on the above-referenced document posted in the *Federal Register* by the Department of Energy. The document requested comments on implementing a consent-based siting process to establish an integrated waste management system.[1] The Energy Commission is California's primary energy policy and planning agency, with core functions that include evaluating and proposing mitigation for public health, safety, and environmental impacts of proposed thermal power plants, including nuclear reactors.

I am the Chair of the Energy Commission and the current California State Liaison Officer to the United States Nuclear Regulatory Commission (NRC). Appointed by the state Governor, the Liaison Officer is the primary contact and intermediary between California and the NRC. The Liaison Officer provides vital information on specific issues, such as state radiological health, emergency preparedness, public utility commission actions, and state nuclear safety agency matters, as needed. I applaud the DOE's invitation for public comment on this critical issue and appreciate the opportunity to submit comments on this important subject and welcome the dialogue for the development of a new, comprehensive, consent-based approach to siting facilities intended for storing and disposing of nuclear waste.

As the California State Liaison Officer, I urge the DOE to act expeditiously in seeking voluntary storage and disposal facilities. California's unique combination of seismicity, coastal nuclear

1 U.S. Department of Energy, "Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities," December 23, 2015, Docket ID DOE_FRDOC_0001. Retrieved from http://www.regulations.gov/#!documentDetail;D=DOE_FRDOC_0001-3000.

facilities, and population clusters dictate a commitment to safety. The citizens of California have expressed their desire that federal agencies fulfill statutory obligations in securing the safe storage, transport, and timely removal of radioactive waste as evidenced by public engagement in the recent San Onofre Community Engagement Panel Meeting on Consolidated Interim Storage.[2] Success in nuclear waste management activities require a transparent and inclusive public process that builds trust between all parties and fully addresses transportation considerations. An engaged public process stresses the importance of providing financial and technical resources to interested communities to allow them to fully and equitably participate in the consent-based siting process.

The Energy Commission's Interest and Subject Matter Expertise

California law requires the Energy Commission to prepare a biennial *Integrated Energy Policy Report* (*IEPR*) that assesses major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety.[3] In fulfilling this legislative mandate, the Energy Commission regularly evaluates—and takes appropriate responsive action regarding—possible federal decision-making that would impact California's existing nuclear reactors, environmental resources, and public health and safety.[4] Section 25303, subdivision (c), of the California Public Resource Code provides, in pertinent part:

> In the absence of a long-term nuclear waste storage facility, the commission shall assess the potential state and local costs and impacts associated with accumulating waste at California's nuclear powerplants. The commission shall further assess other key policy and planning issues that will affect the future role of nuclear power plants in the state.

The Energy Commission has previously taken a particular interest in the Department of Energy's (DOE) proposal for a geologic repository for the disposal of spent nuclear fuel and high-level waste at Yucca Mountain. In particular, the Energy Commission is a party to the underlying proceeding before the Atomic Safety Licensing Board titled *In the Matter of the U.S. Department of Energy (High Level Waste Repository)*, Docket No. 63-001-HLW (High Level Waste Repository Proceeding). In that proceeding, the Atomic Safety Licensing Board admitted 22 contentions brought forth by the State of California and the Energy Commission, charging that DOE's 2002 *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (2002 FEIS) and 2008 *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste*

2 June 22, 2016. San Onofre Community Engagement Panel on Consolidated Interim Storage. Content available at https://www.songscommunity.com/cep-events/062216_event.asp.
3 Cal. Pub. Resources Code, § 25301(a).
4 The Warren-Alquist Act designates the Energy Commission as the state's primary agency for energy policy and planning. Senate Bill 1389 (Bowen and Sher, Chapter 568, Statutes of 2002) requires that the Commission adopt and transmit to the Governor and Legislature a report of findings every two years in the *Integrated Energy Policy Report.*

at Yucca Mountain, Nye County, Nevada (2008 FEIS; collectively, EISs) did not adequately characterize impacts from potential contaminant releases to groundwater and from surface discharge of groundwater.[5] The NRC staff's 2008 *Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain* (ADR) agreed with California's position that the EISs were deficient under the National Environmental Policy Act (NEPA) for failing to adequately discuss the cumulative amounts of radiological and nonradiological contaminants that may enter the groundwater over time and the behavior of these contaminants in the aquifer and surrounding environments.[6] In November 2015 the Energy Commission submitted comments representing California on the *Supplement to the U.S. Department of Energy's Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Waste at Yucca Mountain, Nye County, Nevada* (Docket ID: NRC-2015-0051).[7]

In 2008, the Energy Commission adopted the guidelines outlined in *Assessment of California's Nuclear Power Plants: AB 1632 Report.*[8] At the time of the report, there were two operating nuclear power reactors, Pacific Gas and Electric's Diablo Canyon Power Plant (Diablo Canyon) and Southern California Edison's San Onofre Nuclear Generating Station (San Onofre), as well as two sites, Humboldt Bay and Rancho Seco, undergoing decommissioning. All four sites were, and still are, storing spent nuclear fuel (SNF) onsite. At this writing, only Diablo Canyon is operating but is scheduled to begin decommissioning per a recent settlement agreement in 2024[9]; San Onofre Units 2 and 3 are in the early stages of decommissioning, while San Onofre Unit 1, Humboldt Bay, and Rancho Seco are in later stages. However, as discussed in the *2005 IEPR*[10] and still of concern today, both Diablo Canyon and San Onofre have SNF stored in cooling pools and independent spent fuel storage instillations (ISFSI).

An essential component of the AB 1632 report was the recognition that nuclear plants in California are vulnerable because the local geology is predisposed to seismic activity:

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5 Board Memorandum and Order, May 11, 2009; CLI-09-14, June 30, 2009.
6 U.S. Nuclear Regulatory Commission staff's *Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain,* pp. 3-14.
7 Letter to Secretary of U.S. Nuclear Regulatory Commission from the California Energy Commission regarding, the "Supplement to the U.S. Department of Energy's Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Waste at Yucca Mountain, Nye County, Nevada" (Docket ID: NRC-2015-0051). NRC Accession Number ML15344A101.
8 *Assessment of California's Nuclear Power Plants: AB 1632 Report,* Commission Report, CEC-100-2008-009-CMF, Published November 2008. Retrieved from http://www.energy.ca.gov/ab1632/. Assembly Bill 361 (Blakeslee, Statutes of 2006, Chapter 722). Retrieved from http://www.energy.ca.gov/ab1632/.
9 PG&E News Release, "In Step With California's Evolving Energy Policy, PG&E, Labor and Environmental Groups Announce Proposal to Increase Energy Efficiency, Renewables and Storage While Phasing Out Nuclear Power Over the Next Decade." June 21, 2016. Retrieved from http://www.pge.com/en/about/newsroom/newsdetails/index.page?title=20160621_in_step_with_californias_evolving_energy_policy_pge_labor_and_environmental_groups_announce_proposal_to_increase_energy_efficiency_renewables_and_storage_while_phasing_out_nuclear_power_over_the_next_decade.
10 California Energy Commission, *2005 Integrated Energy Policy Report*, published November 2005, CEC-100-2005-007-CMF. Retrieved from http://www.energy.ca.gov/2005_energypolicy/.

> According to the California Seismic Safety Commission staff, there is a risk of a major earthquake in California on the order of 2 to 3 percent per year. According to the 2007 Working Group on Earthquake Probabilities, California faces a 99.7 percent chance of a magnitude 6.7 or larger earthquake during the next 30 years. The likelihood of an even more powerful quake of magnitude 7.5 or greater in the next 30 years is 46 percent.

The AB 1632 report identified Diablo Canyon's proximity to multiple fault zones as a significant seismic vulnerability.[11] Furthermore, the available seismic and geological data concerning the region encompassing San Onofre indicated that the site could experience larger and more frequent temblors than anticipated when the plant was designed.[12] The AB 1632 report further explained that secondary seismic hazards such as landslides and tsunamis could affect facilities and emergency response. Even if an earthquake did not exceed the design basis, the effect upon support systems, structures, and components could pose a direct risk of injury and loss of life to plant workers and occupants, resulting in indirect hazards to the public.

The California Coastal Commission has also performed seismic reviews of both Diablo Canyon and San Onofre, recently focusing on the licensing of the onsite ISFSI structures.[13] Moreover, the California Public Utilities Commission (CPUC) is involved in the seismic assessment of Diablo Canyon through the Independent Peer Review Panel (IPRP), required by California law to conduct an independent review of enhanced seismic studies and surveys of Diablo Canyon Units 1 and 2, including the surrounding areas of the reactor site and areas of nuclear waste storage.[14] Furthermore, the California Office of Emergency Services, Highway Patrol, and Energy Commission are involved in the Western Governors' Association (WGA) Waste Isolation Pilot Plant Transportation (WIPP) Technical Advisory Group.[15] In cooperation with the DOE and WGA these three California agencies coordinate the transport of high-level radioactive waste through the state en route to the WIPP facility.

The Energy Commission made policy recommendations addressing facility vulnerabilities in the *2008 IEPR Update* that were incorporated in subsequent *IEPRs*.[16] Since adoption of the AB 1632 report guidelines, the Energy Commission has led in assessing the local costs, impacts, and

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11 MRW & Associates, Inc. *AB 1632 Assessment of California's Operating Nuclear Plants*, final consultant report, CEC-100-2008-005-F, Published October 2008. Retrieved from http://www.energy.ca.gov/ab1632/.
12 SCE, 2001, *San Onofre Nuclear Generating Station Units 2 and 3 Seismic Hazard Study of Postulated Blind Thrust Faults*, prepared by Geomatrix Consultants, GeoPentech, and Southern California Edison for the Nuclear Regulatory Commission, 26 December 2001, 165 pp.
13 California Coastal Commission. *Construction of SONGS Units 2 and 3 Temporary Spent Nuclear Fuel Facility*. San Diego. February 28, 2001a. Retrieved from http://www.coastal.ca.gov/energy/E-00-014-3mmi.pdf. California Coastal Commission Appeal Staff. *De Novo Review of A-3-SLO-04-035: Diablo Canyon ISFSI Application*. San Luis Obispo. November 23, 2004. Retrieved from http://www.coastal.ca.gov/energy/W11a-12-2004.pdf. California Coastal Commission. *Application No. 9-15-0228 (Southern California Edison Co., San Diego Co.)*. Long Beach. October 6, 2015. Retrieved from http://www.coastal.ca.gov/meetings/mtg-mm15-10.html.
14 Assembly Bill 361 (Achadjian, Chapter 399, Statutes of 2015). Retrieved from https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB361.
15 Western Governors' Association WIPP Transportation Safety Program reference Web page: http://www.westgov.org/initiatives/102-articles/initiatives/226-wga-wipp-program-implementation-guide
16 California Energy Commission, *2008 Integrated Energy Policy Report Update,* published November 2008, CEC-100-2008-008-CMF. Retrieved from http://www.energy.ca.gov/2008_energypolicy/.

policy issues associated with California's active and decommissioning nuclear power plants along the state's seismically vulnerable coastline. The Energy Commission has taken a particular interest in federal activities related to plant decommissioning, specifically focusing on issues related to the long-term storage of SNF and high-level waste on site.[17] The Energy Commission expressed support in the *2015 IEPR* for the legislation co-sponsored by U.S. Senator Dianne Feinstein (D-Calif.) to establish a Nuclear Waste Administration, a consent-based siting process for repositories and storage facilities, and a pilot program for interim spent fuel storage as identified in the Nuclear Waste Administration Act of 2015.[18] In support of the *2015 IEPR* nuclear recommendations, Energy Commission senior staff attended recent federal meetings on power reactor decommissioning and consolidated nuclear waste management. In a recent meeting before the NRC commissioners,[19] I presented issues pertinent to California in addition to submitting formal comments to the *Federal Register* on power reactor decommissioning rulemaking.[20] Moreover, I provided the keynote speech at the DOE Consent Based Siting public meeting held April 26, 2016, in Sacramento, California. This meeting was followed by Executive Director Robert Oglesby presenting at the San Onfore Community Engagement Panel June 22, 2016, meeting on Consolidated Interim Storage.[21]

(1) How can the Department of Energy ensure that the process for selecting a site is fair?

Consent-based siting (CBS) seeks to ensure fairness in the distribution of costs, benefits, risks, and responsibilities now and in future generations. How, in your view, can fairness be best assured by the process for selecting a site?

Achieving and ensuring "fairness" in the siting of a nuclear waste repository requires a commitment to a transparent process of informed consent. Informed consent is achieved only when the affected entities acquire the requisite depth of knowledge and understanding of the constraints and consequences of the proposed plan and processes. To engage in an equitable and virtuous agreement, the negotiation requires engagement of the right entities while ensuring the appropriate support and education during a transparent process. Before any binding agreement is formed, the affected community must clearly understand the nature and consequences of the generational agreement to which they are committing.

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17 Letter to Secretary of U.S. Nuclear Regulatory Commission from the California Energy Commission regarding, San Onofre Nuclear Generating Station (SONGS) – License Amendments Regarding the Revision to Emergency Plan and Emergency Action Levels (TAC Nos. MF3838 through MF3843). NRC Accession Number ML15135A304.

18 Senate Coalition Introduces Comprehensive Nuclear Waste Legislation, March 24, 2015. Retrieved from http://www.feinstein.senate.gov/public/index.cfm/press-releases?ID=472C5FD2-3A9A-41F2-B0DB-CF6F9C9570C4.

19 Power Reactor Decommissioning Rulemaking public meeting March 15, 2016, http://www.nrc.gov/reading-rm/doc-collections/commission/tr/2016/.

20 Letter to Secretary of U.S. Nuclear Regulatory Commission from the California Energy Commission regarding the "Amended Comment on the Draft Regulatory Basis: Regulatory Improvements for Power Reactors Transitioning to Decommissioning" (Docket ID: NRC-2015-0070). NRC Accession Number ML 16092A238.

21 San Onofre Community Engagement Panel Meeting on Consolidated Interim Storage. June 22, 2016. Information available at https://www.songscommunity.com/cep-events/062216_event.asp.

The *Blue Ribbon Commission on America's Nuclear Future Report to the Secretary of Energy* (BRC) provides a foundation for developing this process.[22] As mentioned in the BRC, the ethical arguments made in the siting process must be grounded in the principle of intergenerational equity. To achieve true fairness, the agreement should favor the stewards of the nation's nuclear waste over the producers since it will be the stewards who carry the primary risks, burdens, and responsibilities for generations to come. The BRC recommends a process that is consent-based, transparent, phased, adaptive, founded on sound scientific principles, and governed by partnership arrangements.

The degree of regional versus federal oversight must be fairly balanced. Stewardship and custodial responsibility must be jointly shared during development, construction, and long-term storage. Roles and responsibilities must be defined in a way such that considerations of fairness and equity are explicit and effectively support an intergenerational process. As recommended by the BRC, the affected entities should retain—or where appropriate, be delegated—direct authority over aspects of regulation, permitting, and operations where oversight below the federal level can be exercised effectively and in a way that helps protect the interests and gains the confidence of affected communities and citizens. Stakeholders must have a meaningful role in the development of testing protocols, selection of test facilities, and selection of personnel.

History has shown that successful siting decisions are more likely to occur if preceded by a complex, extended set of negotiations between the implementing organization and the affected entities. In support of this process, state-appointed experts can serve and represent the public as part of an independent advisory panel that can provide an impartial perspective. A 2014 report by Sandia National Laboratories points out that a defined method of public participation was critical in the successful siting of nuclear waste facilities in Finland, France, and Sweden.[23] The success of the public's inclusion in the socially onerous waste facility siting illustrates the benefits of a defined method of public participation. Inclusion is essential in building public trust and support for any nuclear program.

Fairness requires that issues of intergenerational equity be considered in developing this process. Respected academics and professionals in sociology, economics, history, and science have extensively published on intergenerational equity and are a valuable resource that must be consulted. The DOE must identify and include intergenerational equity in the siting process and the long-term waste management program to achieve fairness over the facility life cycle.

(2) What models and experience should the Department of Energy use in designing the process?

22 *Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy,* January 2012. Retrieved from http://energy.gov/ne/downloads/blue-ribboncommission-americas-nuclear-future-reportsecretary-energy.

23 Price, Laura, Rob Rechard. *Progress in Siting Nuclear Waste Facilities: Fuel Cycle Research & Development*, Sandia National Laboratories, Sept. 2014, FCRD-NFST-2014-000628, SAND2014-18223R.

The challenges and opportunities of site selection drive us to continue to learn from previous or ongoing examples. From your perspective, what experience and models do you think are the most relevant to consider and draw from in designing the process for selecting a site?

Finland, Sweden, and Canada are examples of international models well advanced of the United States' status. Moreover the BRC report provides a U.S. focused perspective on this process. The BRC report contains 113 pages of collected insight and associated references that can serve as a foundation in developing this process. Furthermore, there are successful models of American communities engaging in the oversight and management of nuclear waste: the Tennessee Local Oversight Committee and the Waste Isolation Pilot Plant in New Mexico. Moreover, the DOE should review a broad spectrum of both successful and failed contentious U.S. siting examples. Contentious siting examples from the nation's 50 states offer direct, relevant U.S. specific experience, insight, and perspectives that the international examples lack. The National Academies' 2003 *One Step at a Time* report identified seven key attributes of adaptive staging that could be modified or incorporated into the development process. One consideration that the federal government should review is a national education program. A national program based upon expansion of models successfully used by foreign governments could be used to trigger national interest while disseminating essential information.

The responsible agencies will be required to develop a system that distributes and/or communicates complex legal and scientific information in an understandable framework for public review. Federal agencies must develop an approach that maintains the highest levels of integrity and trust. The international examples indicate that establishing a relationship based upon trust is essential in developing a successful process. Trust in the quality and impartiality of information is critical in informing the public. Similar to the scientific peer review process, information should be vetted by an open quality-control process that allows all resources and associated sources to be scrutinized and critiqued by accepted experts. Furthermore, to maintain transparency and the public trust, this critique must be available for public review.

(3) Who should be involved in the process for selecting a site, and what is their role?

The Department believes that there may be a wide range of communities who will want to learn more and be involved in selecting a site. Participation in the process for selecting a site carries important responsibilities. What are your views on who should be involved and the roles participants should have?

Early coordination, inclusion, and effective communication with state, tribal, and local governments will be essential to the success of any nuclear program. Moreover, early engagement of impacted communities is critical in developing a successful and supportive relationship. In the early stages, those entities include directly affected tribal, local, and state government. Section 6.6 of the BRC provides a synopsis of the role of the various entities in the consent-based process. As the process starts to develop, communities affected by the potential transport routes will need to be informed and included in the process. Inclusion is especially important for nearby communities that will bear the heaviest shipment traffic and any risk of downstream contamination. Where environmental justice communities will be impacted,

additional measures should be implemented to collaborate with community partners to ensure these vulnerable populations are engaged, informed, and included in the process.

However, the BRC recommendations do not provide a clear role for state government. The CBS process should require early and frequent consultation with governors of potential host states. These consultations should be coupled with public hearings before selecting a site for developing a storage facility and for characterizing a repository. A written consent agreement with the Governor or authorized official of the State and supported by the Legislature, in addition to local and tribal governments, would be required upon a final determination of site suitability but before submission of a license application to the U.S. Nuclear Regulatory Commission. Western Governors believe that the safe and uneventful transport of radioactive materials and spent nuclear fuel must be paramount in all federal policies regarding such transportation.[24] Consequently, state inclusion should consist of the host state governor, affected units of local government (including contiguous counties impacted by transportation), state agencies that have oversight or regulatory authority, and any affected Indian tribe.

As recommended by the BRC, the CBS program should provide a statutory basis for binding agreements between the DOE or managing agency and state, local and tribal governments that consent to a storage or disposal facility. Engagement of state and local government will be a key component as evidenced by recent activity in California. The State Legislature[25, 26], Congressional representative[27], and multiple local City Councils[28] have requested that the federal government let the proposed interim storage sites collect radioactive waste held near populated areas at the retired San Onofre Nuclear Generating Station.

(4) What information and resources do you think would facilitate your participation?

The Department of Energy is committed to ensuring that people and communities have sufficient information and access to resources for engaging fully and effectively in siting. What information and resources would be essential to enable you to learn the most about and participate in the siting process?

The initial information, resources, and level of support should mirror the potential degree of viability of the site and public interest. Information can be easily disseminated through a well-developed website, providing supporting documentation that covers both the pro and con

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24 Western Governors' Association Policy Resolution 2016-03, *Transportation of Radioactive Waste, Radioactive Materials, and Spent Nuclear Fuel,* December 4, 2015. Retrieved from http://westgov.org/policies/307-other/1078-transportation-of-radioactive-waste-radioactive-materials-and-spent-nuclear-fuel
25 SJR 23 (Bates, Res. Ch. 76, Statutes of 2016). Retrieved from http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SJR23.
26 AJR 29 (Chávez, 2016). Retrieved from http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AJR29
27 Sforza, T. (April 4, 2016). San Onofre should have a say in 'consent' nuclear waste disposal, Rep. Issa says. *The Orange County Register*. Retrieved from http://www.ocregister.com/taxdollars/nuclear-710796-department-waste.html.
28 Swegles, F. (February 7, 2016). City backs bill to move San Onofre waste.*The Orange County Register*. Retrieved from http://www.ocregister.com/articles/nuclear-702940-fuel-storage.html.

arguments. Resources should be allocated only for those potential sites that meet the first muster. Moreover, the possibility of profiteering should be addressed in some form to avoid the misuse of funds. As evidenced by the Swedish process, some level of early support may be required and ultimately beneficial in fostering active participation.[29] Initial levels of support should be provided for interested communities to progress through preliminary stages in the siting process. The DOE will need to develop the appropriate tools and resources to support early engagement and to assist the public—including individuals, stakeholders, or members of organizations—with meaningful participation in the programs and proceedings. At the minimum, the DOE needs to develop support resources comparable to those used by the Energy Commission Siting Division.[30] As the process develops, the amount of information, education, and support should scale appropriately.

California hosts four independent spent fuel storage installations (ISFSI) at three decommissioning and one operating site. The appropriate state agencies will be engaged in this process and expect the DOE to coordinate and communicate effectively with state, tribal, and local governments. Some means of direct, reciprocal communication between federal and state agencies must be established early in this process to best support the safe and uneventful transport and storage of radioactive materials and SNF. By implementing best practice methods, federal agencies working with states, affected stakeholders, and industry will need to design a coordinated system.

A clearly defined and vetted justification of national purposes is essential in consent-based siting—the subject of this initiative and recommended by the BRC. Siting a facility or even identifying potential sites triggers and sets a destination for SNF transport and is a critical, substantial determinant of potential transportation routes and associated impacts. To reduce transportation impacts at both the origin site and along the adjacent route segments, DOE must coordinate its activities with state agencies to achieve effective and efficient removal. To achieve the best possible outcome, Congress or the DOE will need to address explicitly the current deficiencies in communication and collaboration.

(5) What else should be considered?

The questions posed in this document are a starting point for discussion on the design of the process for consent-based siting of nuclear waste facilities, the Department of Energy would like to hear about and discuss any related questions, issues, and ideas that you think are important.

Lessons Learned from Yucca Mountain

29 Swedish Radiation Safety Authority – Spent Nuclear Fuel Repository: Review Process. Retrieved from http://www.stralsakerhetsmyndigheten.se/In-English/About-the-Swedish-Radiation-Safety-Authority1/Spent-nuclear-fuel-repository/Review-Process/. & Ulf Rossegger, Programme elements of Swedish nuclear waste management – implementing with what results? Energetika. 2014. T. 60. Nr. 1. P. 54–68. Retrieved from https://www.entria.de/uploads/tx_tkpublikationen/Rossegger_Programme_elements_of_Swedish_nuclear_waste_management.pdf.

30 Califonria Energy Commission - *Public Participation in the Siting Process: Practice and Procedure Guide,* Publication Number: CEC-700-2006-002. Retrieved from http://www.energy.ca.gov/2006publications/CEC-700-2006-002/CEC-700-2006-002.PDF.

DOE must avoid the mistakes made during the Yucca Mountain proceedings. Three key issues that the federal agencies must avoid are (1) losing technical and scientific credibility, (2) underestimating or ignoring the transportation impacts, and (3) failing to achieve stakeholder confidence. Public fear of nuclear materials and radiation coupled with a distrust of the federal government create a significant barrier to nuclear siting. Successful design and implementation of a CBS process will be defined by the perceived nature of the initial federal efforts. Early failures or stumbles will only justify and reinforce negative bias. It is critical that the early stages of the process be founded in integrity and transparency so that federal CBS activities are perceived as fair and balanced.

The politicized selection of Yucca Mountain failed to consider the implications of the number of shipments, the distance, or the impact to corridor communities. The Yucca Mountain EIS did not directly identify affected corridor communities along the considered routes,[31] or the homes, schools, hospitals, or community centers located along the routes. Furthermore, the Yucca EIS failed to identify other forms of traffic on or crossing the routes and the characteristics of the community that might affect the residents' responses to the prospect of 25 years of SNF transport. All future sites should be assessed in full and in comparison to avoid similar failures and with a focus on avoidance, mitigation, and management of all transportation impacts. CBS program development will require the DOE to transparently communicate impacts and risks, both to host and transportation stakeholders, in a method that supports and promotes risk reduction and impact management.

Law of the Land and Congressional Variance

Consent is not the law of the land, nor is a consent-based approach traditional practice for the federal government. Generally, consent is not asked or given, as evidenced by the Yucca Mountain contentions. Moreover, Congress or the DOE must address questions on whether consent is actually possible and to what extent any agreement is valid if a new administration, with congressional support, can rewrite the terms. Federal funding, contracts, and agreements can be altered. Laws can be changed, as evidenced by the Nuclear Waste Policy Act amendments of 1987. There is still significant uncertainty on how to protect a process and program that is longer than any term of office or human lifespan.

Transportation and Site Coordination Considerations

The siting of interim storage facilities and the siting of permanent repositories are only two heads of the nuclear waste hydra. Significant lead time is required to develop and establish the required processes for any significant shipping campaign. It could be argued that informed consent has not been given if the host and adjacent communities are not fully informed of the associated transport logistics and risks. Furthermore, communities along transportation corridors must be informed and prepared. Coupling the development of the waste transportation issues to consent-based siting might be the proper method and should be reviewed. Since the location of all stored waste is known and two possible interim sites have been identified, development and planning of the various elements of the transportation campaign should begin in earnest.

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31 Subsequent assessment by Fred Dilger identified 891 directly affected corridor communities: 100 in the Northeast, 298 in the South, 353 in the Midwest, and 140 in the West.

Federal agencies should make an effort to review and take advantage of the work and knowledge found in many of the state collaborative efforts such as the Western Governors' Association and Western Interstate Energy Board.[32] It has been estimated that advanced planning time frames on the order of a decade would be required to develop a coordinated transport strategy and the associated logistics and physical infrastructure.[33] Defining priority shipping factors and developing a shipping schedule are likely to become contentious issues. Furthermore, older decommissioning facilities and stranded ISFSIs have less direct management oversight, security, and regulatory monitoring than operating facilities; consequently, they represent a unique risk profile that must be addressed. Identification of shipment priority should begin early in this process. Moreover, early identification provides the essential lead time required to develop the transportation procedures, routes, policies, and supporting state and local infrastructure.

As recommended by the National Academies of Science report on the safe transport of SNF, it is important that the DOE begin identifying and prioritizing sites so that an initial shipment schedule can be developed.[34] A first step in this process is engaging with impacted communities. California communities near decommissioning sites desire the rapid development of a storage facility to remove waste from decommissioning sites. Shipment priority and scheduling should be based upon a risk assessment with older decommissioning facilities slotted into the first tier, followed by operating sites. Planning and preparations for shipments from at risk decommissioning sites, such as San Onofre, Rancho Seco, and Humboldt Bay, should be given priority, as a recommended in the *IEPR*.[35] ISFSIs in regions exposed to seismic or weather events should be first on the list. In support of early planning, the DOE must recognize that transportation impacts require a fuller assessment than what was performed for the *2008 Environmental Impact Assessment for the Yucca Mountain Project*. Program design must avoid impacts when possible and mitigate when impacts cannot be avoided.

The safe, uneventful transport of radioactive materials and spent nuclear fuel must be paramount in all federal policies regarding such transportation and with regard to all transportation modes, including truck and railway. In a 2014 report, the State of California Interagency Rail Safety Working Group outlined serious vulnerabilities along rail lines such as close proximity to population centers, earthquake faults, lack of adequate emergency response capacity, natural resources, and a number of "high hazard areas" for derailments, generally located near

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32 Niles, Ken, and Rick Moore, "The WIPP Transportation Program at 10 Years: Making the Case for Above-Regulatory Procedures," Waste Management Symposium, March 2009, at p. 4 (available at http://www.brc.gov/sites/default/files/comments/attachments/above-regulatory_transport.pdf).
33 Presentation of Lisa Janairo, Midwest Council of State Governments, to the BRC Transportation and Storage Subcommittee, Nov. 2, 2010 (accessible at http://www.brc.gov/index.php?q=meeting/open-meeting-3).
34 Transportation Research Board and National Research Council. *Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States*. Washington, DC: The National Academies Press, 2006. doi:10.17226/11538.
35 California Energy Commission. *2015 Integrated Energy Policy Report*, February 2016, Publication Number: CEC-100-2015-001-CMF. Retrieved from http://www.energy.ca.gov/2015_energypolicy/index.html.

waterways and fragile natural resources.[36] A Natural Resources Defense Council fact sheet on crude by rail in California identifies how more than 3.8 million people live within 1 mile of proposed routes.[37] In support of the safe and uneventful transport of material, DOE must continue to provide sufficient and timely in-kind, financial, technical, and other appropriate assistance to communities through whose jurisdiction waste will be transported for planning, developing, and implementing a transportation safety program. The Western Governors' Association believes it is the responsibility of the generators of spent nuclear fuel and high-level radioactive waste and the federal government, not the states and tribes, to pay for all costs associated with assuring safe transportation, responding effectively to accidents and emergencies that may occur, and otherwise assuring public health and safety.[38] This includes costs associated with evaluating routes and inspecting and escorting shipments.

A critical condition for program acceptance and consent is confidence among representatives of affected states, entities, and prospective corridor communities in the system, components, security, and processes. Origin site coordination will require extensive lead time and early inclusion of state agencies and affected parties will be critical in route preparation, scheduling, planning, and deployment. To obtain the appropriate level of program buy in, confidence must be developed by engaging with representatives of the affected parties in a process involving a comprehensive program evaluation. Confidence in a broader program for route preparation, transport processes, and removal priorities requires a central role for affected states.

National Education and Communication Program

Broadening the process to include affected adjacent communities will be critical in choosing a final site. Engagement of "potentially" impacted communities may need to begin at some period before the license application and should not occur after license approval. As the license approaches approval, communication with the transportation corridor communities will be necessary. A possible solution could include a national education and communication program that consists of reputable scientific literature, video programs consisting of independent reports, and panel debates or discussions that present all sides of the issue. Furthermore, this will require a comprehensive approach to communicate the technical and scientific issues with multilingual communities. To this end, impacted communities should be consulted for input on the most effective educational and communication models for their community. Any program will need to support multiple languages and cover a broad spectrum of background knowledge. To maintain the integrity of the process the federal government must engage in a transparent inclusive approach.

Adverse Economic and Social Impacts

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36 *State of California Interagency Rail Safety Working Group, Oil by Rail Safety in California: Preliminary Findings and Recommendations*, June 10, 2014.
http://sd27.senate.ca.gov/sites/sd27.senate.ca.gov/files/Oil%20By%20Rail%20Safety%20in%20California.pdf.
37 Natural Resources Defense Council, California Crude Oil by Rail Fact Sheet, June 2014;
https://www.nrdc.org/sites/default/files/ca-crude-oil-by-rail-FS.pdf.
38 Western Governors' Association Policy Resolution 2016-03, reference 22.

Adverse economic and social impacts are potentially as important as health and safety issues; special government efforts, possibly advisory groups, will be needed to manage social and economic impacts before and during shipments.[28] The DOE or a sibling agency needs to assess and consider the social and economic risks and associated consequences a minor shipping incident would have on both short- and long-term efforts. Moreover, federal agencies need to identify what level of an incident is the predicted threshold for a community-triggered backlash and the eventual derailing of the entire process due to civilian opposition. Recent developments and research in social risks need to be considered due to the size and scope of this process. Potential economic benefits should also be assessed and considered for impacted communities. Advisory groups should also identify environmental equity efforts to ensure that workforce development and training opportunities for local communities are included in a selection process.

Because of the intergenerational nature of a permanent repository, the fair treatment defined in statute and code may be insufficient, requiring federal agencies to expand environmental justice legislation to protect those individuals or communities most likely to disproportionately bear the burdens imposed by a nuclear waste repository. Efforts to effectively address fairness and equity in the CBS program will require partnership, coordination, and support. In efforts to pool all available knowledge of the impacted community and bring it into the process, a dedicated environmental justice advisory team may be needed to focus outreach on local, affected members, and stakeholders with a background and understanding of the community.[39]

Binding Agreement

The DOE should review the BRC recommendation on when to define a binding agreement. The BRC recommends that the right to opt out expires at the point of license application. The DOE should consider the cost and consequences of pushing the binding aspect of the agreement back to some period between license approval and site construction. The license review and approval process will provide more information and insight and, hence, lead to a greater degree of informed consent.

(*) Additional comments?

Any additional comments that do not address a particular question should be included at the end of your response to this IPC as ''Additional Comments.''

Successful endeavors require collaboration. Therefore, developing public trust is essential in the successful conclusion of all programs involving nuclear issues. The foundation of public trust and support in a new relationship may be achieved through early engagement in the Nuclear Regulatory Commission's efforts to develop new rules for decommissioning nuclear power reactors. A positive working relationship founded on respect and trust can be developed through federal agencies implementing changes to power reactor decommissioning processes that support state and local roles. While the concerns and procedures for siting a waste repository are distinct

39 California Energy Commission Public Advisers Office. Environmental Justice Resources. Retrieved from http://www.energy.ca.gov/public_adviser/environmental_justice_faq.html.

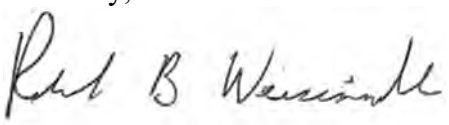
from developing power reactor decommissioning rulemaking, the successful inclusion of the public in the decommissioning process provides a defined method of public participation. Two relevant decommissioning recommendations that may be directly applicable to the CBS process are:

1. Formation of a citizen's advisory/oversight board composed of state and local government representatives, community representatives, and affected stakeholders that are engaged at the earliest stages of the process as essential in developing a consent-based, adaptive, staged process intended to maintain the public trust and support.
2. Expansion and enhancement of the current role of the States, the public, and other stakeholders in the CBS process.

The foundation of public trust developed in the inclusive NRC decommissioning process can then be rolled into the more socially onerous waste facility siting process. Success in the NRC decommissioning rulemaking adds value to the CBS process in the form of increased public support and confidence. A CBS process that communities and stakeholders nationwide find legitimate, effective, trustworthy, and practical will require careful reflection and attention to procedures in developing and implementing core principles of consent and addressing challenges that can undermine them.

We appreciate the opportunity to comment on the design of a consent-based siting process and request that you consider these comments before developing an integrated waste management system to transport, store, and dispose of commercial spent nuclear fuel and high-level radioactive waste. Please send any future notices, correspondence, and documents related to these comments to Justin Cochran, Ph.D., Senior Nuclear Policy Advisor, California Energy Commission, MS-36, 1516 Ninth Street, Sacramento, CA, 95814-5512, or via email at Justin.Cochran@energy.ca.gov.

Sincerely,



ROBERT B. WEISENMILLER
Chair and State Liaison Officer to NRC

cc:
Robert P. Oglesby, Executive Director, California Energy Commission
Justin Cochran, Senior Nuclear Policy Advisor, California Energy Commission

Consent-Based Siting

From: Cole, Kent [mailto:kcole@nacintl.com]
Sent: Friday, July 29, 2016 5:44 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: NAC International Response on Consent Based Siting

Dear Sir / Madam:

Please find attached a letter from NAC International with comments on the consent based siting process and responses to the questions posed by DOE. We appreciate the opportunity to offer comments.

Best regards,
Kent Cole
President & CEO
NAC International, Inc.
(o) +1 678-328-1311
(c) +1 404-353-0556
kcole@nacintl.com<mailto:kcole@nacintl.com

NAC INTERNATIONAL

Atlanta Corporate Headquarters
3930 East Jones Bridge Road
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770-447-1144 www.nacintl.com
FAX 770-447-1797

To: consentbasedsiting@hq.doe.gov
From: NAC International
Subject: Consent Based Siting Process Feedback

Dear Sir/Madam:

NAC International Inc. (NAC) is a leading nuclear fuel cycle consulting and technology company with key technical capabilities in nuclear fuel transportation and storage. As such, we have followed the Department of Energy's nuclear waste management efforts with significant interest. NAC was previously awarded a contract to design and license one of the transportation aging and disposal canister designs that DOE sought for integrating spent fuel storage when the Yucca Mountain Program was still active. NAC has also supplied spent fuel storage systems to nuclear facilities throughout the U.S., including five (5) sites with decommissioned nuclear power plants. New efforts by DOE to develop consolidated storage capability through a consent based siting process have also attracted our interest.

DOE posed questions through its Notice Of Invitation For Public Comment (IPC) published in the Federal Register Notice on December 23, 2015 with the acceptance of comments extended to a July 31, 2016 deadline stated on DOE's Nuclear Energy Website. NAC's response to these questions is attached to this letter.

The IPC posed five questions centered on a public approach to site development. That is a very constrained approach to used fuel management, and may not provide the best options for moving forward. The stated goals in DOE's consent based siting process can also be met through private/public partnerships that are developed outside of DOE's outreach efforts. These private/public partnerships can deliver the same level of the consent of the fully public process, with the added benefit of strong private sector project management for implementation. This combination of private and public interests offers meaningful cost and schedule benefits for the federal government and should not be excluded from the Department's contracting considerations. We have answered the questions posed in the Federal Register Notice, but our answers are groomed to accommodate the private/public partnership approach that was not part of DOE's initial outreach efforts.

We hope you consider these comments in the spirit of our combined national interests to manage used nuclear fuel efficiently as well as safely.

Sincerely,

Kent Cole

Kent Cole, CEO and President
NAC International

NAC International Inc.
Response to DOE Consent Based Siting Questions

1. **How can the Department ensure that the process for selecting a site is fair?**

One key element of an appropriate site selection is to ensure the process and selection criteria are adaptable and flexible to the purpose of the site. For instance, a process for the selection of an interim storage site may be very different from the process used to select a permanent disposal site, especially where the latter requires extraordinary geologic characteristics and permanency. Also, interim storage facilities are functioning safely and securely at 61 operating nuclear power plant sites and at 11 sites with decommissioned nuclear power plants. Thus, interim storage has a defined technology baseline that has been licensed and proven under nationally applicable regulations. On the other hand, a U.S. repository has not yet been licensed and while the engineering principles and safeguards for Yucca Mountain appear sound, the technology has not yet been deployed. A new repository site (with different geology) will require new licensing regulations, significant characterization and a repository design that is not yet known. This future work, the technology and regulatory unknowns translate into a process of informed consent that is lengthy and iterative. Certainly, a site selection process (steps, durations, iterations, funding) would differ significantly based on factors such as these.

Of course, fairness is a vital criteria in constructing a selection process, but of equal import is a process that is effective (leads to selection of best site), straight forward and an efficient use of taxpayer money.

Today there are communities that have teamed with members of private industry that are interested in hosting an interim storage site. These industry/community partnerships have local support and are developing state and Congressional support with the goal of the industry partner entering into a contract with the federal government to store spent fuel.

The DOE should work directly with these interested community/industry partners, to potentially shorten the site selection process thereby saving millions of taxpayer dollars and moving a step closer to solving a long-time national problem.

The DOE should begin by clearly and comprehensively articulating its expectations regarding the role that consolidated interim storage will play in an integrated spent fuel and waste management program, so that communities and states are able to fully and appropriately assess the costs and benefits of that program for their citizens. DOE should also seek legislative authority, as appropriate, to secure the legal framework that would allow for private sector engagement in the full development of a CIS project.

The Department should then encourage competition and ultimately select a site (or sites) for a CIS project based on economic benefit, quality, schedule, community support and safety among other factors. In pursuit of "fairness", the Department should not attempt to bias the site selection process with factors other than the ones formally identified in the selection process.

In constructing evaluation criteria, DOE should recognize the benefit of sites in or near communities that already manage or process radioactive materials and/or wastes. Populations

surrounding these sites are more informed about the risks and benefits of such work and are less likely to experience radical changes in their level of support over time. Selecting such a site would not add appreciably to community costs or risk because similar work is already being done nearby.

The Department has acquisition procedures that enable it to conduct a Sources Sought inquiry to determine if an adequate number of interested and qualified bidders (communities/sites/consortiums) exist to conduct a competition. We encourage the Department to promptly utilize this tool to assess the competitive landscape.

2. What models and experience should the Department use in designing the process?

A "one size fits all" approach to consent based siting will not be successful. It needs to be flexible and adaptable. Each state, tribal government and local community should be allowed to define what consent means to them and how that consent is expressed. The federal government's definition must be broad enough to allow for the individual preferences of the consenting community. The real challenge may be in blending the consent based process with the technical, schedule and cost selection criteria that will guide the federal contracting process. Developing these contract selection criteria in advance so they can be shared with prospective host communities and private/public partnerships would be very beneficial. These contracting criteria may speed decisions on whether to participate in the selection process or not. Given the significant costs associated with not taking used fuel from power plants (especially shutdown sites), accelerated development of consolidated storage capability should be a primary consideration.

3. Who should be involved in the process for selecting a site, and what is their role?

A successful siting process for anything begins with a local community. If a local community has decided to move forward as a host site then the county and ultimately the state must be supportive.

The process will be different in each state and community according to their own laws, customs, and governance relationships.

Once local, county and state support is assured, the remaining selection decisions reside in Washington, and they include:

- a license from the NRC, with whom we are in active pre-application discussions;
- a clear statement of authority that allows the DOE to contract with private companies as well as public entities to store spent fuel. Legal access to the Nuclear Waste Fund to pay for these contracts; and
- the active engagement of the DOE to take advantage of the progress others have made to garner consent for a site to conduct the storage mission.

4. What information and resources do you think would facilitate your participation?

Any community or private/public partnership considering participation needs to understand the DOE's concept of the facility scope of operations, duration of licensure, and the construct and frequency of shipments to the site. The Department should actively pursue Congressional support through budget requests that can be supported within the confines of the existing NWPA as outlined by the Blue Ribbon Commission. In addition, DOE should advocate for maximum flexibility in contracting options to store nuclear wastes at an interim storage facility.

5. What else should be considered?

Time is of the essence.

The federal government's financial responsibility for continued storage of UNF at nuclear power plants is expanding rapidly. That rapid liability expansion is being driven by the unexpected early closure of large numbers of nuclear power plants. This new market trend brings new urgency for addressing the spent nuclear fuel management problem with consolidated storage. In order to benefit from the schedule and cost advantages offered by the industry/community partnerships the DOE must be prepared to advance its contracting schedules to minimize the government's life cycle costs for used fuel management. The monies in the Nuclear waste Fund come with an obligation to manage them efficiently. Meeting that obligation requires a more aggressive used fuel management contracting approach than DOE has considered previously. If these industry/community partnerships come to the point of a construction decision and the DOE and Congress have made no progress toward resolving the questions of contracting and funding, the private/public partnership efforts will come to a halt. That outcome will cost the federal government an opportunity to make substantial progress on its spent fuel management program and dramatically cut the flow of taxpayer monies to contract holders from the judgment fund. DOE could pursue more than one consolidated storage facility and thereby allow continued engagement with public groups in parallel with accelerated private/public partnerships that are able to proceed expeditiously to site and operate a pilot consolidated storage facility for taking fuel from the multiple "stranded" sites around the country.

COMMENTS
ON BEHALF OF ENERGY COMMUNITIES ALLIANCE

SUBMITTED TO THE

U.S. DEPARTMENT OF ENERGY
ON

INVITATION FOR PUBLIC COMMENT TO INFORM THE DESIGN OF A CONSENT-BASED SITING PROCESS

JULY 29, 2016

Submitter's Name/Affiliation: Energy Communities Alliance
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GENERAL COMMENTS ON THE CONSENT-BASED SITING EFFORT AND ECA RECOMMENDATIONS

The Energy Communities Alliance (ECA) supports efforts by the federal government to actively address – and prioritize – the management and disposal of legacy high-level waste (HLW) and spent nuclear fuel (SNF). The local governments and communities of ECA, those that are adjacent to or impacted by DOE activities, have long played a key role supporting the country's national security efforts with the understanding that the legacy waste from the Cold War would ultimately be disposed of in a safe and timely manner in a geologic repository. Our local communities are currently the *de facto* storage sites for defense waste as the political stalemate in Congress and the Administration continues.

ECA supports moving ahead with the Yucca Mountain licensing review – not only because it is the law – but the site has been analyzed and studied, billions of taxpayer and ratepayer dollars have been spent, and science should be the basis of decision-making. A parallel consent-based siting approach authorized by Congress may help resolve the current political impasse, avoid incurring billions of taxpayer dollars in projected future liabilities, and allow nuclear waste to be moved out of our communities as safely and expeditiously as possible.

DOE's proposal for a phased, adaptive consent-based siting process that "endorses that prospective host jurisdictions must be recognized as partners" is to be commended for engaging local governments, communities and other impacted stakeholders in waste decisions. ECA supports a consent-based approach that ensures:

- Decisions are based on sound science and meaningful collaboration;
- Interested communities, states and/or tribes volunteer and can work to establish mutually agreeable and binding terms under which they will host a nuclear waste facility;
- There is flexibility, transparency and opportunities throughout the process for public input.

However, the proposal in its current form fails to convey a sense of urgency and specific information that can help potential host communities understand how and when the process will move forward or what resources will be available. More guidance from DOE – such as identifying suitable geologies and geographies – could be provided now without compromising the fairness or inclusiveness of the process.

ECA offers the following overarching recommendations:

1. **Finish the Yucca Mountain licensing review and pass legislation to modify the Nuclear Waste Policy Act (NWPA) and allow alternative sites – including Yucca Mountain – for interim storage or permanent disposal to also be considered.**

2. **Continue working with local governments to identify components for consent.**

3. **Identify the necessary process – including the order that each step should be accomplished – to move a consent-based siting process forward.**

4. **Congress/Administration must provide resources and funding for education, outreach, feasibility studies and research and development aspects for waste management and disposal. In addition, DOE must use this funding to assist local governments and communities interested in hosting sites or involved in waste management and disposal missions to educate the local community and hire independent third party scientists and engineers.**

5. **DOE should develop a list of suitable disposal mediums (salt, granite, etc.) and indicate where they exist to inform potential public interest and feasibility studies.**

6. **A new entity focused solely on HLW/SNF nuclear waste management should be established and empowered to consent on behalf of the federal government.**

7. **DOE should develop an initial list of the type of incentives/compensation for host communities for taking on this mission.**

8. **DOE, the Nuclear Regulatory Commission (NRC) and the Environmental Protection Agency (EPA) should begin to develop scientifically-based health and environmental standards, model state laws and regulations to guide the siting process.**

In addition, ECA recommends that if tangible progress cannot be made in a timely manner**, the federal government should provide funding to the communities that have become *de facto* interim storage sites for both defense high-level nuclear waste as well as commercial spent nuclear fuel to offset the impacts of storing waste beyond the timeframe originally expected.**

ECA greatly appreciates the efforts made by Acting Assistant Secretary John Kotek and his colleagues in DOE's Office of Nuclear Energy to make nuclear waste management a priority and identify a publicly supported path forward. Our members support the federal government's goal to develop a consent-based path forward for the management and disposal of legacy high-level waste and commercial spent nuclear fuel. Local governments, communities and the public must have an opportunity to help shape policy and be formally engaged on any preferred alternative DOE proposes in pursuit of a consent-based siting process.

DOE's current effort has succeeded in creating momentum again around nuclear waste management and disposal. DOE should work with Congress to build support and ensure resources go out to the local governments of potential host communities as soon as possible in order to maintain that momentum. This will allow those that will be most directly impacted to provide education and outreach, determine whether there is support for hosting an interim storage or disposal site and identify the terms under which they will provide consent.

ECA input on the specific questions posed in the Federal Notice follow in Appendix A.

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APPENDIX A: ECA RESPONSES TO QUESTIONS IN THE FEDERAL REGISTER

Founded in 1992, ECA members are the sender and receiver sites for nuclear waste, sites that currently produce or formerly produced defense nuclear waste, sites that store and process defense nuclear waste, and the sites that may potentially host a future interim storage facility, reprocessing facility or geologic repository. Our members have jointly prepared the following input on the five questions outlined in the Federal Register Notice inviting public comment (set forth in bold) on designing a fair and effective consent-based siting process. ECA looks forward to providing any assistance we can as your work continues.

1. How can the Department ensure that the process for selecting a site is fair?

To ensure that a consent-based siting process if viewed as "fair," state, local and tribal government engagement is critical at all steps in the process — beginning with the development of the vision, refining the goals and priorities, and anytime conflicts arise. All parties must take the necessary steps to develop and maintain trust, accountability and transparency.

Trust is paramount and an integral part of fairness. The degradation of trust in DOE has been highlighted since the Blue Ribbon Commission on America's Nuclear Future was announced and throughout DOE's current effort to develop a consent-based siting process. DOE's decision in 2010 to withdraw the Yucca Mountain license application, failure to meet cleanup milestones across the nuclear weapons complex, the effort to terminate the MOX project in South Carolina, each is an example of a decision that negatively impacted public trust that DOE can manage and dispose of nuclear waste or enter into a legally enforceable consent-based siting agreement. Without trust, public acceptance and political support will be difficult to develop and maintain over time.

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In 2009, President Obama issued the Memorandum for the Heads of Executive Departments and Agencies 3-9-09[1] stating:

> "Science and the scientific process must inform and guide decisions of my Administration… The public must be able to trust the science and scientific process informing public policy decisions. Political officials should not suppress or alter scientific or technological findings and conclusions. If scientific and technological information is developed and used by the Federal Government, it should ordinarily be made available to the public. To the extent permitted by law, there should be transparency in the preparation, identification, and use of scientific and technological information in policymaking. The selection of scientists and technology professionals for positions in the executive branch should be based on their scientific and technological knowledge, credentials, experience, and integrity."

DOE should ensure moving forward that this is the basis that will be used in developing a fair consent-based siting process for nuclear waste facilities and policy development.

In addition, any "fair" consent-based siting decisions must be made through a process that allows affected local and state governments to decide whether, and on what mutually agreeable terms, the affected communities will host a nuclear waste facility. Local and state governments are critical in decision-making as they, along with the federal government, are responsible for protecting the health, safety, economic-viability and quality of life of the public and the environment. Ultimately, however, the process can be deemed "fair" if a fully informed community volunteers to host a nuclear waste facility and chooses to enter into a legally enforceable consent-based agreement.

To ensure that affected local governments and their communities make informed decisions, they must be educated on all aspects of a potential project. A local government needs to have a full

[1] See: https://www.whitehouse.gov/the-press-office/memorandum-heads-executive-departments-and-agencies-3-9-09

understanding of the benefits and risks that are associated with siting, constructing, operating and hosting a nuclear waste storage facility.

To that end, financial resources must be provided as early as possible to local governments in potential host communities to provide outreach and education. With information, local governments can educate their citizens and citizens in adjacent communities and help to identify for federal policy-makers and regulators key community issues. More specifically, these resources are necessary for local governments to hire their own third party experts that work for the local government to undertake independent analyses, develop educational materials for distribution, and to create their own opportunities for public comment. Local values, concerns and priorities must be taken into account when decisions are made. This will also help local advocates have the resources and experts to address the inevitable political and public concerns related to the siting of a nuclear facility.

2. <u>What models and experience should the Department use in designing the process?</u>

At the federal level, the NWPA provides a good starting point for consideration of how local governments have been engaged in nuclear facility development. The aspects of the law related to siting and developing nuclear waste facilities can help potential host communities better understand what resources they may need, what resources or incentives they may want, and how those resources can be used.

Specifically, the NWPA allocated dedicated funding for "affected units of local governments," to help:

- Provide resources to permit the local community to hire third-party scientists to review data and increase public confidence in the scientific integrity of a project;
- Provide impacted citizens with the information and means to interact with the federal government and any operator; and
- Demonstrate a commitment to external oversight over nuclear projects.

In addition, the amendments made in 1987 to the NWPA that created the Office of the Nuclear Waste Negotiator could be used as a model for phased resource allocation.[2] The Nuclear Waste Negotiator was empowered to find a state or Indian tribe willing to host a repository or monitored retrievable storage (MRS) facility, and to negotiate the terms and conditions with a governor of a state or governing body of an Indian tribe under which a prospective host would accept a facility. ECA recommends that any law include local governments as eligible entities. In conjunction with the creation of the negotiator's office, the Secretary of Energy was authorized to make grants of financial assistance to states and tribes to assess site feasibility in their jurisdictions. The grants were divided into two categories: Phase I (preliminary) and Phase II (advanced). Under Phase I, grantees could receive up to $100,000 for use over a six-month period "to develop an understanding of the nuclear waste management system and to determine if they have a real interest in pursuing feasibility of hosting an MRS facility." Under the two stages of Phase II, grantees could receive up to $3 million more to support a more detailed examination of site feasibility. By the end of the first stage, a governor or chief executive of an Indian tribe had to inform the negotiator that one or more areas had been identified as potential MRS sites. By the end of the second stage, feasibility studies would continue as formal discussions and negotiations for a proposed host agreement got underway.

ECA also recommends looking at how the federal government reached out to interested states and local governments under the Global Nuclear Energy Partnership Initiative (GNEP). In 2006 and 2007, DOE sought out local governments interested in hosting new nuclear energy reprocessing facilities, awarding a total of close to $16 million in grants to conduct siting studies. Many communities expressed interest and some of the data collected through their siting studies could still be used. The GNEP initiative also provides an example of communication failure that needs to be avoided – various ECA communities only learned through their local media outlets that the initiative was no longer being pursued rather than hearing that message from DOE officials directly.

[2] Nuclear Waste Policy Act Amendments Act of 1987, Title IV, see: https://www.congress.gov/bill/100th-congress/house-bill/3430

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As many have noted, the Waste Isolation Pilot Plant (WIPP) provides useful lessons learned – from who was involved in the negotiating, designing transportation routes to avoid specific communities and ensuring an oversight role for the state and impacted local governments hosting the facility. It is worth noting a 2008 presentation by a DOE Carlsbad Field Office official outlining the keys to the successful siting and licensing of WIPP:

- Recognition of a national need to clean up the nuclear weapons complex.
- Existence of a "clear" benefit for citizens of the state and community in which the repository is sited.
- Solid local support (with "clout").
- Competent technical oversight by the state of New Mexico.
- Intense and early outreach.
- Rigorous quality assurance from the earliest stages of the project such as traceability, transparency and independent review to facilitate the open discussion of technical and scientific if they arise.
- Reliable and powerful local political support prior to the licensing and construction is worth any cost.

ECA encourages DOE to look at international efforts for lessons learned. In Finland, for example, the local government at the potential site host held a vote to determine whether there was a majority in favor of siting the repository there, and a negotiated compensation package for the hosting local government provided local infrastructure funding, the creation of a business investment fund, a direct loan to the local government to address budget issues and the purchase of local resources by the federal government.

The process used in Sweden similarly provides good models. That country's initial "top-down" approach wherein sites were identified rather than volunteers sought failed. Once a voluntary

siting process was implemented, municipalities involved in the feasibility study phase were able to set up organizations to follow the work being done by the Swedish Nuclear Fuel and Waste Management Company (SKB). Municipalities were allowed access to monies in the Swedish Nuclear Waste Fund[3] to facilitate participation in the process by conducting their own studies and, in at least one case, by hiring consultants to assist in the technical review of the project.[4] Municipalities also were given the veto power to end their involvement in the process. Municipalities held referendums to determine whether to continue in the siting process.[5]

According to information provided to the BRC by the former site manager for SKB site investigation at Forsmark:

> [SKB] set a goal to get in touch with every resident within ten kilometers. They met people in their own homes. Public meetings have been held once or twice every year, with greater than 100 residents attending. Several free two-day facility tours have been arranged and about 20 percent of residents have participated . . . An annual poll is conducted on public opinion on the Forsmark site with acceptance increasing over time. Opposition has also decreased from 27 percent down to 10 percent. The process continues and will never be complete.[6]

ECA recommends also looking at the process in Australia. One aspect to consider is the government's commitment to comprehensive community engagement "about all aspects of the project including technical and heritage assessments, site design and an assessment of how the community can benefit from the project going forward. The Government will also work with the

[3] Swedish Nuclear Waste Funds were distributed through the municipality.
[4] Minutes of the Meeting of the Disposal Subcommittee of the Blue Ribbon Commission on America's Nuclear Future in Forsmark, Sweden. 23 October 2010.
http://www.brc.gov/sites/default/files/meetings/minutes/forsmark_meeting_minutes102311.pdf
[5] Nygårds, Peter; Hedman, Tommy; and Eng, Torsten. "The Swedish Program has Entered the Site Selection Phase." Waste Management Conference 2003, Session 22, Global Perspectives II.
http://www.wmsym.org/archives/2003/html/prof415.html
[6] Mr. Kaj Ahlborn at the Meeting of the Disposal Subcommittee of the Blue Ribbon Commission on America's Nuclear Future in Forsmark, Sweden. 23 October 2010.
http://www.brc.gov/sites/default/files/meetings/minutes/forsmark_meeting_minutes102311.pdf

community to understand and address any other concerns they may have."[7] In addition, the Government has stated it will establish a Regional Consultative Committee at the chosen site with ongoing direct engagement with the Department and its project consultants, and the establishment of a local office in the host community. The Government also committed to creating a Community Benefit Package in response to concerns raised during the initial consultation phase and "to support local communities in the period before the final site is confirmed." The package is designed in recognition of the community's contribution to hosting the site and any short term disruption that the detailed assessment may involve. Up to $2 million will be provided to the community for projects that encourage local economic and social activity. Projects will be selected through a competitive process, and funding will be given to those that will lead to a strengthening of social and economic outcomes in the community.

This Community Benefit Package will be delivered regardless of whether the facility is ultimately sited in the community. The Australian government specifically notes that the Community Benefit Package is separate and in addition to the $10 million National Repository Capital Contribution Fund which would come into effect once the facility is operational. Finally, the government has made the guidelines for receiving grants under the program very clear and assessable.[8]

The role for potential host communities in Canada's process can also help inform DOE's consent-based siting process. The Nuclear Waste Management Organization in Canada notes that "Potentially interested communities may explore their interest in the project in the way they see fit, with the support of the NWMO, and with funding available to seek independent advice and peer review, and to involve residents in the community, at each stage." ECA also notes that the Canadian government has done a good job of outlining the different phases of their program and what each phase will entail. That level of information is very helpful for potential host communities to have at the outset so stakeholders know what to expect and understand that the government has a comprehensive approach over time.

[7] http://www.radioactivewaste.gov.au/frequently-asked-questions
[8] https://www.business.gov.au/assistance/national-radioactive-waste-management-facility-community-benefit-programme

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3. <u>Who should be involved in the process for selecting a site, and what is their role?</u>

Local governments are responsible for education and outreach to the community; education and outreach to state, regional, federal decision-makers and industry; negotiation on behalf of the potential host community; protection of public and environmental health and safety; and securing a viable economic future. The meaningful involvement of the local government in a potential host community will ensure that local values, concerns and priorities are meaningfully considered as a site is selected and a consent-based agreement is negotiated.

State governments are responsible for ensuring the safety of operations and protection of the environment and public health; serving as 'co-regulators' in various aspects of regulation, permitting and operations; and being national partners with the federal government in a federal system.[9]

Local governments are uniquely positioned to negotiate conditions for hosting a site on behalf of the impacted community; as is a Governor for the impacted State. Experience has shown that support by one without the other will prevent successful siting so they must work together. Both will also need to work with the federal government, regulators, and private companies and both will need to be given resources to participate fully throughout the consent-based siting process. If a State is willing to host the facility, the State will need to license or permit the facility and remove any conflicting state laws or statutory prohibitions.

ECA encourages DOE to look at what was proposed in the Nuclear Waste Administration Act of 2013:

> "…A potential storage site will be eligible for evaluation if recommended by a Governor or duly authorized official of the State in which the site is proposed to be located; each affected unit of general local government; and any affected Indian tribe. The head of a new waste management organization (the Administrator) must then submit a program plan that includes, among other

[9] Environmental Council of the States (ECOS) Resolution Number 12-6

things, a schedule for removing the spent fuel from and decommissioning of the storage facility and an estimate of the cost of any financial assistance, compensation, or incentives proposed to be paid to the host State, Indian tribe, or unit of local government.

For repositories, the Administrator would consider for review sites recommended by 'the Governor or duly authorized official of the State in which the site is located; the governing body of the affected unit of general local government; the governing body of an Indian tribe within the reservation boundaries of which the site is located.' The Administrator may also seek out sites to review, but must still consult with and get consent from the parties named above.

Before selecting a site for characterization, the Administrator will hold public hearings in the vicinity of the site and at least one other location within the State where the site is located. The purpose of the hearings is to inform the public and the proposed characterization activities and to solicit public comment and recommendations. The Administrator must also enter into a consultation and cooperation agreement to provide 'compensation … for any potential economic, social, public health and safety, and environmental impacts associated with site characterization.' Under the consultation and cooperation agreement, financial and technical assistance must be given to enable the State, any affected units of local government, and any affected Indian tribes to 'monitor, review, evaluate, comment on, obtain information on, and make recommendations on site characterization activities.'

Before making a final determination, additional public hearings must be held. Prior to submitting a license application, the Administrator will enter into a consent agreement ratified by law that expresses the consent of and contains the terms and conditions on which each State, local government, and Indian tribe consents to host the repository or storage facility. Once ratified, the consent

> agreement can only be amended or revoked through mutual agreement of the parties."

Furthermore if the government decides to formally create any advisory boards around a potential site, ECA urges that it include a representative from the local government of the potential host community and a representative of the potential host State. Ensuring input from the parties that will be most directly affected by a decision on nuclear waste management will help build trust that the federal government is being as inclusive and transparent as possible. Specifics as to who is eligible for these boards and their responsibilities should be defined in legislation to promote accountability.

As the BRC advised, "a good gauge of consent would be the willingness of the host local government and state government to enter into legally binding agreements with the facility operator, where these agreements enable states, tribes, or communities to have confidence that they can protect the interests of their citizens."[10]

4. <u>What information and resources do you think would facilitate your participation?</u>

While the public meetings DOE is hosting across the country are an important part of defining a consent-based siting process, DOE itself needs to provide more specific information so that potential hosts can understand what they should really consider and to reduce the number of unknowns. For example:

- How will "consent" be defined?
- What are the steps necessary and the order in which those steps need to be taken in order for sites to be chosen a consent-based agreement to be reached?
- Who will receive resources for public outreach and education programs and feasibility studies and how will that be determined? Will a specific level of support (state and/or

[10] Blue Ribbon Commission's Final Report to the Secretary of Energy. January 2012. p. 57.

local) be necessary to be eligible for the funds? What is that level, how will it be measured and who decides if it exists?

- What kind of outreach and education will be acceptable – how will that be determined and by whom?
- How much financial assistance will be available – equal amounts to all volunteers or differing amounts depending on the program proposed (borehole vs. interim storage site vs. permanent geological repository) or the proximity of the community to the proposed facility?
- What will be required in a funding proposal?
- Can a community apply to do R&D related to waste storage and disposal even if they are not interested in potentially hosting a facility?
- What terms or incentives is the federal government willing to negotiate as part of a consent-based siting agreement? Is anything off the table?
- Are there specific geologies and geographies that are preferred or will not work?
- Will there be preference given to a site that is interested in hosting both an interim storage facility and a permanent geologic repository?
- When can a community/state withdraw from the process?
- Who in the state will need to sign a consent-based siting agreement with the federal government?
- Who in the federal level will have ultimate authority for signing a consent-based siting agreement?

The universe of possibilities needs to be whittled down to make the process more efficient and take into account political, technical and economic limitations.

In addition, financial resources are necessary so that interested local governments and trusted individuals within a community can engage with the community at large now. Education and outreach efforts may include:

- Hosting meetings for the community with site managers, contractors, utilities and economic development entities;
- Creating public information centers and campaigns online and in community centers;
- Coordinating programs with local universities and community colleges;
- Building websites and producing written materials for distribution − such as fact sheets or issue briefs − that explain the pros and cons of nuclear initiatives.

Without resources, a potential host cannot specifically identify where there is support, the issues creating opposition or what it needs and wants from the federal government, regulators and private contractors that will construct and operate a facility. Support can only be built if a potential host community understands the process, can choose independent experts to supply scientific data and, most importantly, if the community trusts that its interests, concerns and priorities are being recognized and meaningfully considered.

5. What else should be considered?

One very clear challenge that must be addressed in terms of who should be involved is defining "stakeholder" versus "interested party." The difficulty is evident when we look at Yucca Mountain – the local communities around Yucca Mountain say they have consent for the repository, yet parties not immediately impacted by the facility say they do not. One proposal to consider: "stakeholders" are impacted parties located within a specific geographical radius of a proposed facility; "interested parties" are those outside of that radius. The weight each of these groups will have in determining whether there is consent at each phase of the process needs to be clarified before a consent-based siting process is implemented.

Conclusion

ECA urges DOE to consider the public comments that are submitted along with all available lessons learned – from Yucca Mountain to WIPP to international efforts – and develop a feasible plan that can be carried over from this administration to the next. The mission is clear; the

vision for getting there needs to be as well. Policymakers need to find the balance between science and politics, to gain access to assured funding and ensure that the process is transparent, flexible and fair – these are the necessary components for rebuilding trust.

Comments on Integrated Nuclear Waste Management Consent-Based Siting

from the Wyoming LFTR Energy Alliance

We propose an entirely different approach to nuclear waste management than simply building processing and storage facilities to handle waste from today's conventional reactors. Our approach requires final development and deployment the Liquid Fluoride Thorium Reactor (LFTR, "lifter).

LFTRs have so many advantages over the conventional reactor, particularly for electric power generation, that LFTRs will eventually replace conventional reactors; however, our comments focus on the different waste profiles and how the LFTR would produce a far more manageable waste stream. Specific advantages of the LFTR for this application are summarized under item 5, below.

1. The 97% "burning up" of waste from conventional water-cooled reactors in LFTRs is a key element of an effective integrated nuclear waste disposal program.

2. The volume and, especially, the type of waste to be stored, and its projected storage history, must be specified for effective planning. In particular, we must specify:

- transporting highly radioactive waste from conventional reactors and storing it for 10,000 years; or,

- transporting waste from LFTRs – including the residual waste from "burning up" the waste from conventional reactors – with less than one percent the volume and 1/10,000th the radioactivity of equivalent waste from conventional reactors, and storing it for 300 years.

3. Final LFTR development is worth doing even if only to process radioactive waste from conventional reactors – let alone because LFTRs are the optimum GHG-emission-free way to fire large-scale electric power generation.

4. If the LFTR option is specified, LFTR development would be a major priority in designing an effective integrated radioactive waste disposal program. LFTR development accomplished through the mid to late 1960s was curtailed short of final development in favor continuing conventional (solid uranium fuelled) reactor development and deployment, on political and military grounds. (Final LFTR development presently under way in several garages, and in more substantial venues, would benefit greatly from renewed government support.)

5. An extensive list of all the LFTR's advantages is found in Part I (attached) of our WLEA paper "Wyoming's Energy Future: The Case for the Other Reactor"; these advantages focus our comments concerning nuclear waste management on the following factors:

First, a LFTR breeds all its fuel from thorium into a fuel that is all converted to fission products – no transuranics. This reduces the waste stream to less than three percent of that from conventional reactors.

Second, the signature of LFTR waste is much more benign: it is much less radioactive and there is a lot less of it.

Third, in addition, the waste from conventional reactors would be introduced to LFTRs and burned completely to fission products, reducing its volume by 97%.

Fourth, all the fission products would be stored in secure above-ground storage for ten years; then, the 17% of the remaining fission products could be separated and stored for 300 years, rather than the 10,000 years required for conventional reactor waste. Separation of the fission products prior to long-term storage would be guided by the value of the various isotopes recovered.

Bottom line: LFTRs waste less than three percent of that from conventional reactors to store for 300 years instead of 10,000 years.

A final thought: Savings in processing and storage might well cover the cost of final LFTR development.

For the Wyoming LFTR Energy Alliance(WLEA),

David A Copeland
Founding Associate, WLEA

David G Earnshaw
Founding Associate, WLEA

Enclosures:

References
Attachment A "LFTRs to Power the Planet," Part I of "Wyoming's Energy Future: The Case for the Other Reactor"
Attachment B "About the Wyoming LFTR Energy Alliance"

References:

Books:

Bryce R (2010) Power Hungry. U.S.A, PublicAffairs

Crane HD, Kinderman EM, Malhotra R (2010) A Cubic Mile of Oil. New York, Oxford U.P.

Hargraves R (2012) Thorium – Energy Cheaper Than Coal. U.S.A., Robert Hargraves

Luzzi L, DiMarcello V, Cammi A (2011) Multi-physics Approach to the Modeling and Analysis of Molten Salt Reactors. New York, Nova Science Publishers (Novinka)

Martin R (2012) Superfuel. U.S.A., Palgrave Macmillan

Presentations:

Kirk Sorensen on youtube, TEDxYYC: www.youtube.com/watch?v=N2vzolavvkw

Our website: www.wyominglftrenergy.org
Our email: wyolftr@gmail.com

Attachment A:

*"My personal vision? To hasten the day that LFTRs have replaced all fossil-fuel fired power plants and all solid-uranium fueled, boiling water and pressurized water reactors in the world. This devolves from my understanding that the **L**iquid **F**luoride **T**horium **R**eactor is superior in every way I can think of to the solid-uranium fueled, water cooled nuclear reactors used today."* – David Earnshaw

Part I – LFTRs to Power the Planet

David Earnshaw

By one account, to generate 1 GW of electricity for 1 year:

Mine 3,200,000 tons of coal – emit 8,500,000 tons of greenhouse gasses and particulates which cause 500,000 premature deaths – landfill 900,000 cubic meters of hazardous fly-ash;

OR

Mine 50,000 tons of uranium ore – emit far less greenhouse gas – produce 24 tons of highly radiotoxic unprocessed waste to be stored and guarded for 10,000 years;

OR

Mine 50 tons of equivalent-grade thorium ore – emit even less greenhouse gas – produce 0.8 tons of radiotoxic 'waste' with *one ten thousandth the radioactivity* of conventional uranium to be stored for 300 years.

Introduction

There are two kinds of nuclear reactor, the kind we have and the kind we could and should have. The kind we have, the conventional reactor – solid uranium in fuel rods, moderated and cooled with water under high pressure and at moderate temperature – we see as unacceptably costly, disaster-prone, productive of copious toxic waste to be accumulated and stored forever. (Ten thousand years is forever.) The kind we should have, the Liquid Fluoride Thorium Reactor (LFTR, "lifter") – fueled with thorium in a molten salt at atmospheric pressure and high temperature – we see as safe, efficient, and economical to build and operate.

All the shortcomings of the conventional reactors in use today are eliminated in the Liquid Fluoride Thorium Reactor (LFTR). When I had read and absorbed the ideas presented in an *American Scientist* article [Appendix A] and confirmed in other sources, I believed that I had

discovered something too good to be true yet absolutely true. The advantages of the LFTR over the conventional reactor are overwhelming. All these advantages center on the molten salt core vs. solid fuel rods, water cooling, and the use of thorium vs. uranium as the major fuel element.

Try as I might to discover any comparative fault with the LFTR, I could not find even one. In every way the LFTR is superior to the conventional U235-fueled, water moderated and cooled reactor. To show this, I compiled Table 1, a list of 24 comparisons between the conventional reactor and the LFTR. Every comparison in Table 1 favors the LFTR.

Details

A nuclear reactor involves a chain reaction in which fissionable material is bombarded by neutrons. When a fissionable nucleus (U235, Pu239) is struck by a thermal neutron, it breaks into two lighter nuclei and produces up to three additional neutrons that then strike other fissionable nuclei to sustain the reaction.

To feed a conventional reactor, uranium, the primary fuel, has been enriched from its naturally occurring 0.72 percent U235 up to about 4–5 percent U235; the rest of the fuel, 95–96 percent U238, is not fissionable. Because U235 and U238 are isotopes of the same element, enrichment cannot be done chemically but must be done physically. Physical enrichment is much more expensive. Again at great expense, this mixture has been oxidized and encapsulated in zirconium fuel rods prior to insertion into the core of the conventional reactor.

In a LFTR, thorium (Th232), the primary fuel, is naturally occurring at 100 percent. It needs no enrichment. Th232 is fertile, but not fissile, so it must be converted to U233 (fissile) by neutron absorption followed by beta decay.

A conventional reactor is configured so that control rods are interspersed with fuel rods throughout the core to absorb enough neutrons that the reaction runs at a steady state – just enough reactions to keep running but not enough to "run away."

A LFTR has a different configuration – molten salt vs. solid fuel rods – with the non-fissile thorium placed in a "blanket" around the core so that the Th232 can absorb neutrons and convert to fissile U233. No enrichment is necessary, but the reactor must be started with (1) U233 from another source, (2) U235-enriched fuel, or (3) Pu239-enriched fuel. Once started, a LFTR breeds fissile U233 from non-fissile Th232. The LFTR is then largely self-regulating. If it starts to run too fast, the liquid fuel load expands and slows the nuclear reaction. If it gets too cool, the fuel load contracts and speeds up the reaction.

Table 1. Comparison of the conventional reactor with the LFTR. (Compiled by author from various sources)

The Conventional Reactor	The LFTR
1. Uranium 27 ppm in earth crust	Thorium 96 ppm in earth crust – 3.5 times more abundant than uranium
2. Must be mined independent of other products	Thorium produced as a by-product of rare-earth mining – 20-year cache available now
3. Just 0.72 percent of mined uranium fissionable	100 % of mined thorium usable
4. Uranium must be enriched – at great expense	Thorium need not be enriched
5. Must be made into fuel rods – subject to radiation damage and fission-product buildup	Thorium derived fuel in liquid ionic salt impervious to radiation damage and is already liquid
6. Only 3–5% of fuel can be used before refueling shutdown for fuel rod replacement every 18 – 24 months	100% of fuel used; continuous refueling – shut-down seldom if ever required
7. Fission products trapped in fuel rod assemblies	Fission products continuously removed from reactor and separated chemically – valuable fission products recovered
8. Some U238 converts to transuranic elements – 2000 times more radioactivity	Minute volume of transuranic elements produced
9. Converts U238 to weapons-available Pu239	Makes insignificant Pu239

10. Neutron economy amenable to production of fissionable (weapons) material	Reactor designed to make just enough neutrons to maintain breeding

Table 1 (continued).

The Conventional Reactor	The LFTR
11. Diversion to weapons use by rogue states	Diversion to weapons use extremely dangerous and difficult
12. Spent fuel rods must be stored and guarded for about 10,000 years – under U.S. reprocessing ban	1/30th the weight of material to be processed or stored and guarded for about 300 years
13. Spent fuel rods continue to accumulate without reprocessing	Contents of spent fuel rods from conventional reactors can be gradually introduced to LFTRs and consumed
14. Requirement for core cooling water creates inherent risk – incrementally improved safety must be engineered in at great cost	Inherent safety – no core cooling water
15. Operates using water at high pressure, requiring massive containment vessel (dome)	Operates at ambient pressure, needs no containment vessel
16. Uses great amounts of water for water cooling or evaporation	Can be air cooled, using no water
17. Continuous transport of fissionable material required for refueling	Single transport of fissionable material required at start-up
18. Must be built on site	Can be mass produced in factory, trucked to site

19. Large siting footprint	Small siting footprint – can be built in or near urban centers
20. Not amenable to distributed production	Ideal for distributed production – less grid building, line loss

Table 1 (continued).

The Conventional Reactor	The LFTR
21. Construction costs $4.00 per watt to build compared with coal at $2.00 per watt	Construction costs similar to those of coal – much less time to build than conventional reactor
22. Not adaptable to existing coal plant	Adaptable to modify existing coal plant
23. Runs cooler than thorium reactor – less efficient	Runs hotter – 30–40 % more efficient electricity production
24. 350°C operating temperature too low for process heat – thermodynamically inefficient for process heat	800–900°C operating temperature – far greater thermal efficiency, ideal for high-temperature processes

A LFTR is also easy to stop. At the bottom of the reactor vessel is a pipe blocked by a plug of solid fuel. This pipe is cooled by a fan to keep the plug solid. If the reactor gets too hot, the plug of solid fuel melts and the fuel load drains through the pipe into a containment vessel where it passively cools in a non-fissile configuration. If power fails, the fan turns off and the same draining and cooling occur. It is inherently safe. If you wish to shut down a LFTR, you simply switch off the fan.

Another disadvantage of a conventional reactor is the use of water circulated through the core as a coolant/neutron moderator/heat-exchange fluid. In order to achieve a high enough temperature for power generation, the water must be circulated at high pressure in order to stay liquid. This limits the temperature that can be practically obtained to about 350°C. A LFTR can be designed to operate at any temperature from 700°C to 950°C, at atmospheric pressure.

No nuclear reactor can experience an atomic-bomb-type explosion, because the uranium is never enriched to "bomb grade" level. However, loss of cooling water can cause a melt-down of the fuel rods when they become overheated. A steam explosion can occur, or

residual water can react with super-heated zirconium fuel rod cladding to produce hydrogen that can then explode, as at Fukushima Daiichi.

The use of water under pressure in the core of a conventional reactor requires a massive steel and concrete pressure dome to completely enclose the reactor core. The dome must have a large volume for expansion of water vapor in the event of a leak in the high-pressure water circulation system. If it becomes impossible to get cooling water to the reactor, the containment dome can be breached if there is a core meltdown.

Chernobyl experienced a steam explosion that released large amounts of fission products because it had no pressure containment dome. Three Mile Island and Fukushima Daiichi experienced hydrogen explosions caused by loss of cooling water and consequent core meltdown. The fuel rods got hot enough to melt; the hydrogen produced by reaction with zirconium exploded to disperse fission products into the environment.

In contrast, cooling water is unnecessary in a LFTR, and there is no chance of melt-down because *the fuel load is already molten*. No massive pressure dome is required, because a LFTR operates at ambient pressure – this represents huge savings in time and expense of construction. No chance of steam or hydrogen explosion also contributes to inherently safe operation. The use of great quantities of water is avoided.

Then, there is the waste problem, particularly in the US, where reprocessing is not allowed. No long-term solution has been adopted, so large amounts of radioactive waste are accumulating at existing power plants. These "spent" fuel rods are so hot that they must be stored for three to four years in a cooling pool with circulating water to carry away the waste heat. They are then sealed in concrete casks and stored indefinitely. The stored waste is hazardous for about 10,000 years.

Degradation of the fuel rods in service by heat and radiation requires that they be replaced after only about 5 percent of the fuel is consumed. The problem is exacerbated by some of the U238 converting to fissionable Pu239 and other transuranic elements, adding greatly to the radioactive waste load of the fission products.

In a LFTR there is no U238 to be converted to transuranic elements, so the only radio-actives are the fission products from the U233 reaction. Thus, you get only a small fraction of the waste products that you obtain from a U235–U238 fuel load. In fact, if all of the world's nuclear reactors were LFTRs, *altogether they would create just half the waste that* ***one*** *conventional reactor creates today.*

If the U.S. continues to ban reprocessing, LFTRs could be used to solve the problem of the 50,000-plus tons (and growing) of radioactive waste stored on-site at America's uranium-fueled nuclear reactors. These wastes could be gradually introduced into LFTRs and "burned up" over time. LFTRs would solve the waste storage problem because LFTRs would produce only fission products, not all the transuranic elements and residual U238, to be stored.

Next, consider the problem of weapon-grade fuel proliferation. During the course of operation of a conventional reactor, a small but significant amount of plutonium 239 is generated. This material can be used to make atomic weapons, so measures must be taken to insure that it is not diverted to terrorist or rogue government elements. Plutonium is also a very poisonous element chemically.

By contrast, a LFTR makes almost no Pu239. Not only that; one of the isotopes created in LFTRs has a radioactive daughter-product that is a high gamma emitter. Would-be bomb makers would get lethal doses of radiation trying to fabricate weapons. Also, by design, the neutron economy of a LFTR can be regulated so that just enough U233 is produced to sustain the nuclear reaction. Any diversion would shut down the reactor.

We mentioned above that LFTRs operate at significantly higher temperature than conventional reactors. This means that one can get 40 percent more electric power from LFTRs and use less or, in many cases, no cooling water in the electricity-generating cycle. The opportunity for air cooling is very important in water-scarce areas such as Wyoming.

We must distinguish between water used to cool a reactor core and water used to produce steam for electric power generation. Any water used in a LFTR would never be in contact with the reactor core: steam or other gas would be produced in a heat exchanger, which would keep water isolated from the reactor. All such gas could be either water or air cooled and re-circulated. Emerging gas turbine technologies offering alternatives to steam turbines would rely on the LFTR's high operating temperature.

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At present there is no concerted effort to develop LFTRs in this country, but some work is being done in France and India. China has announced its intention to develop LFTRs as well. Our response to these initiatives will determine whether they auger boon or disaster to Wyoming's economy. A reactive response – doing nothing until crisis requires us to buy LFTRs from China – would be disastrous. To date, our response has been nonexistent. We continue to hear proposals to build both coal-fired and conventional nuclear electric power plants in Wyoming, a tremendously short-sighted prospect. LFTRs have so many advantages over coal, gas, and uranium for electric power production that it would only be a matter of time before Wyoming coal and uranium would no longer be mined for use as fuel. So, just about the time new coal-fired power plants would spring up in Wyoming, they would be obsolete and would be shut down at net loss to Wyoming's economy. It would be like beefing up production of Conestoga wagons about the time Henry was introducing the Model T.

Despite the long lead times generally required to achieve broad technical application of most new technologies, we believe that LFTRs have the potential to spread rapidly. Consider the fact that 200-megawatt LFTRs could be produced at a dedicated factory at the rate of one per day, and that a LFTR could be trucked to a site and installed on-site in a matter of weeks, rather than the years required for construction of a conventional reactor.

A timely, bold, proactive response to the challenge of LFTR development would be a real boon to Wyoming and the nation. This sort of response, with Wyoming as the example of interest, is addressed in Part II of this paper. With careful study, preparation, and response, LFTR development in Wyoming could assure all elements of our economy a healthy future.

Attachment B

About the WLEA

Our Story began in 2014 when two retired scientists, David Earnshaw and David Copeland, founded the Wyoming LFTR Energy Alliance (WLEA). "Having muttered and grumbled about the global energy situation for years, we decided to get off our duffs and do something."

*"My personal vision? To hasten the day that LFTRs have replaced all fossil-fuel fired power plants and all solid-uranium fueled, boiling water and pressurized water reactors in the world. This devolves from my understanding that the **L**iquid **F**luoride **T**horium **R**eactor is superior in every way I can think of to the solid-uranium fueled, water-cooled nuclear reactors used today. Once I understood the LFTR and thought about its potential, I realized that it will be utterly world changing in its use to generate electricity, provide high-temperature process heat, desalinate water, and do multiple other things more efficiently than coal or oil without producing greenhouse gases."* – David Earnshaw

"My personal vision is a 95-percent or greater reduction in global anthropogenic greenhouse gas emissions through a balanced LFTR/renewables energy platform." – David Copeland

THE WYOMING LFTR ENERGY ALLIANCE (WLEA)

Our Mission is to promote the development, manufacture, and deployment of the Liquid Fluoride Thorium Reactor (LFTR, "lifter").

Our Vision is the LFTR accepted and adopted worldwide in energy platforms comprising LFTRs for continual, large-scale applications and renewables for intermittent, small-scale applications.

Our Belief is that a 95-percent or greater reduction in global anthropogenic greenhouse gas emissions can be obtained through the judicious

complementary deployment of LFTRs and renewable energy sources to replace hydrocarbon energy sources.

[This is the magnitude of change necessary for the survival of human beings and of life as we know it on this planet.]

Our Focus is LFTRs.

[Wind and solar sources of electric power are on-line today. The LFTR requires final development of several engineering and material elements to be commercially viable. Thus, while the WLEA argues for a global LFTR/renewables energy platform, our focus is LFTR development, manufacture, and deployment.]

Our Argument:

- Our future global energy platform must meet the dual challenge of providing for greatly increased electric power *use* while eliminating emissions of CO_2, methane, and other pollutants from electric power *generation* as well as greatly reducing these emissions from other sources.

- With our present knowledge and *at the scale envisioned,* this dual challenge can be met effectively only with an energy platform comprising renewable energy sources and electric power generation fired by nuclear reactors.

- The LFTR is the nuclear reactor of choice.

[There are two kinds of nuclear reactor, the kind we have and the kind we could have. The kind we have, the conventional reactor, uses solid uranium in fuel rods, is moderated and cooled by water under high pressure, and operates at moderate temperature: the inefficiency, high cost, and occasional catastrophic failure associated with the conventional reactor arise from these attributes. The kind of reactor we could have, the LFTR, is fueled with thorium in a molten salt, and operates at atmospheric pressure and at far higher temperature: these attributes make for efficient, safe, economical operation.]

[A sampling of projected benefits: with respect to our national economy, a LFTR-based energy platform supporting greatly increased use of electric power, especially in transportation, will shrink oil imports, our balance of payments deficit, and our energy costs. For Wyoming these benefits will be augmented by converting coal to transportation

fuels, plastics, asphalts, alcohols, carbon-fiber products, and other chemicals using LFTR-produced hydrogen and LFTR process heat, with no CO_2 emissions and with far greater value added to the coal we produce.]

Our Goal is a LFTR-fired power plant on line, providing low-cost electric power and process heat, with no GHG emissions, in an initial **L**FTR **D**evelopment **A**rea (LDA): a geographically bounded area whose natural and human resources can be beneficially integrated in a sustainable economic system served by energy from LFTRs.

[With one LFTR on line, we will see economic, social, and political forces converging on further LFTR deployment within the initial LDA, then nationally and throughout the world.]

Our Objectives:

- Identify and promote LDAs.
- Identify ways to bring an initial LFTR on line in an initial LDA.

[We have initially focused on Wyoming as an LDA, and are concurrently looking at the Indus river valley in India and Pakistan, at Germany, and at California as potential LDAs.]

[In the short term, existing renewable energy sources (wind and solar) will be backed up by LFTR-fired electric power generation in some LDAs. In the long term, LFTRs will serve major loads, and renewables will serve minor isolated and mobile loads and appropriate intermittent loads such as water heaters. Technology and economics will determine an optimum balance and distribution of energy from LFTRs and renewables. And, some LDAs will include hydro or tidal energy sources.]

- Establish working relationships with other LFTR organizations: Thorium Energy Alliance, FLIBE Energy Inc., Farnsworth Nuclear LLC, et al.
- Develop the skills and procedures For running the WLEA effectively and transparently.
- Raise funds for WLEA operations.

Our Inspiration:

Books:

Bryce R (2010) Power Hungry. USA, Public affairs.
Crane HD, Kinderman EM, Malhotra R (2010) A Cubic Mile of Oil. New York, Oxford U.P.
Hargraves R (2012) Thorium – Energy Cheaper Than Coal. USA, Robert Hargraves
Luzzi L, DiMarcello V, Cammi A (2011) Multi-physics Approach to the Modeling and Analysis of Molten Salt Reactors. New York, Nova Science Publishers (Novinka)
Martin R (2012) Super Fuel. USA, Palgrave Macmillan

Presentations:

Kirk Sorensen on youtube, TEDxYYC:
www.youtube.com/watch?v=N2vzolavvkw

Our Papers:

File name	Description
About WLEA [this paper]	WLEA overview and vision statement
Coal to diesel calculations	Coal–to-diesel conversion calculations
Combined paper	Position paper – LFTRs, Wyoming
Environment org ltr	LFTR promotion to environmentalists
Fission is the future pdf article	Full rebuttal to anti-nuclear New Scientist
Full scan 2.jpg, *and* nukes	New Scientist opinion article depreciating
Letter to editor 5th annual.jpg	Rebuttal letter to editor, New Scientist
LFTR – Water 103114 osmosis	Clean water using LFTR and reverse
LFTR questions 022015 developing LFTRs	Some questions we have about

Merkel ltr 011514	Ltr to chancelorin Merkel about LFTR
NRC regs modified 092514	Modifications to NRC regs to fit LFTR
Understanding LFTR	Layman's guide to how LFTRs work

Our Heroes:

- Kirk Sorensen of FLIBE Energy Inc., who has occupied the forefront of LFTR development and promotion for many years.
- Conrad Farnsworth and others at Farnsworth Nuclear LLC, who are deep into the design, testing, proving, and manufacture of a LFTR.
- Siouxanna Downs, who is engaged in LFTR design and development.

Our Contacts:

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Our website is www.wyominglftrenergy.org

Our email is wyolftr@gmail.com

Consent-Based Siting

From: Mary Costello [mailto:mc.costello5@gmail.com]
Sent: Friday, July 29, 2016 4:59 PM
To: Consent Based Siting
Subject: Comment Opposing DOE's Consent-Based Siting Process for Nuclear Waste

Dear Secretary Moniz,

As someone who lives near the White Mesa Uranium Mill in Blanding, Utah, I have serious concerns about the mill's importation of "alternate feed material," a k.a. radioactive waste.

Currently, radon emissions from the mill exceed Clean Air Act standards, and the mill is violating a regulation that limits the number of active waste pits to two. The liners in the tailings cells are old and have likely breached-sending radioisotopes and heavy metals into our ground and surface waters.

I fear more waste is destined for my small community and that of White Mesa and Bluff. We don't need any more radioactive wastes deposed of in our communities and waterways!

Mary Costello
188 N. Main St.
Blanding, UT 84511

From: joann crane [mailto:jo23ge@gmail.com]
Sent: Tuesday, July 19, 2016 2:41 AM
To: Consent Based Siting
Subject: Response to IPC

Dear DOE,

As a long time resident of Idaho, I am appalled <but not surprised> that an attempt is being made to send more nuclear waste to the INL under the guise of research.

This is a clear violation of the Batt Agreement of 1995 and I am totally opposed to any more nuclear material coming into Idaho, especially when it will be stored over the Snake River aquifer and there is still decades old waste that has yet to be dealt with.

Yours truly,
Joann Crane
Pocatello, ID

Consent-Based Siting

From: George Crocker [mailto:gwillc@nawo.org]
Sent: Tuesday, July 26, 2016 1:40 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: Kotek, John <John.Kotek@Nuclear.Energy.Gov>
Subject: Comment of the North American Water Office

Dear DOE: Please find attached the comment of the North American Water Office regarding the DOE nuclear waste siting program. Thank you for your attention to this matter.

Sincerely,

George Crocker
Executive Director
North American Water Office

NORTH AMERICAN WATER OFFICE

PO BOX 174 LAKE ELMO, MN 55042
PHONE: 651-770-7861

www.nawo.org

July 26, 2016

Comment of the North American Water Office
Regarding the U.S. Department of Energy
Consent-Based Siting Program for
Irradiated Waste Nuclear Fuel

Among informed members of the public, there is a firm knowledge-based understanding that consent-based siting of irradiated waste nuclear fuel storage facilities is not possible so long as the practical result of commissioning such storage facilities is the production of more irradiated waste nuclear fuel. It follows that consent-based siting of such facilities can only be possible after commercial reactor phase-out policy is firmly in place and operational. Absent such policy, the capacity of the waste management program will be overwhelmed by on-going production of additional waste. More sites will be required. All risks and threats attached to commercial nuclear operations will be heightened. Biological destruction caused by exposure to radionuclides will accelerate. Economic disparities inherent in the nuclear fuel chain will become increasingly intolerable, and there still will be no solution to the problem of how to safely bequeath this material to posterity for the required millennia. It is simply not possible for humans to rationally "consent" to a process that produces such bizarre, destructive, and self-defeating results.

Only after a viable phase-out policy is established and operational will it be possible to know the volume of waste that must be accommodated by the waste management program. Only then can rational criteria for selecting sacrifice zones be determined, and decisions made regarding how to adequately and equitably compensate those presently abiding in sacrifice zones.

The purpose of this comment, therefore, is to begin DOE's process of establishing a viable commercial nuclear phase-out program based on existing economic realities that determine how electric utility services are currently delivered. The North American Water Office leaves it to others to specify the long

list of additional factors that a truly consent-based siting process must accommodate.

Current electric utility economic realities are heinously warped and skewed to protect capital investments already sunk into electric utility infrastructure, including nuclear reactors. As a result, humans are not only exacerbating economic disparities that threaten to tear apart the fabric of society, but are also rapidly eroding the ecological foundations of civilization by spewing out electric utility wastes that cause climate chaos, mercury pollution, poisoning due to fine particulates, and acidification in addition to wholesale radiological contamination.

In other words, this comment offers a solution to many protracted and firmly entrenched problems in addition to its primary objective, which is to provide a foundation for a nuclear waste facility-siting program that truly is consent-based.

Historically, regulated electric utilities have been ***required*** by the Public Utilities Regulatory Policy Act (PURPA) of 1978 to purchase power from Qualifying Facilities (QFs) at the purchasing utility's Avoided Cost (AC). Under PURPA, a QF is an electrical generation facility of 80 MW or less whose primary energy source is renewable (hydro, wind or solar), biomass, waste, or geothermal. Up until now, regulated utilities have been able to set the PURPA AC at about the cost of fuel not burned in the conventional power plants they own, resulting in few PURPA Projects due to inadequate cash flow.

Meanwhile, wholesale competition is now the established business model for electric utility markets. In order for this business model to function, market prices must be established for specific locations, in real-time and on a day-ahead basis, so that wholesale market managers (the Midwest Independent System Operator, or MISO, throughout most of the center part of the nation, for example) can specify the dispatch order for generation facilities that will serve electricity markets within its footprint. As the actual cost of delivering power to any given location at any given time is location and time specific, the Locational Marginal Price (LMP) of power is set by the wholesale market manager based on real-time, and on day-ahead bids submitted by wholesale competitors. The LMP, based on the bids of wholesale competitors, then determines the dispatch order for electrical generation facilities capable of serving electrical requirements at specific locations, depending on electrical loads at those location, at any given time.

Establishing a competitive wholesale market based on LMPs while restricting AC under PURPA to the cost of fuel not burned by monopoly actors creates a fundamental and unfair contradiction. To be fair, the same market forces that determine competitive advantage for wholesale markets must also be used to determine AC under PURPA.

As a hypothetical illustration, if the cost of retail power is $0.10/kWh, roughly $0.04/kWh of that is the generation cost, roughly $0.03/kWh is the cost of high-voltage transmission, and the remaining $0.03/kWh is the cost of the

distribution system that delivers power to consumers. Hypothetically, therefore, the LMP for wholesale power delivered to the high-voltage side of the substation that delivers power to the distribution system is roughly $0.07/kWh.

If the LMP of wholesale power delivered to the high-voltage side of a substation that serves the distribution system is slightly less that $0.07/kWh (accounting for ancillary value of the over-all system in terms of reliability, etc.), it is unfair and in defiance of market rationality for the price of power delivered to that same substation from a PURPA machine to be determined by an AC that amounts to about $0.015/kWh. Yet this is standard practice within the electric utility industry. Altering this standard practice has only proceeded on a case-by-case basis in the rare instance in which a renewable energy project developer has been willing confront major uncertainty, long delays, and massive additional costs by going to court to challenge the utility's determination of a conventional PURPA AC.

There has been at least one such challenge, in South Dakota, which resulted in the utility being ordered by the court to negotiate a Power Purchase Agreement (PPA) that took account of the pertinent LMP. The negotiated PPA enabled the project to produce a viable cash flow, and the project was built. Further such court challenges will no doubt be forthcoming, hopefully with similar outcomes.

But instead of forcing developers to fight for legitimate PURPA ACs one at a time through judicial proceedings, the pathway for PURPA Project deployment would be dramatically streamlined and simplified by establishing a ratio between LMPs and PURPA ACs that would hold for any given location.

If DOE is truly interested in consent-based siting for nuclear waste storage facilities, it will first, as a pre-condition for consent-based siting, work with the Federal Energy Regulatory Commission and the Independent System Operators across the nation to establish LMP/PURPA AC ratios that will set the terms for PPA negotiations between renewable energy developers and purchasing electric utilities.

The enactment of such ratios would clear the pathway for massive deployment of community-based electrical generation projects. Most of these projects would be 5 MW or less because the grid interconnection process for such projects is expedited due to the fact that most of the energy produced would be consumed within the footprint of the substation to which the project is connected. Very little power would ever be pushed back onto the high-voltage grid, so the potential for such projects to introduce grid instability is minimal.

Most of these projects would be 5 MW or less also because projects this size can be located almost anywhere within the interconnected grid system. This means that new, clean renewable electrical generation capacity amounting to more than half of all existing installed generation capacity could be installed with no, or very few new transmission infrastructure enhancements, and the new capacity could be brought on-line just as fast as developers could construct them.

In Minnesota, which has a total electrical capacity requirement of around 10,000 MW, establishing LMP/PURPA AC ratios would enable about 5,000 MW of new renewable electrical generation capacity, from about 1,000 projects, to come on-line in a relatively short timeframe. Considering that the nuclear electrical generation capacity in Minnesota is less that 2,000 MW, establishing LMP/PURPA AC ratios would constitute a viable nuclear power phase-out program. Further, if each of the 1,000 projects were a 5 MW wind/solar hybrid system, each would cost about $10,000,000 and have a life span of 20-30 years. Each would produce about $1.5 million worth of electricity per year and therefore be a significant economic development engine within its community, producing wealth that would be circulated locally. Curbing climate chaos, and acidification, and mercury poisoning, and fine-particulate exposure, and fracking damage, and radioactive contamination would all be by-products.

Establishing LMP/PURPA AC ratios would actually reduce electric rates for energy consumers because such large-scale deployment of mass-produced machines would continue to drive per unit costs of renewable energy technologies down, while avoiding expensive retrofits and upgrades that are required for many old conventional central-station generation facilities.

If DOE is serious about consent-based siting for nuclear waste storage facilities, it will immediately embark on a program to establish LMP/PURPA AC ratios. Until a commercial nuclear power phase-out program is in place, there will be no consent-based nuclear waste storage-siting program.

George Crocker, Executive Director
North American Water Office

Consent-Based Siting

From: Cindy Curran [mailto:cindcurran@hotmail.com]
Sent: Thursday, July 28, 2016 3:19 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: response to IPC

to whom it concerns,
I do not consent to "centralized interim storage" facilities becoming a de facto permanent surface storage parking lot dumps for high-level radioactive waste..
We should be shutting down the Nuclear Industry. Solar, wind, geothermal are our future if indeed we are to have a future.
Sincerely, cindy Curran

Eat less. Sleep more. and Exercise with gratitude

April 12, 2016
U.S. Dept. of Energy
Office of Nuclear Energy
"Response to IPC"
1000 Independence Ave. S.W.
Washington, D.C. 20585

Dear Leaders:

My family & I live only a few miles from the San Onofre Nuclear Generating Plant (Station) SONGS. We will forgo all of the technical talk. You know that.

It is our desire to have the waste material removed, moved, and or stored in the safest way possible for the long term. Not the fastest or cheapest.

Having lived here for the past 24 years & tolerating both SONGS and the Camp Pendleton Marine Corps Base just a few miles down the 5 Freeway, please keep our beloved town & community safe.

Sincerely,

Patricia G. Curto
106 E. Avenida Cornelio
San Clemente, Ca. 92672

P.S. We need our meetings to be local.
Member of League of Women Voters
Capistrano Bay / So. Coast

THE CURTO'S
106 E. AVENIDA CORNELIO
SAN CLEMENTE, CA 92672

SANTA ANA CA 926

18 APR 2016 PM 2 L

Received

APR 25 2016

MAIL SANITIZED

U.S. Department of Energy
Office of Nuclear Energy
1000 Independence Ave. S.W.
Washington, D.C. 20585

20585

"Response to IPC"

Consent-Based Siting

From: Bates, Melissa (HQ)
Sent: Monday, August 01, 2016 5:11 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Public Comments from Roger Cuthbertson

All,
Please see the attached file that was provided to me by Roger Cuthbertson during the Minneapolis Public Meeting. This needs to be added into the record.

Thanks,
Melissa Bates

EVERY NUCLEAR REACTOR IN THE WORLD AN EVENTUAL FUKUSHIMA OR CHERNOBYL EQUIVALENT DISASTER!

Think about the ongoing catastrophes of Chernobyl and Fukushima. Now imagine the nuclear material at every single one of the world's 437[1] commercial nuclear reactors undergoing similar fates. Unimaginable? It WILL happen! Again, every single nuclear reactor in the world will experience a catastrophe roughly equivalent to the disasters of Chernobyl or Fukushima, or the fuels and wastes associated with each of the world's 437 reactors will experience a disaster roughly equivalent to what happened at Chernobyl or Fukushima.

Here's the proof:

What we want to believe is that what happened at Chernobyl and Fukushima Daichi is so terrible and unacceptable that it cannot/will not ever happen again. Unfortunately the system that produced these disasters is still in place. As aging nuclear reactors continue to consume fuel and produce extremely toxic and long lasting radioactive waste with no long-term safe place to put it, the situation becomes increasingly dangerous, not increasingly safe.

In the entire 50 year span of time in which nuclear reactors have been used, there have been many mishaps which have spewed radioactivity into the environment. But there have been only 2 truly gigantic meltdown type disasters so far. Let's just concentrate on the two – Chernobyl and Fukushima Daichi. Let's look to the next 50 years. What is the best bet for how many Chernobyl or Fukushima type catastrophes will happen in the future? Well, if you had 2 in the last 50 years, the best prediction for the next 50 years would be 2. In the next 100 years there should be about 4 such disasters. You can go on extrapolating for 1000 years, 10000 years and so on. But you need to introduce a bit more sophistication into your math, because the number of unaffected reactors keeps going down as disasters occur.

A formula you could use is: $F(t) = P * (1 - r)^t$

F(t) doesn't mean F times t. It represents the number of reactors or stashes of nuclear fuel and nuclear wastes associated with reactors still having not had a catastrophic accident at some number of years (t) into the future.

P is the original number of reactors in the world, or 437.

* in this formula means multiply.

r is the rate of catastrophic accidents per year. As previously noted, there have been 2 such mega disasters in 50 years. But we are keeping track of the number of domestic reactors in the world, not the number of power plants. At Chernobyl only one reactor melted down. At Fukushima, 3 reactors melted down and one more was damaged. That is a total of 4 reactors, not two. r = 4 per 437/50 years (1964 to 2014). So, r = .000183.

We need the expression (1 – r), because we are looking at a rate of decline, not a rate of increase.

t is the number of years we want to project into the future. In this formula, t is expressed as an exponent.

So, let's plug in the numbers, starting by going just 50 years into the future: $F(t) = P * (1 - r)^{50} = 437 * (1 - .000183)^{50} = 437 * .999817^{50} = 433$ reactors or associated nuclear fuels/wastes not catastrophically destroyed. Four reactors destroyed. That's what we expected, right. Four destroyed in the past 50 years, four destroyed in the next 50 years. The formula works.

F(t) 100, or 100 years into the future $F(100) = 437 * ..999817^{100} = 429$ left; 8 catastrophically destroyed

F(t) 1000 produces 364 left intact, 73 mega accidents

F(t) 10,000 leaves us with only 70 reactors or 70 reactor stashes of nuclear material unencumbered by catastrophe. 367 have melted, vaporized, or oozed into the environment.

F(t) 30,000 gives the result of only 2 reactors/reactor nuclear material stashes not hit by catastrophic accident. 435 have met the bad case disaster.

F(t) 40,000 <= zero. All of the present day reactors or stashes of radioactive materials associated with such reactors are gone! None left. Goodbye Moticello, goodbye Prairie Island, Indian Point, Diablo Canyon, Sequayah, browns Ferry, Peach Bottom. All gone.

But not really gone! Nuclear accidents are not like other types of accident like fire or flood or explosion. When a nuclear accident occurs, it isn't over after it happens. Whether dispersed into the global environment or still

remaining at the site of the accident, some gradually decreasing amount of radiation will continue to be a hazard to humans, causing cancers and birth defects and other problems for tens of thousands of years until, finally, the last of the radioactive materials have decayed into lead. The ravaging of life will continue for tens of thousands more years into the future, because there are substances like plutonium in the mix that are 2 million times more toxic than cobra venom and which have a half life of 24,000 years. In our model, by the time the last agglomeration of nuclear material associated with the last nuclear reactor undergoes catastrophic dispersal, the plutonium in the mix will have undergone only its first half life of decay, meaning that it will be a problem to any life that becomes exposed to it for hundreds of thousands more years.

So, I am saying that it is folly to think that there won't be another Chernobyl or Fukushima. I have tried to show with a simple model, that, given enough time all of the nuclear reactors in the world will go the path of Chernobyl or Fukushima. However the reader is almost certainly challenging some assumptions and saying "....But what about this? and this? So, let me take up some of these critical questions:

Question: 40,000 years! Who cares?

Well, it is just basic morality. We care about our children and other people's children probably more than anything else. We therefore have to be concerned about our children's environment and their children's environment, and so on. We are responsible for a good measure of the health of the planet. We have to be long ranged in our thinking.

Question: But you are going thousands of years into the future. The reactors of which you speak will be long gone – decommissioned or whatever? How can you calculate catastrophe to a reactor that isn't there?

The answer to this question is that the nuclear materials associated with a reactor (fuel plus waste) never go away until they decay ultimately into relatively harmless substances. In the beginning a reactor will have all fuel and zero waste. As the years go by, the waste as a ratio to fuel becomes greater and greater through time until the waste far exceeds the fuel. Both fuel and waste are extremely dangerous. It is hard to say which is most dangerous. A reactor may be decommissioned or whatever, but the nuclear materials associated with the reactor, especially the wastes, don't go away. They might be left on site, or they might be moved, but they have to be guarded to keep them out of the environment for thousands of years, or it is catastrophe. If you put the radioactive wastes from several reactors into one waste dump, you still have to deal with it. When there is a catastrophe to a

repository for waste from 100 reactors, you have an accident 100 times Chernobyl or Fukushima. It doesn't change the equation.

I do admit that the two mega accidents that we have been talking about – Chernobyl and Fukushima – were accidents where the point of the problem was meltdown of reactor core (fuel) rather than a catastrophic dispersal of spent fuel or waste. One could argue that I don't have a very good basis for predictions of accidents to nuclear waste. I concede a certain weakness in my argument along these lines. I just think in time the wastes are going to be more of a problem than the fuels, because of the sheer quantities and because it is easy to be careless with wastes – especially someone else's waste that is out of sight. What do you think?

Question: But you are assuming that the radioactivity of the materials associated with a reactor, especially the waste materials is constant through time, when they should be decreasing as the materials decay.

True. I haven't allowed for this. Probably should have. I will take someone smarter than me to plug this nuance into the equation. To me, when you have many pounds of plutonium in the waste of every reactor, and when it takes only 6 pounds, evenly dispersed, to kill every person on the planet[2], I don't find much comfort in the fact that some of the other nuclear materials have a much shorter life. And I do think that the decrease in radioactivity through time is somewhat offset, during the lifetime of each reactor, by the increase in quantity of wastes. In the long run, the danger of the wastes is exacerbated by the utter failure to find some safe underground repository for nuclear wastes. The recent accident to and closure of the temporary salt bed repository in New Mexico[3] underscores this point.

If this report seems glum, please notice that we haven't said anything about the dangers of catastrophic accidents at military reactors or research reactors, or other places in the nuclear power process, such as enrichment factories, fabrication factories, mining centers or reprocessing centers. Then, one could think about accidents at nuclear bomb stockpiles, or the ever present possibility of nuclear war or nuclear terrorism. Nuclear danger abounds.

Notes

1. According to the European Nuclear Society, as of August 28, 2014 there are 437 operational nuclear reactors in 31 countries with net capacity of about 375 GW or more. 70 are under construction.
2. Plutonium Shuttle; The Space Probe's Lethal Cargo, by Carl Grossman. Also, Idaho State University Radiation Information Network's Plutonium Essay by Gary Masters. Mr. Masters argues that one pound could

theoretically kill everyone if it be somehow ground into fine enough particles and if there were a way to distribute the dust through the atmosphere to all of the people equally. He says, as a practical matter this is impossible. This quote about 1 pound or 6 pounds of plutonium being enough to kill everyone on earth is also more or less associated with Dr James Goffman, Ralph Nader, Helen Caldicott, MD and others, Not everyone agrees about the exact details, But plutonium is one of the most dangerous substances on earth. The hundreds of pounds of plutonium associated with just about any given reactor are certain to be a big problem in any catastrophe such as Chernobyl.

3. Nukewatch Quarterly, summer, 2014 – "WIPP Leak Tracked to Kitty Litter Mishap"

Roger Cuthbertson 9/9/2014

rojo@visi.com

I will send the prem (take off on Dr Smith

From: Annelle Watts [mailto:AWatts@EurekaCountyNV.gov]
Sent: Wednesday, July 27, 2016 11:12 AM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: Abigail Johnson (saged183@gmail.com) <saged183@gmail.com>; Ronald Damele <RDamele@EurekaCountyNV.gov>
Subject: Response to IPC

Attached Letter: Response to IPC

Annelle Watts
Administrative Assistant
Eureka County Public Works
(775)237-5372
www.co.eureka.nv.us
Please note my email address has changed and is now: AWatts@EurekaCountyNV.gov

OFFICE OF
Eureka County Public Works

Administrative Bldg.
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www.co.eureka.nv.us

July 26, 2016

U.S. Department of Energy, Office of Nuclear Energy
Response to IPC, 1000 Independence Ave SW
Washington DC 20585
Via email: consentbasedsiting@hq.doe.gov

RE: Response to IPC

Eureka County, Nevada, provides this response to the Department of Energy's request for public comment concerning the development of a "fair and effective" consent-based siting process. Eureka County is one of the ten affected units of local government under Section 116 of the Nuclear Waste Policy Act as amended. Eureka County has been an active participant in oversight activities related to the Yucca Mountain project and has received direct payments in order to perform oversight as outlined in Section 116.

The Federal Register notice posed five questions for consideration.

1. How can the Department of Energy ensure that the process for selecting a site is fair?

The Blue Ribbon Commission on America's Nuclear Future (BRC) strongly recommended that the Department of Energy should not be in charge of nuclear waste disposal siting or management. The BRC recommended a quasi-governmental entity similar to the Tennessee Valley Authority. The BRC's recommendation should not be ignored. It was based on the fact that trust and confidence is integral to successful waste management and disposal.

Regarding the issue of fairness in the distribution of costs, benefits, risk and responsibilities, Eureka County is a Downwinder county. Our residents were subject to the airborne radiation affects of aboveground and underground nuclear weapons tests at the Nevada Test Site and still experience health effects today. We are acutely aware of the risks and fairness issues associated with unwanted federal facilities. **In** 2011 we initiated a Lessons Learned interview project (http://www.yuccamountain.org/lesson.htm) timed to coincide with the information-gathering phase of the BRC. We conducted extensive interviews with observers and participants in the County. The interviews revealed that trying to site a nuclear facility in an area already experiencing the ill-effects of a nuclear project is probably a mistake. Whereas it appeared that Yucca Mountain was an ideal site because of previous nuclear activity on the Nevada Test Site, it may have been just the opposite. Instead

of being welcomed by state and local governments, the state and many local governments were skeptical of another "safe" project from the same agency that made promises of safety about nuclear weapons testing and instead harmed residents.

To be fair, the "consent" should also include local units of government directly affected by the project, but are not the proponents who are advocating for the site. This is true whether it is a site such as Yucca Mountain in Nevada where the facility was proposed to be developed on federal land by the federal government, or the PFS proposal in Utah where the facility was proposed by a private entity on Tribal lands. Without allowing residents who have a direct stake in the outcome to participate in the "consent based" process, true consent cannot be obtained.

2. What models and experience should the Department of Energy use in designing the process?

Other countries have pursued a less politicized site selection process. The Nuclear Waste Technical Review Board and the Blue Ribbon Commission have gathered some of that information and other sources exist, perhaps even within DOE, to capture and analyze the siting process of other countries for nuclear waste sites, and for other large controversial projects.

The Nevada experience, decades long, provides some indicators of what not to do. The DOE picked the site without Nevada's consent and then spent decades and millions of dollars to justify the site rather than to objectively consider it and compare it to other sites.

The DOE should consider environmental justice, not only the definition in the Executive Order, but also the broader challenge and concern of siting an unwanted project in a community or area desperate for jobs and economic uplift, or in a rural area which is considered to be politically weak or expendable.

Always consider transportation and emergency response. If the project siting does not take transportation access and impacts into consideration, it will be even harder to get consent. In the case of Nevada, Yucca Mountain does not have, but requires rail access. By considering the site's attributes apart from the transportation challenges, it made it much harder to accomplish the project. The nature of governmental institutions is to concentrate on the part of the project within their authority and domain. It is a mistake not to have a systems analysis and the big picture as a top priority at all times. Management by an organization tasked to consider both siting and transportation would improve the process.

3. Who should be involved in the process for selecting a site and what is their role?

For site selection to succeed, there must be a common understanding among all affected parties which includes the Governor and state agencies, Native American tribes, units of local government including counties and cities/towns, regional groups, university involvement, and transportation and emergency services, and non-governmental organizations and civic groups. The process should clearly state at what points the state and affected units of local government can "opt out" and identify the point of no return, when the state and community are committed to moving forward with the project.
Adequate and consistent oversight funding to ensure that participation is not a burden is essential. Involving the critics and being able to address their concerns builds organizational credibility for the

project proponent and improves chances that public trust and confidence will be assured. As was proven many times in the Nevada experience, public trust and confidence is a building block for a successful project.

4. What information and resources do you think would facilitate your participation?

Eureka County has years of experience as an affected unit of local government, with direct payment funding from DOE to participate in oversight activities. Oversight funding which is adequate is essential to ensure public involvement and participation. This funding should be available consistently throughout the planning process. It is also useful and productive to ensure that non-governmental organizations with specific interests be able to participate. Information resources are also essential, through websites (for example in our case www.yuccamountain.org) newsletters, and social media (which did not exist for most of the time that Yucca Mountain was considered.) Activities and organizations asking the hard questions should be encouraged rather than stifled because a consent-based siting will only work if the process is transparent and the hard questions can be answered.

Any funding for information dissemination should be provided to enhance public understanding, not to further the point of view of the project proponent. Public libraries are great but underutilized resources for this.

Information about transportation should be an integral part of the public education process. DOE's pattern is to set transportation aside, to be considered after siting. This mistake during Yucca Mountain site characterization should be instructive for a new siting process.

5. What else should be considered?

Transportation and emergency response. We cannot emphasize enough that if transportation and emergency response impacts are set aside or deemed to be secondary considerations, it is a mistake.

Consent-based siting is easier said than done. The Nevada experience is instructive of what not to do. As long as a forced siting process remains active, it will be very hard to move forward with consent-based siting.

We appreciate the opportunity to provide comments on consent-based siting.

Sincerely,

Ronald Damele, Director
Eureka County Public Works

From: Diane D'Arrigo [mailto:dianed@nirs.org]
Sent: Sunday, July 31, 2016 6:52 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>; Secretary Moniz <The.Secretary@hq.doe.gov>
Subject: Response to IPC: Comments of Nuclear Information and Resource Service and Sierra Club

Attached are the comments of **Nuclear Information and Resource Service** and the **Sierra Club**
in response to DOE's invitation for public comment to inform the design of a consent based siting process-- http://www.energy.gov/ne/consent-based-siting.

US Department of Energy
1000 Independence Ave SW
Washington, DC 20585

Consent-Based-Siting Consultation comments
Submitted via email: consentbasedsiting@hq.doe.gov
Cc: The.Secretary@hq.doe.gov

July 31, 2016

Secretary Moniz:

The Department of Energy's (DOE) consent-based siting initiative has no basis in policy or the public interest, and is simply a vehicle to put the short-term interests of the nuclear power and radioactive waste industries before the need to protect public health and safety and the environment. In short, DOE is putting the nuclear cart before the horse. DOE has no authority to pursue such a siting process for consolidated storage of commercial nuclear waste. The Nuclear Waste Policy Act (NWPA) and the DOE's Standard Contract with nuclear power generators explicitly state that the federal government may take title to and possession of the waste from commercial nuclear power generation when a repository is in operation.

DOE should abandon efforts to develop "consent-based siting" until it has a credible program for the very long-term management of nuclear waste. The Department must also demonstrate that it respects fundamental principles of public consent by honoring the decisions of communities that have rejected nuclear waste facilities. The first evidence of such a change in the agency's practices would be to lead the process to end the Yucca Mountain Repository Program in Nevada. The State, the People of Nevada and the Western Shoshone People have said 'no' to the proposed repository, and while DOE has ceased work on the project, rather than informing Congress of the need to get the waste program back on track by first removing Yucca Mountain from consideration, the agency is instead focused on consolidated storage proposals that could ensure the repository program's permanent derailment.

DOE's recent decisions to conduct testing for deep borehole storage technologies in North Dakota and South Dakota do not inspire confidence in the agency's commitment to respecting public consent. DOE unilaterally announced its plans to conduct testing without consulting with North Dakota beforehand, and only rescinded those plans after state officials and residents registered vociferous opposition. DOE then promptly went on to repeat the same process in South Dakota. The fact that the DOE staff never held a public meeting in either Texas or New Mexico in this consent-based siting "consultation" process substantiates our view: this "process" is out of line, out of context and out of order. And at no point in the "consultation" did DOE

inquire of reactor site host communities whether there are conditions or criteria that would make them more willing to continuing storing nuclear waste for the interim storage period, thereby avoiding new facility siting and licensing, as well as redundant transportation of waste.

DOE is demonstrating its lack of sincerity about wanting to know what constitutes consent by failing to take the initiative to ask in places now targeted for such sites in Texas and New Mexico, where applications are known to be underway. Even worse, DOE reported at its meetings that communities were interested when residents of those states and communities are objecting/stating that they do not consent.

The top goal for managing nuclear waste must be to cease producing it and to isolate the waste we already have from the environment. The only rational basis for an "integrated management plan" for highly radioactive spent (irradiated) nuclear fuel is to:

- To terminate the production of nuclear waste.
- To provide for secure interim storage at, or as close as possible to, the site of generation.
- To determine scientifically viable, environmentally responsible, and socially just and equitable methods for its long-term management and isolation from the biosphere.

More than 100 organizations have endorsed improving the storage and security of nuclear waste at reactor sites through Hardened On-Reactor-Site Storage (HOSS). HOSS would first move waste (when sufficiently cooled) out of fuel pools to robust, hardened dry-cask storage, reducing the hazard of catastrophic fuel pool fires and better protecting the waste from natural disasters, industrial accidents, and military or terrorist attacks. HOSS would improve the safety and security of this waste for interim storage at, or as near as possible to, the reactor sites where it is generated.

We oppose Consolidated Interim Storage CIS (formerly termed MRS Monitored Retrievable Storage and AFR Away From Reactor storage). We also oppose transportation of waste to new sites unless and until it is to a permanent site, or if the current location is demonstrated not to be suitable for storage of waste during the interim storage period, and that lower-cost, lower-risk modifications and enhancements to on-site storage are not available, such as Hardened On-Site Storage. The Nuclear Waste Policy Act does not allow Monitored Retrievable Storage sites, now termed Consolidated Interim Storage, until a final repository is operational and we support that linkage as essential to the success of the federal government's nuclear waste management mission.

The consolidated storage facilities under consideration would use precisely the same technology and dry-casks currently available for storage at reactor sites, with containers on a concrete slab with a fence. The only substantive changes would be the added hazards and insecurity of transportation, and the unprecedented amount of nuclear waste to be stored in this configuration at one or more centralized additional sites, both of which are security risks. Consolidated storage facilities would be little more than "parking lot dumps" for nuclear waste.

If these facilities turned out to be temporary as intended, then, by definition, each container would move at least twice, compounding transportation hazards. Depending on how long the waste remains in an interim consolidated storage system—awaiting DOE's development of operating repositories or other long-term storage facilities--waste may need to be transported multiple times, as community consent periods expire and require siting of new consolidated storage facilities. Conversely, if consolidated storage sites devolve to *de facto* long-term or even permanent waste sites, there would have been no technical qualification or scientific basis for choosing them for the purpose; the willingness of communities to support the siting of temporary storage facilities would be violated; and the consent-based process would be meaningless, if not fraudulent.

The Nuclear Waste Policy Act is correct in requiring DOE to have a permanent facility licensed and in operation before the agency can take title to and transport civilian nuclear waste. The central problem afflicting nuclear waste policy in the United States is the selection of Yucca Mountain as the sole site to be considered for a nuclear waste repository. Yucca Mountain was chosen by Congress through an unscientific and politicized process of elimination, excluding all other sites before Yucca Mountain was studied to determine whether the site could isolate the radioactivity in this waste.

The first step to getting nuclear waste policy on track is to remove Yucca Mountain from the US nuclear waste program. The second step is to cease the production of waste. And third is to make energetic progress on scientific research to identify feasible technologies and types of geological locations for isolating the radioactive materials in nuclear waste from the environment for a million years, so that storage at or near reactor sites will actually be "interim" on the scale of human generations. Only once scientifically viable and environmentally responsible nuclear waste storage methods are developed—and the options and risks for nuclear waste storage are known--can public consent to the siting of nuclear waste facilities be possible, much less play a meaningful role in the process. To pursue consent before there can be public confidence in nuclear waste management first is deceptive and irresponsible.

The Department of Energy has gone rogue in pursuing consent-based siting for consolidated storage first and suggesting that the public's input has any value when the agency has no statutory authority to pursue such a program. Unless and until Yucca Mountain is removed from consideration under the Nuclear Waste Policy Act, there can be no progress on a legal and scientifically viable site. The current DOE administration must stop scapegoating the NWPA for prohibiting consolidated storage independent of an operating repository, instead of offering candor in admitting that the Department of Energy failed in its effort to implement NWPA. Consolidated storage only increases the risks of nuclear waste, and does nothing to advance credible solutions to the long-term management and isolation of radioactive materials.

COMMENTS ON DOE'S FIVE QUESTIONS:

As part of the consent-based siting initiative, the Department poses 5 questions to the Public:

1. **How can the Department of Energy ensure that the process for selecting a site is fair?**

The Department currently has no authority to select a site, therefore it should ensure that the process is legal before it worries about whether it is fair.

DOE should do all within its power to limit the amount of radioactive waste so there is a finite amount to be isolated for the eons it remains dangerously radioactive. DOE should stop providing subsidies, tax incentives, loan guarantees and signing contracts to take back more waste that would be created by new reactors.

DOE should abandon the idea that anyone other than those with a direct business interest in nuclear power or radioactive waste ever says "yes" to nuclear waste, and then only because they are statutorily exempted from ultimate liability for its management. At this juncture, DOE and the US federal government must understand, acknowledge and respect decisions by states and local communities to reject nuclear waste. In order for the public to have any confidence in the DOE's waste management program after 36 years of failure to heed public input, the Federal Government, as embodied by the Department of Energy, must demonstrate that it will forego siting of nuclear waste facilities when the affected localities reject them.

When the Department has authority, in the future, to pursue a siting process, then a clear published proposal for the purpose, function(s) and regulation of a hypothetical site must be provided before the process of site selection begins. Any communities that are considering becoming the host for such a site should be able to (at the very least) review the standards the site must meet as well as projections on how and why the site might fail to meet those.

We support state authority to be more protective than the federal government especially regarding nuclear waste. Key to a truly volunteer / consent-based siting is the authority of the jurisdictions. Various states have passed laws asserting the authority of the State over aspects of nuclear waste storage. These laws must be respected, as long as they are at least as protective as federal regulations, and if DOE is serious about an enduring waste host function, then even encouraged.

In nearly any geographic area, the impact of a waste site will extend beyond the boundaries of the political jurisdiction in which it is located. It is a hollow concept to allow one community to consent, and not others that will be affected. It must include all potentially impacted residents, communities and jurisdictions (local, regional, state, federal, international, tribal, etc) including those along all potential transport routes, downwind and downstream and sharing aquifers and bioregions.

2. **What models and experience should the Department of Energy use in designing the process?**

DOE should follow the steps outlined above under #1 starting with limiting the amount of waste produced. DOE is only authorized to pursue development of one repository, with a statutorily

limited capacity of 70,000 metric tonnes. The inventory of civilian nuclear waste already exceeds that limit, and is expected to total nearly double that amount if the current fleet of reactors operate to the end of their operating licenses, necessitating the development of at least one more repository or other long-term storage facility. It is negligence to support the continued licensing and operation of new reactors, and subsequent license extensions for existing reactors.

In addition, opposition research should be funded as per the Canadian model which has, at points, given one percent of a project's budget to its opponents for intervention.

And further, any community that is considering volunteering should have access to technical assistance funds that are not constrained—i.e., permitting the community to hire any consultants they wish, to answer any questions they have. Accepting money for this purpose should, in no way, obligate communities to become a potential site, nor should it imply consent.

If a community consents to facility siting it should have ongoing technical assistance funding. The so-called "Low-Level" waste authority in Pennsylvania adopted principles in the 1990's that could and should be adopted here, including guaranteed healthcare for anyone within a radius of the evacuation zone with the rebuttable presumption that the site is the cause of any and all illnesses.

Finally, there are problems with containers that make any future waste isolation facility challenged. A key component to the original repository program of the 1980's was the definition of the "waste form." Today that concept is in jeopardy in part because of the shift to high-burn-up fuel, and now, in part due to the failure of waste containers. At one time there was a theory that casks based on canister systems could substitute the canister for the waste form. This idea is not supported: canisters in use today are thin-walled steel and subject to heat, corrosion and stress. These forces can lead to cracking. Unfortunately there is no current method for testing the containers for cracks, calling into question whether these containers are suitable as shipping containers let alone permanent waste-form for isolation. The decision by licensees to use casks not compatible with the DOE's well-established waste-form requirement should not increase the taxpayers' liability for its long-term management. The DOE CIS plan proposes to transport and store canisters that cannot be inspected or adequately monitored to prevent radioactive leaks. Thus, DOE might want to consider the rationality of its rush to accept and ship this material.

These are offered as examples, not the full scope of the rights and responsibilities that should be defined in the event of a new nuclear waste site.

3. **Who should be involved in the process for selecting a site, and what is their role?**

As indicated above, there is no meaningful role for consent unless and until there is a scientifically credible, environmentally responsible proposal for the long-term management and isolation of nuclear waste. Only when there can be public confidence in the waste storage options being proposed, and the full implications and impacts of a siting such a facility be known, can affected members of the public be expected to provide their consent. In addition, the management of nuclear waste inherently involves intergenerational impact, in that the vast majority of people who will be impacted by this waste are not yet born. There is no easy answer

to this problem, but it therefore necessitates that DOE's efforts align with the goal of the long-term isolation of radioactive materials from the environment;.

4. **What information and resources do you think would facilitate your participation?**

Funding for interveners per # 2.

5. **What else should be considered?**

The policy framework of the Nuclear Waste Policy Act (NWPA) must be preserved and respected. With minor adjustments, NWPA could and should stand as the road-map for the permanent isolation of radioactivity generated by nuclear power. The requirement that a repository be licensed and operating before pursuing consolidated storage, and specifying waste-form requirements for acceptance of civilian nuclear waste into federal custodianship, set the priorities and responsibilities for long-term waste management. DOE must adhere to and align its waste management program with that framework rather than circumvent, undermine, or abandon it.

Respectfully Submitted,

Tim Judson, Executive Director
Mary Olson, Southeast Office Director
Nuclear Information and Resource Service
6930 Carroll Ave Suite 340
Takoma Park, MD 20912
timj@nirs.org; maryo@nirs.org

Susan Corbett, Chair, Nuclear Free campaign
John Coequyt, Director, Federal and International Climate Campaign
Sierra Club
50 F Street, NW, Eighth Floor
Washington, DC 20001
John.coequyt@sierraclub.org; scorbett@mindspring.com

Consent-Based Siting

From: Madavis95 [mailto:madavis95@aol.com]
Sent: Tuesday, July 26, 2016 5:07 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

To U.S. Department of Energy,
Office of Nuclear Energy

I have read the outlines of the proposal for handling nuclear waste which is being considered and find it appalling. Transporting nuclear waste is extraordinarily dangerous and storing it in communities that may be poor and need support is unconscionable. I understand the problem of disposal is a terrible one, and we are not paying for this dangerous and dirty form of energy, but I do NOT consent to this plan.

Sincerely,

Dr. Martha Davis

The Commonwealth of Massachusetts
MASSACHUSETTS SENATE

SENATOR VINNY DEMACEDO
Plymouth and Barnstable District

STATE HOUSE, ROOM 313C
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Ranking Member
SENATE WAYS AND MEANS

DISTRICT OFFICE
SUITE 229
10 CORDAGE PARK CIRCLE
PLYMOUTH, MA 02360
TEL. (508) 747-6500

June 1, 2016

Mr. Stephen G. Burns
Chairman
Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Burns

We write to you today as concerned elected officials representing the residents of Plymouth, Massachusetts and the surrounding communities. We and our families live in and around Plymouth and are rightfully proud of our beautiful region.

For many years, one of Plymouth's local businesses has been Entergy's Pilgrim Nuclear Power Plant. While providing energy to the region, the plant has also been accumulating a great deal of nuclear waste in the form of spent fuel rods. This has become a constant and growing concern to all of the residents of the region. As we continue to meet with NRC officials and local citizens who are worried about the spent fuel being stored onsite, we recognize that for the near future and until a permanent national storage solution is found, the spent fuel will remain here at Pilgrim.

We appreciate your efforts to explore new siting possibilities for this spent fuel, and would certainly welcome any viable alternative site. As you know, the proposed Yucca Mountain storage site will never be able to receive spent nuclear fuel from any nuclear power generating station in the United States, including Pilgrim. We and other elected officials from the Town of Plymouth have advocated for other solutions and alternative sites for this spent fuel. We are relieved to see the fuel being moved to dry cask storage, but would like to see it completely transitioned as soon as possible, and we in no way see dry cask storage as a permanent solution.

Under these circumstances, we see the Town of Plymouth currently serving as a de facto nuclear repository and, with the quickly approaching 2019 end of operations at Pilgrim, are deeply concerned about the remaining spent fuel and its impacts upon the residents, the environment and the public safety of the town. We therefore are seeking appropriate assistance, including financial compensation, from the NRC, our federal government, and the Department of Energy's Nuclear Waste Fund. While we support your efforts to find a consent-based solution to the spent fuel

storage problem, the burden of the spent fuel at Pilgrim continues to fall directly and solely on the Town of Plymouth with no mitigating benefits. This spent fuel was never intended to be stored in Plymouth permanently. We ask your support, advice and cooperation in providing adequate compensation to the Town and its residents until a future permanent fuel storage location is established and the spent fuel is removed from Plymouth.

We thank you for the opportunity to address this critical issue and hope to continue working with you to resolve these concerns in a manner which fairly compensates the residents of Plymouth for the environmental, safety, and logistical consequences of creating a de facto spent fuel repository in America's Hometown.

Sincerely,

Senator Viriato M. deMacedo
Plymouth and Barnstable

Representative Mathew Muratore
First Plymouth District

Representative Thomas J. Calter
Twelfth Plymouth District

Representative Randy Hunt
Fifth Barnstable District

The Commonwealth of Massachusetts
MASSACHUSETTS SENATE

SENATOR VINNY DEMACEDO
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Senator Viriato M. deMacedo
Plymouth and Barnstable

Representative Mathew Muratore
First Plymouth District

Representative Thomas J. Calter
Twelfth Plymouth District

Representative Randy Hunt
Fifth Barnstable District

WINDHAM REGIONAL COMMISSION

Engaging Nuclear Plant Host Communities to Inform Multiple Federal Agencies across Interrelated Policy Issues Concerning Nuclear Plant Closure, Decommissioning, and Spent Fuel and Waste Management

Multiple federal agencies would benefit from having an organized group of nuclear host local communities to provide local government stakeholder input on policy matters related to spent nuclear fuel, nuclear waste, and nuclear plant closures and decommissioning. Specific issues include integrated waste management and consent-based siting of spent fuel and high-level radioactive waste, spent fuel transport, and decommissioning rulemaking discussions. Relevant agencies include the Department of Energy, the Environmental Protection Agency, and the Nuclear Regulatory Commission, but also the Economic Development Administration and Department of Agriculture as communities – especially rural communities – plan for socioeconomic impact mitigation in the wake of the closure of a major contributor to employment, household income, and local taxes. This need will become all the more relevant as the current wave of nuclear plant closures continues.

Engaging host local governments in the consideration of multiple interrelated nuclear plant closure, decommissioning and waste policy matters would establish a cadre of well-informed local stakeholders who are most directly affected by plant closures to advise multiple federal agencies. Communities that host nuclear power plants should be actively and substantively engaged in policy deliberations from the outset. The Nuclear Energy Institute serves as a unified industry voice and has formed a Decommissioning Task Force to advise the NRC and other federal agencies. We believe it is in the best interest of the public, the federal government and the industry to have host communities similarly engaged. It would also create a core group of nuclear plant host community stakeholders which could engage with potential consenting waste-receiving communities.

An organization such as the National Association of Development Organizations should be supported to convene host local governments. At issue is the mitigation of local impacts of nuclear plant closures, orderly redevelopment, and the relationship of these goals to federal policy. An entity like NADO could convene host governments to 1) document the local experience of past closures and decommissionings including economic, fiscal, employment, and environmental impacts; 2) assess host community costs, benefits and risks of different closure, decommissioning and fuel and waste management scenarios; and 3) forming a Host Community Closure, Decommissioning, Fuel and Waste Policy Task Force to solicit input from the larger group of affected communities to provide local government stakeholder insight for multiple federal agencies across a range of interrelated policy issues. This would be similar to NADO's work funded by the Economic Development Administration to document local resilience responses to multiple disasters in the 2011-2012 timeframe.

Contact:
Chris Campany, Executive Director
Windham Regional Commission
139 Main Street Suite 505 Brattleboro, VT 05345
ccampany@windhamregional.org cell 802-380-3511 office 802-257-4547 x106
www.windhamregional.org

Consent-Based Siting

From: Brian Donovan [mailto:donovan2419@comcast.net]
Sent: Thursday, July 28, 2016 9:39 PM
To: Consent Based Siting
Subject: No Consent-based siting public comment What to the people even know?

Don't ya think ya should have had a workable plan before you made all this waste?

Seriously? What do the people consenting know about nuclear wastes? what a stupid plan.

Classify it, then break the glass up and mix it with concrete to where is no more radioactive then 1% uranium ore. then drill holes in huge rocks, and put the concrete slugs in those, then bury 100's of meters below the ocean floor on a subduction plate.Last I read, this was the most acceptable plan, except for the costs, and the need for multi nation international observers on every ship, to prevent just dumping it overboard.

Brian Donovan

98684

Consent-Based Siting

From: Rosemary Doyle [mailto:rdoyle@cheerful.com]
Sent: Monday, July 11, 2016 2:27 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Process needed to manage spent fuel and high-level radioactive waste feedback

These comments refer to your request for continued feedback on facilities for storing spent fuel from nuclear power plants.

It is not fair to use any site within 50 miles of residents to store the spent fuel. It is high risk to those residents Residents have the right to vote on this problem of storage.

There no successful model for storing spent-fuel. Please invest and request science]to develop a safe process for storing or recycling spent-fuel. Future generations depend on you.

What are your results of previous call for feedback on this topic? I believe it was to be completed at the end of June.

Information is needed from the scientists who have worked on this or are now working on a safe disposal process. My vision is that since science created nuclear power, they can determine a safe disposal process for the benefit of humanity.

My request is that funds be delegated to a scientific resolution that would not put at risk current and future humankind.

Respectfully,

Rosemary Doyle, Director of Education
Citizens for Peace
31648 Pembroke
Livonia,MI 48152

Consent-Based Siting

From: Kathleen Drury [mailto:japaneselindsay@gmail.com]
Sent: Friday, July 29, 2016 10:14 AM
To: Consent Based Siting
Subject: My Comment: No DOE Consent-Based Siting Process for Nuclear Waste

Dear Secretary Moniz,

I strongly urge you and your organization,the Department of Energy/DOE to not allow enactment of any, misleadingly-called by the way, consent-based siting initiative/CBSI.

CBSI does NOT put protecting public health first, by any means. In that same vein, immediately the making of nuclear waste should stop. Therefore, the Nuclear Waste Policy Act is correct since nuclear waste does exist.

Kathleen Drury
7661 N. Sheridan Rd.
Chicago, IL 60626

US Nuclear Energy Foundation

"Evangelizing Nuclear Advocacy by Bringing Science to Citizens"

A Non-Profit 501 (C)(3) Nevada Foundation
PO Box 2867, Sparks, NV 89432 (775) 224-2089
www.usnuclearenergy.org Email comments@usnuclearenergy.org

Public comment to the U.S. Department of Energy

The DOE's effort to work collaboratively with the public, communities, stakeholders, and governments at the state, tribal and local levels, when it comes to siting nuclear waste facilities

07-14-16

Dear Sirs:

The US Nuclear Energy Foundation would like to submit our public comment concerning Consent Based Siting of Spent Nuclear Fuel facilities, (wrongfully termed as nuclear waste). This dilemma has been caused by the state of Nevada's "political opposition" instead of a "reasonable analysis of science based fact".

"In 2015 the retirement of **Rep. Rush Holt (D-NJ),** for 16 years was Congresses resident astrophysicist, for several years a string of departures by members **trained in the sciences**." This leaves Reps. **Bill Foster (D-IL)** and **Jerry McNerney (D-CA),** as the only remaining members who hold **doctorates in the natural and hard sciences out of 535 senators and representatives.** Our countries future is dealing with issues concerning advanced technology science and engineering. It is very concerning to common sense citizens that our political representation in Washington DC is seriously lacking in representation from science and technology.

For the past decade we have been researching spent nuclear fuel data and the dialogue between science data political and media representations of this dialogue. Speaking as the grassroots public, we are concerned that the Department of Energy and Nuclear Regulatory Commission and other such agencies are being micromanaged by politics, instead of oversight by Congress. We do not feel this represents American citizens, especially in the matters of science and technology. We are here to emphasize again, that our grassroots citizens have the common sense to request that our scientific agencies and national laboratories be allowed to operate autonomously through oversight and not micromanagement. It is one thing for Congress to offer an opinion but it is another thing to execute political obstruction without substantiated cause.

In the case of Nevada and the Yucca Mountain repository, the public have not been provided a sufficient or equal understanding of the science versus the politics. During the entire 30+ year dilemma of the Yucca Mountain facility its safety determination was designed to be achieved by the completion of the Yucca Mountain Application Process. Partisan politics caused this obstruction

by defunding the funds for its completion instead of changing federal law in the context of the Nuclear Waste Policy Act. Common sense would rule that if they cannot change the law than the law as passed should be upheld.

This first page represents our primary message to the DOE concerning consent based siting. In an effort to save time we will conclude this verbal portion of our message but in our submitted public testimony a couple more pages go on to detail some further recommendations.

We thank the DOE for providing us this opportunity to address the topic of consent based siting.

Continuing we would like to provide a further recommendation to the Department of Energy to establish a National Above-Ground Temporary Storage Facility for America's Spent Nuclear Fuel (SNF). The removal of these materials from some 70 different sites nationwide is long overdue because of the above stated political obstruction. It is only correct in serving the citizens of this country that the DOE would initiate a process to establish a National Above-Ground Temporary Storage Facility. In respect to, either reconsideration of Yucca Mountain and or some other community approved siting, the DOE through congressional approval, should develop a mechanism to relieve the nuclear waste materials from the private nuclear companies, who have been forced to retain them for long after the original contractual basis.

We would also indicate that USNEF a non-profit 501 (c)(3) Nevada Corporation would be willing to function as an "orchestrating entity" in this process. We are currently seeking support participation through Nevada's major corporate stakeholders. We maintain an excellent advisory board whose mini bios can be referenced on our website. We are aware that the Texas-based Waste Control Specialists are actively moving with their SNF interests but Nevada still remains a logical location.

To explain our position; politics, corporate lobbying, legislation, etc. are all hitting road blocks when it comes to dealing with national controversial public policy "issues" which government is struggling to resolve. The DOE has been facing this struggle for the past 30+ years with respect to the nuclear waste repository. Our past decade of effort has taught us that a "community friendly" public can only be achieved through significant grassroots education. It seems now, that it is only since the discovery by the Blue Ribbon Commission that fulfilling grassroots education is the KEY to "community friendly acceptance".

One of these issues is the completion of the Yucca Mountain Repository. Most issues can be resolved if only these entities would be more willing to negotiate variables. The industries who provide a scientific analysis of nuclear technologies must coordinate with the government in educating the grassroots public on issues of this importance and magnitude in a manner that promotes the values of their policies to the people in a way that truly connects with them. Government programs do not provide enough public awareness. Grassroots education should be assigned to 3rd party independent foundations, who by nature, have more skin in the game, with an open and flexible line of communication with the public.

Just last week, July 7th a contingent of Nevada representatives provided testimony to The Committee on Energy and Commerce. Nearly 70% of the discussion in this testimony has also been recommended over the past decade by many other organizations, e.g. The American Nuclear Society, Nuclear Energy Institute, U.S. Chamber, Institute for 21 Century Energy, etc. This demonstrates an overall cohesiveness that nuclear technology including the Yucca Mountain issue has been proposed by many, many impartial organizations, but, the fact remains, government, the DOE, NRC, industry, etc. the grassroots have not been effectively educated about the issue.

USNEF is suggesting that the DOE, NRC, etc., consider a local message provided by a "local entity." Engaging in local grassroots messaging, contractors, etc., provides a GREATLY improved potential

for “community acceptance.” We as citizens, have to understand that bureaucratic stalemates are NOT resolving our important technical public problems. The only way we may be able to engage in correcting this is with a completely “out-of-the-box” paradigm shift in the public policy messaging that reaches across party lines into the real world of the citizens most affected by these issues.

We are asking that Congress, the DOE, you and your colleagues review our recommendation with an open mind and advance our recommendations to the appropriate Congressional committees. It is a long process to modify standard procedures, but it is important to evaluate processes that reverse a stalemate. If a laws exist hinder such processes, then let’s change the laws, especially when conditions exist that support common sense to achieve the resolution.

We are offering a method to rebrand, reprocess and renew the misunderstanding about spent nuclear fuel which has been incorrectly termed as nuclear waste. In 2013, a paper was submitted by Kenneth D. Kok, PE Richland, WA to the 15th International Conference on Environmental Remediation and Radioactive Waste Management on the current state of America’s used reactor fuel. His baseline analysis was done on 70,000 metric tons of spent fuel from analytical data recorded by the Energy Information Administration. His calculations indicate that the retail value of our 70,000-ton stockpile has a value of $53 trillion dollars when extended through the entire cycle (2013) dollars.

We recognize that the dilemma with Washington is the investment into a major commercial size reprocessing facility and public perception thereof. We continue to purport that everything nuclear should be amortized over 70 years because that is the average operational functioning life of nuclear technology, as proven in time. In February 2016 we presented a program to the Advanced Reactor Technical Summit III in Oak Ridge Tennessee. Our take away from this summit links also to the economic dilemmas of Yucca Mountain and reprocessing technology. Part of our revised program will deal with the economics of advanced nuclear technology. The process of new nuclear development is more complex than any other industry. The venture capital industry needs a framework of overview education specific to the nuclear industry.

In addition to Yucca and Advanced Reactor symposiums, we believe there may exist a need for Advanced Reactor Technical Symposiums - “Venture Capital”. Nuclear has always been a unique business model and one seldom fully understood by its participants. In the venture capital world their normal startup to “returns” commencing is about 10 times investment return in 5-years. In the nuclear world, we’re looking at 10 to 30-year timelines. The nuclear industry has always faced plant amortization after 30 years of operation to net profit cash flow generation, by design run up to 80 years. We need to develop a “special breed of venture capital investors”, seeking development of a “Nuclear Billionaires Club”; to cultivate science investors with a method of moving offshore “cash troves” of funds back to the U.S. by authoring legislation allowing avoidance of tax penalties if they commit to 30+ year investments of advanced nuclear technology that would produce “returns” to their businesses or foundations for later years of funding continuation. Maybe termed as “Legacy Economic Repository Investments”?

Meanwhile, the shutdown of Yucca Mountain is costing taxpayers billions in legal suits and national security for non-performance by the contract of the DOE, for non-removal of the spent fuels from the power companies’ onsite storage. We would rather see these funds applied to the construction of a national temporary storage facility, basically developing it into a multi-trillion-dollar safe deposit box. We know that the world’s 270,000 tons of used fuel CAN be reprocessed, the issue has ALWAYS been initial economic investment and awaiting the development of molten salt reactors capable of burning that spent waste. When science and engineering provide a dilemma, this is when Congress should focus on logically based decision making and educated constituent sentiment, NOT on Congressional bickering and personal egos. If we are indecisive about a million years of storage safety, we should AT LEAST accept a 200-year resolution by science?

In this light, we believe that Nevada has several locations that would be an excellent site for a national temporary above ground SNF spent nuclear fuel storage facility. It could help fend off the lawsuits making those costs available for construction and operation of the facility. Our current mission is precisely this, to educate the grassroots constituents about the common sense of "ISSUES" resolutions and having them bring it to their representatives. Below are some of the advantages.

Above ground spent fuel rods cask storage systems horizontal and vertical methods

There is a degree of consideration with or without the DOE completing or re-siting a permanent storage facility at Yucca Mountain. A high probably exists that the final selection site would be located in an expansive desert location in the Western U.S. This makes Nevada an ideal CENTRAL location for such a temporary above ground transfer facility. Nevada offers 100% security as our military test ranges provide a high-security profile over much of the desert land mass.

- There is a push in Washington to move more DOD operations and facility management to the private sector reducing the costs of military operations. This same push could be applied to the DOE, NRC and the management of SNF nuclear waste and its security. The private sector has developed much of our U.S. nuclear industry and throughout the world, yet federal agencies manage it through regulation which is necessary but, at the same time should require common sense. In most of these government versus private industry tag team events, the public almost always falls short in the educational process provided by the agencies and industry sector. Public policy must rebrand, reuse, recycle education about nuclear energy technology and its waste repository alternatives and economic facts. We need to re-engage President Eisenhower's 1953 "Atoms for Peace" speech to the United Nations.

- The establishment of an above ground SNF facility managed by the private sector would be an asset to all rural Nevada Counties providing jobs, taxes, and spinoff local commerce. Nevada needs to diversify its economy into advanced high technology and this can be encouraged by logical common since utilization of its land AND a successful education of its citizens in reprocessing technology.

- Projects such as this would include business development in rural areas for robotics, drone surveillance applications, high-tech concrete technology and many other spinoff services, construction, housing, restaurants, hotels, etc.

- When we consider that the AREVA Company in La Hague France receives 250 requests annually for plant tours of that high tech facility and the public walk on the floor underneath which, spent nuclear fuel remains, the notion that these sites are dangerous loses clout. This is the message we need to bring to the grassroots public, Rebrand,

Reuse, Recycle. When government and this industry unite in this task, the people, (Congressional constituents) will re-frame "their" values to include the benefits of nuclear technology in the Western U.S.

- The current above ground systems we have developed over the past 40 years have proved their stability. There is no question that moving these casks to a "national SNF center" from 72 diverse locations around the country would be a much more secure resolution for the public.

- At the same time, this program would provide the resolution of removing these materials from power plants so that they can extend their operating licenses and continue cost effective operations based on their originally designed above ground storage facilities, not having to expand locally which would continue to offer a complex security situation.

- Another very important consideration is that we are aware that several of our National Laboratories, and other spent nuclear materials facilities, are experiencing leaks and additional capacity overloading. It is only fair to suggest that engineering, materials and technology we had available for temporary containers 40 years ago are not capable of spent fuel radioactive lifetime safety. It is also only fair to suggest that most of these materials were planned to be moved to the Yucca Mountain facility 20 years ago. It is this political dilemma that has prevented our government agencies from accomplishing a safe timely management of our radioactive materials. We have to get this educational awareness into our public policy engagements and directly to the public conscious itself. This is the mission of the US Nuclear Energy Foundation.

- USNEF is hopeful to generate and submit grant application funding and industry support that will provide us with the ability to get our nuclear advocacy and SNF educational material to our citizens.

We cannot expect to secure public acceptance without adequate educational awareness of "issues" to the grassroots public. This may be one of the most important factors that we should all address as we have a growing divide between, governments its agencies, business, science and grassroots public.

Gary J Duarte, Director

US Nuclear Energy Foundation

Consent-Based Siting

From: Consent Based Siting
Sent: Monday, July 25, 2016 11:00 AM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: FW: Our comments

From: GJD Comments <comments@usnuclearenergy.org>
Sent: Friday, July 22, 2016 2:29:16 PM
To: Kotek, John
Subject: Our comments

John, I'm sure you get plenty of feedback. I would be interested to know if our observations are shared by others. It is a challenge bridging the gap between science and a wide variety of public awareness. I'm still perplexed by the lady being insulted by my stating "Yucca Educational Symposium". The word symposium is indicative of an educational meeting-event. Oh well, that's what makes the challenge the challenge. ☺ Gary

---

Gary J. Duarte, Director

US Nuclear Energy Foundation
PO Box 2867
Sparks, NV 89432

775 224-2089

http://www.usnuclearenergy.org
comments@usnuclearenergy.org = GJD Direct

Imagination is more important than knowledge, Albert Einstein

"Those who are crazy enough to think they can change the world usually do." Steve Jobs

you have received this transmission in error, please immediately notify the sender by telephone or return e-mail message comments@usnuclearenergy.org and delete the original transmission, its attachments, and any copies without reading or saving in any manner. **Thank you.**

US NUCLEAR ENERGY FOUNDATION

"Nuclear Advocacy through Grassroots Education"

A Non-Profit 501 (C)(3) Nevada Foundation
PO Box 2867, Sparks, NV 89432 (775) 224-2089
www.usnuclearenergy.org Email comments@usnuclearenergy.org

Mr. John Kotek 07-22-16
Acting Assistant Secretary for Nuclear Energy
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Mr. Kotek:

It was great to attend your Boise meeting on Consent Based Siting, CBS, JUL-14. USNEF has been advocating nuclear energy for the past decade, including the nation's Yucca Mountain Facility. Our effort has continued to stress the importance of grassroots public education to the industry, DOE, and NRC agencies. The public constituent sector must be engaged with additional knowledge concerning nuclear technology. We need the engagement of our legislators with their constituents to mold new public policy concerning the need, value, and safety of nuclear and spent nuclear fuel. It is our opinion that public messaging by a private foundation would be more receptive to the public than from the government or industry.

We hope our feedback will provide some insight for the summary of your CBS program. Our take away from your meeting is still with messaging the grassroots. "We" need to address the public via Kiwanis, Rotary, Lions clubs, plumbers, beauticians, etc. These are grassroots people, all with "community interests". These are the people we need to engage. The people in Boise from the Snake River Alliance, by our assessment, only came to complain about the process and not participate in a knowledgeable discussion of the CBS purpose. My colleague, Ken Koeppe, was perplexed as to what their questions were.

One individual at my roundtable asked why the DOE was not forthcoming about some military plane, (F-35?), being stationed in Boise. I saw no connection to CBS, this would have been a DOD question. I would wonder if the promotion of your meetings was confusing to the attendees but, suspect the confusing was with them. We hope that your engagement at other meetings was better focused on the CBS mission.

We would also request that DOE, NRC, and the industry. review our suggestion for grant and economic support to private foundations to champion the message of nuclear advocacy. We can provide receptiveness to the public vs a caution flag by the government. and industry. Thanks very much for your CBS Tour.

Gary J. Duarte, Director

US nuclear Energy Foundation

Consent-Based Siting

From: Mary and David Dudley [mailto:dmdudley@centurylink.net]
Sent: Thursday, July 21, 2016 2:58 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Nuclear waste

Dear DOE People;

Thank you for this opportunity to comment about nuclear waste and our beloved state of Idaho.
We want to remind you that Idaho is a Non-consent state and always will be!

Sincerely,
Mary & David Dudley
Ola, ID 83657

Consent-Based Siting

From: Duane Ediger [mailto:duaneediger@gmail.com]
Sent: Sunday, July 24, 2016 11:24 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC: DOE Radioactive waste pollution plans (Design of a Consent Based Siting Process)

To: Fuel Cycle Technologies, Office of Nuclear Energy, Department of Energy

I do NOT give consent for more radioactive waste dumps until

- The nuclear industry stops making more waste, and
- DOE fixes all the problems it has already created with waste dumps, contaminated areas, and abandoned uranium mines around the country, and
- Congress establishes a truly independent process to find and designate a permanent, deep-geological radioactive waste ***disposal*** (NOT storage) site other than Yucca Mountain.

Sincerely,

Mr. Duane Ediger

511 N Cuesta Ave

Tucson AZ 85745

Consent-Based Siting

From: Jack Elder [mailto:highlandllak@yahoo.com]
Sent: Sunday, July 31, 2016 11:10 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

To Whom It May Concern, I deeply oppose the transport of nuclear waste through my neighborhood (IH-10 in SE San Antonio) as well as its storage on the Texas-New Mexico border. Current stockpiles of radioactive waste should be kept on-site using hardened on-site storage protocols approved by the Nuclear Regulatory Commission.

Sincerely, John B. Elder 235 Kayton

San Antonio, TX

Consent-Based Siting

From: Melissa Elstein [mailto:melissaelstein@nyc.rr.com]
Sent: Sunday, July 31, 2016 10:15 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC - Public Comment re Nuclear Waste Siting

To: U.S. Department of Energy, Office of Nuclear Energy

I urge you to offer more public comment hearings and to extend the deadline for comments regarding this very important environmental issue.

For the following reasons, I do not consent to the DOE's current proposed plan for dealing with nuclear waste.

Nuclear waste is deadly – radioactive and poisonous.

Transporting said waste from nuclear plants via barges on our waterways risks the fresh drinking water supply for countless millions. Similarly, transporting nuclear waste via truck and train shipments through the heart of major population centers, the agricultural heartland, and over, or alongside waterways is also a major for the drinking water supplies of our nation. Other risks include terrorist attacks of these shipping containers.

Storing nuclear waste near or in communities of color is environmental racism. Especially of concern is storing nuclear waste on Native American reservations. Leaks from nuclear waste storage sites would devastate those who already have fewer resources and have been burdened with systemic exclusion from positions of power and influence.

The only safe and sound solution for radioactive waste is to not make it in the first place. Reactors should be permanently shut down, to stop the creation of high-level radioactive waste for which we have no safe disposal solution.

Living in NYC, only 35 miles from Indian Point Nuclear Facility, I am especially concerned regarding the risks to 8 million New Yorkers – and that is not including the millions of suburban residents in the NYC vicinity. I urge you to close Indian Point Nuclear Plant.

Thank you for the opportunity to comment.

Yours,

Melissa Elstein
255 West 85th Street, # PH-AB
NY, NY 10024

Consent-Based Siting

From: Leif G Eriksson [mailto:nukewastedisp@gmail.com]
Sent: Wednesday, June 15, 2016 7:03 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: George Dials <gdials@pscnda.com>; George Critz <critz.george@gmail.com>
Subject: "Response to IPC"

TO WHOM IT MAY CONCERN

As per the instructions provided in Federal Register/Vol. 80, No. 246/Wednesday, December 23, 2015/Notices, attached please find my responses to your invitation for public comments to inform the design of a consent-based siting process for nuclear waste storage an disposal facilities comprising four text pages, four referenced data sources, and three related slide presentations.

Please note that the first two numbers in each title depicts the year the related Waste Management Symposium was held, e.g., 13015 was given at WM2013.

Please let me know if any clarification or additional information is required.

Sincerely

--
Leif G Eriksson, Registered Professional Geologist
Nuclear Waste Dispositions
535 N. Interlachen Avenue
Unit 303
Winter Park, Florida 32789-3252
USA

Tel: +(407) 647-1806

Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities" (IPC)

TO WHOM IT MAY CONCERN

The December 23, 2015, Federal Register "Invitation for Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities" (IPC), as well as the handout provided at the first related public meeting held in Washington, D.C. on March 10, 2016, solicited public responses on five "key" questions. Please find below responses to the aforementioned five questions from Leif G Eriksson, 535 N. Interlachen Avenue, Unit 303, Winter Park Florida 32789. The ensuing responses are based upon my active involvement in and monitoring of nuclear waste management programs in the USA and abroad since 1978 (resume available on request by e-mail to nukewastedisp@gmail.com or by phone at +(407) 647 1806).

1. **"How can the Department ensure that the process for selecting a site is fair?"**

   Put simply, ***it can't, because the "Department" does not control the process***.

   Case in point, since the enactment of the still applicable, but not enabled since FY2011, Nuclear Waste Policy Act of 1982 (NWPA), as amended in 1987 (NWPAA), both the Secretary of Energy and the U.S. Department of Energy's (DOE's) Office of Civilian Radioactive Waste Management (OCRWM), have been controlled both financially and productively by one or more of the U.S. President, the U.S. Congress, the majority leaders of the U.S. Senate, and the majority leaders of the U.S. House of Representatives. The related results, or rather the globally-embarrassing lack thereof, are not conducive to instilling confidence in either the Secretary of Energy's or the "Department's" ability to be able to ensure a "fair" process in the future.

   With a peripheral glance beyond the current legal situation, as elaborated upon in e.g., the attached Waste Management (WM) 2013 [1], WM2015 [2 and 3], and 2016 [4 and 5] papers and the therein listed references, the new organizational Executive Branch structure for the siting and development of future spent nuclear fuel (SNF) and other high-level radioactive waste (HLW) storage and disposal facilities unsuccessfully introduced hitherto in the U.S. Senate in 2013 (S.1240-IS) and 2015 (S.854-IS) to replace the Secretary of Energy's responsibilities under the NWPA, i.e., the OCRWM, would exacerbate rather than decrease the political control and financial chokeholds imposed upon the DOE/OCRWM in the past.

   In summation, to imply or suggest that the "Department" would be able to ensure a fair process for the siting and development of future storage

and/or disposal facilities for SNF and HLW fails to account for the related historical record.

2. ***"What model and experience should the Department use in designing the process?"***

Put simply, "consent-based" is a qualitative term/concept lacking exactitude that accommodates a broad variety of amorphous interpretations. As elaborated upon in several of the attached four WMS papers [1-4] and related slide presentations, the siting pre-process could be a never effort unless a measurable definition of "consent-based" is provided from the outset. One of several potential "consent-based" siting and development models is also described in a couple of the attached WMS paper and illustrated in the related slide presentation.

With regard to relevant experience, as suggested by the Blue Ribbon Commission on America's Nuclear Future (BRC) in 2011 and 2012, the voluntary-based siting and development process for the Waste Isolation Pilot Plant (WIPP) transuranic radioactive waste (TRUW) repository in New Mexico, USA, and the societally-equitable repository siting and development process designed and re-designed in Sweden based upon LOCAL public opposition and continuous involvement, embody particularly-relevant experiences as do their respective licensing processes and the related parties involved in them (please also see question 3 for additional information).

Suffice it to also mention here that an acute experience issue in the USA is the continually diminishing availability of relevant domestic institutional subject-matter intellectual and hands-on professional resources. A large number of professionals involved during the past 30 years or longer in the siting and development of deep geological disposal systems (repositories) for SNF and HLW (and TRUW) in the USA have retired or passed away. Furthermore, based upon the premise that valuable lessons can also be learned from failures, it should also be noted that the USA's only candidate SNF/HLW repository since 1987 at the Yucca Mountain site in Nevada, which may be considered by many to represent a domestic antithesis to "consent-based", have been on hold since 2010 and its implementing organization, the OCRWM, was de-staffed in 2011.

3. ***Who should be involved in the process for selecting a site, and what is their role?***

As elaborated upon in several of the attached WMS papers and schematically illustrated in them and their related slide presentations, all interested parties residing legally in the USA should have the opportunity to access relevant information and expressed their respective opinion and

concerns. However, the design and implementation of the siting and development processes should be primarily governed by the opinions, concerns, and requests vested in the directly affected parties. Admittedly, "directly affected parties" is also a qualitative term/concept that needs to be *timely* defined in measurable terms to be workable. One of several potential definitions of "directly affected parties" definitions is described in a couple of the attached WMS papers and is also schematically illustrated therein and in the related presentations.

Suffice it to mention here that in Sweden, the local residents and authorities, as well as the national authorities and the elected representatives, were involved in the siting process from the outset. Furthermore, the potential and candidate facility-host municipalities for the SNF repository, i.e., i.e., the municipalities of Oskarshamn and Östhammar, were adequately funded from the outset to retain their own subject matter experts throughout the process. They also were given the legal authority to unilaterally veto the siting of an SNF repository in their municipality, but adjacent and distant communities had to direct their respective concerns to one or more of the implementer, (SKB), the regulator (SSM), their elected representatives at local and national levels, the National Council for Nuclear Waste, and, ultimately, if necessary, to the environmental court.

4. What information and resources do you think would facilitate your participation?

As suggested under questions 2 and 3, and elaborated upon in the therein referenced papers, the process for siting and developing future SNF and HLW storage and disposal sites should be controlled by the directly affected parties.

5. What else should be considered?

One inherent past and future key issues is the extensive lack of understanding among laypeople of the state-of-the-art concepts and issues involved in the string, design, development, construction, operation, decommissioning, and closure of a repository for long-lived radioactive waste. As emphasized in most of the attached papers, trust in the messenger has been and will continue to be important to public acceptance and project progress. As also summarized in most of the attached papers, the Department's related track record since 1983 is not conducive to building or establishing trust. As follows, the existing, long-standing and wide-spread, distrust in the Department and the Executive Office will be very difficult to mitigate/overcome. Promising things that subsequently cannot be delivered is not a viable solution.

A starting point for re-building public trust in the Department would be to present a preliminary siting process, including a quantitative/measurable definition of consent-based siting, for review and comments, rather than collecting information from the general public on how the Department or another legal entity should conduct its siting and development mission.

ATTACHED DATA SORCES ELABORATING UPON THE RESPONSES PROVIDED IN THE PRECEDING TEXT

1. **WM2013 paper 13015 entitled *"Societal-Equity-Enhancing Criteria and Facility-Host Incentives Supporting Five Key Elements in the January 2012 Blue Ribbon Commission Report".* Prepared by Leif G. Eriksson, George E. Dials, and Critz H. George, and presented by Leif G Eriksson..**
2. **WM2015 paper 15103 entitled *"Status of HLW Disposal in the USA and Rational, Progressive, Paths Forward Based Upon Lessons Learned In the USA and Abroad Since 1973".* Prepared by Leif G. Eriksson and George E. Dials, and presented by George E. Dals.**
3. **WM2015 paper 15104 entitled *"Robust Disposal Concept, Uniform Regulations, and Trust in the Messenger; Three Fundamental Building Blocks for Consent-Based HLW-Disposal Solutions in the USA"*. Prepared and presented by Leif G. Eriksson.**
4. **WM2016 paper 16019 entitled *"U.S. Senate Bill S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting of New HLW-Repositories"*. Prepared and presented by Leif G. Eriksson.**

Although some of the above listed data sources were co-authored with other professionals, the text in this IPC is solely attributable to Leif G. Eriksson and all related questions should thus be directed to him.

This IPC was prepared by and submitted by e-mail to consentbasedsiting@hq.doe.gov on June 15, 2016, by:

Leif G. Eriksson, Registered Professional Geologist 0437 in North Carolina
535 N. Interlachen Avenue, Unit 303
Winter Park, FL 32789
V: +(407) 647 1806
E: nukewstedisp@gmail.com

Societal-Equity-Enhancing Criteria and Facility-Host Incentives Supporting Five Key Elements in the January 2012 Blue Ribbon Commission Report – 13015

Leif G. Eriksson*, George E. Dials**, and Critz H. George***
* Nuclear Waste Dispositions, 535 N. Interlachen Avenue, Unit 303, Winter Park, Florida 32789, USA, nukewastedisp@gmail.com
** B&W Conversion Services LLC, 1020 Monarch Road, Suite 300, Lexington, Kentucky 40513, USA, gedials@DUF6.com,
*** Retired DOE and Consultant, 1218 Countryside Lane, Albuquerque, New Mexico, 87114, USA, critz.george@gmail.com

ABSTRACT

In February 2009, the Obama Administration announced it would abandon USA's only candidate SNF/HLW-disposal facility since 1987. In 2010, all related activities were stopped and the Blue Ribbon Commission on America's Nuclear Future was established "to recommend a new strategy for managing the back end of the nuclear fuel cycle", which it did in January 2012, emphasizing eight key elements. However, Key Element 1, *"A new, consent-based approach to siting future nuclear facilities",* is qualitative/indeterminate rather than quantitative/measurable. It is thus highly-susceptible to semantic permutations that could extend rather than, as intended, expedite the siting of future nuclear facilities unless it also defines: a) **Whose consent is needed?**; and b) **What constitutes consent**?

The following "generic", radiation-risk- and societal-equity-based criteria address these questions:

1. Identify areas affected by projected radiation and other health risks from:
   a. The proposed nuclear facility (***facility stakeholders***); and
   b. The related nuclear-materials-transportation routes (***transportation stakeholders***); then
2. Surround each ***stakeholder area*** with a *buffer zone* and **use this enlarged foot print to identify**:
   a. ***Stakeholder hosts***; and
   b. Areas not hosting any stakeholder category (***interested parties***).
3. Define ***"consent-based"*** as being at least 60 percent of the "population" in the respective ***stakeholder category*** and *apply this yardstick to both "in favor" and "against" votes*.

Although criteria 1 and 2 also need facility-based definitions to make Key Element 1 measurable, the described siting approach, augmented by related facility-host incentives, would expedite the schedule and reduce the cost for achieving Key Elements 4-6 and 8, politics permitting.

INTRODUCTION

At the end of 2012, the USA's policies for the safe and secure management of the back end of the nuclear fuel cycle were fragmented and many of the related programs were in a state of flux or at an impasse. The most promising master-keys for unlocking the future of the back end of the nuclear fuel cycle (Figure 1) were the findings and recommendations described in the Blue Ribbon Commission on America's Nuclear Future (BRC) 26 January 2012 report to the Secretary of Energy (the Secretary).[1] It was used herein as the starting point to design a transparent, *quantified*, approach for the siting (and development) of future nuclear facilities based on our more than 100 years of combined related experiences from nuclear waste management and disposal programs in the USA and abroad since the early 1970s [e.g., 2-7] that rationalizes the back end of the nuclear fuel cycle by applying the principles of **societal equity** and **scientific management.** Although the focus herein is on safe disposal of used and spent nuclear fuel (SNF) and high-level radioactive waste (HLW), *the described siting approach is **generic** pending facility-specific definitions and incentives*. It can therefore be adapted to a broad range of nuclear facilities.

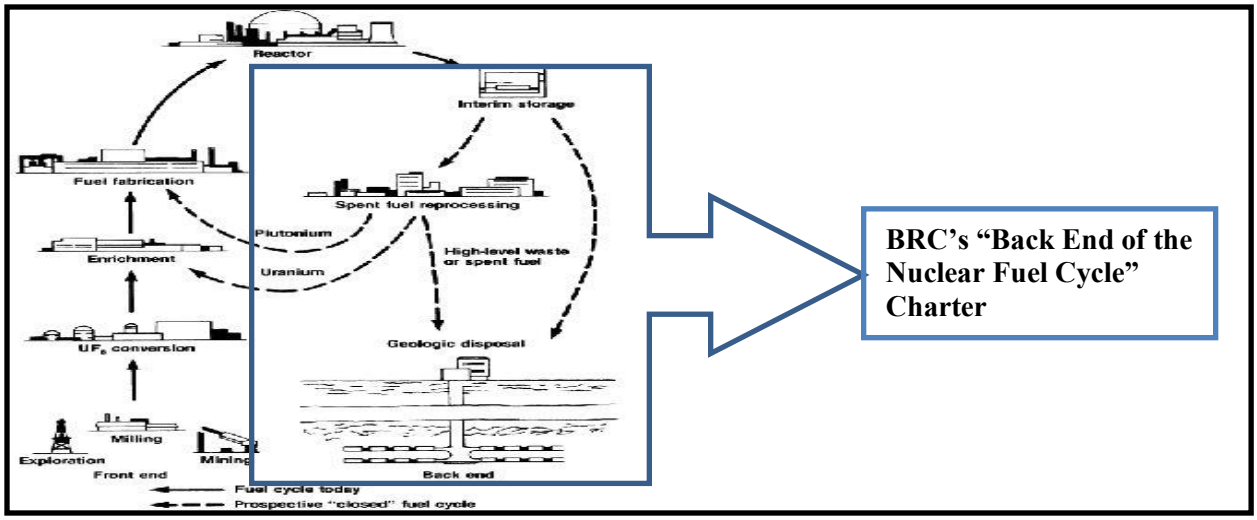

Fig. 1. Schematic illustration of main components of the nuclear fuel cycle and BRC's related charter (dashed and solid lines with arrow indicate transportation and, sometimes, treatment/packaging).

BACKGROUND

At the end of 2012, long-lived radioactive materials (LLRMs)[1] had been generated in the USA for more than 70 years and deep geological disposal of *solid-state* LLRMs had been the preferred (global) solution for more than 55 years.[8-10] Yet, in the USA, several LLRMs, including Class B and Class C LLW in 34 states, and all GTCC LLW, SNF, and HLW, still lacked "agreed-upon" disposition (= storage, reprocessing, and disposal on Figure 1) solutions; due in large part to differing and compartmentalized, federal and state laws, and the lack of Congressional action on LLRM laws with unmet schedules and/or objectives.[e.g., 5,7,11,12] For example, the still-legally-mandated opening date for the USA's first SNF repository failed on 1 February 1998.[12] In addition, the Executive Office announced in February 2009 [13] that the Obama Administration was abandoning the USA's only option since 1987 [14] for disposal of SNF and HLW at the YM site in Nevada (Figure 2). The YM site had been evaluated since 1978 and its repository-construction license had been reviewed by the NRC since June 2008. Pending the opening of an SNF- and/or a HLW-disposal solution, the more than 80,000 metric tons of heavy metals or an equivalent amount of uranium (MTU) of SNF and HLW already stored in the USA at more than 130 sites in 39 states (Figure 3) will continue to grow at least 2,000 MTU per year. Locations and rock types considered in the past for deep geological disposal of SNF and HLW in the USA are shown on Figure 2.

In 2010, the Secretary defunded the YM project, closed the DOE's Office of Civilian Radioactive Waste Management (OCRWM), assigned all its nuclear waste matters and staff to the DOE Office of Nuclear Energy (NE), and motioned to the NRC for withdrawal of the YM SNF/HLW-repository construction license application. At the direction of President Obama, he also established the BRC in January 2010 and chartered it *to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle, including all alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel, high-level waste, and materials derived from nuclear activities* (Figure 1) *and to submit a final report within 24 months including a set of recommendations regarding policy and management, and any advisable changes in law,*[1, pp. 122-125] which it did on 26 January 2012. The NE prepared related draft responses for the White House in the fall of 2012, but they remain under wraps at the end of 2012.

[1] As used herein, the term "LLRM" typically refers to used and spent nuclear fuel (= SNF, herein), and other HLW, but it also occasionally includes other radioactive-waste categories containing long-lived radionuclides, such as Greater than Class C (GTCC) LLW, TRU waste (TRUW) and ILW (ILW-LL).

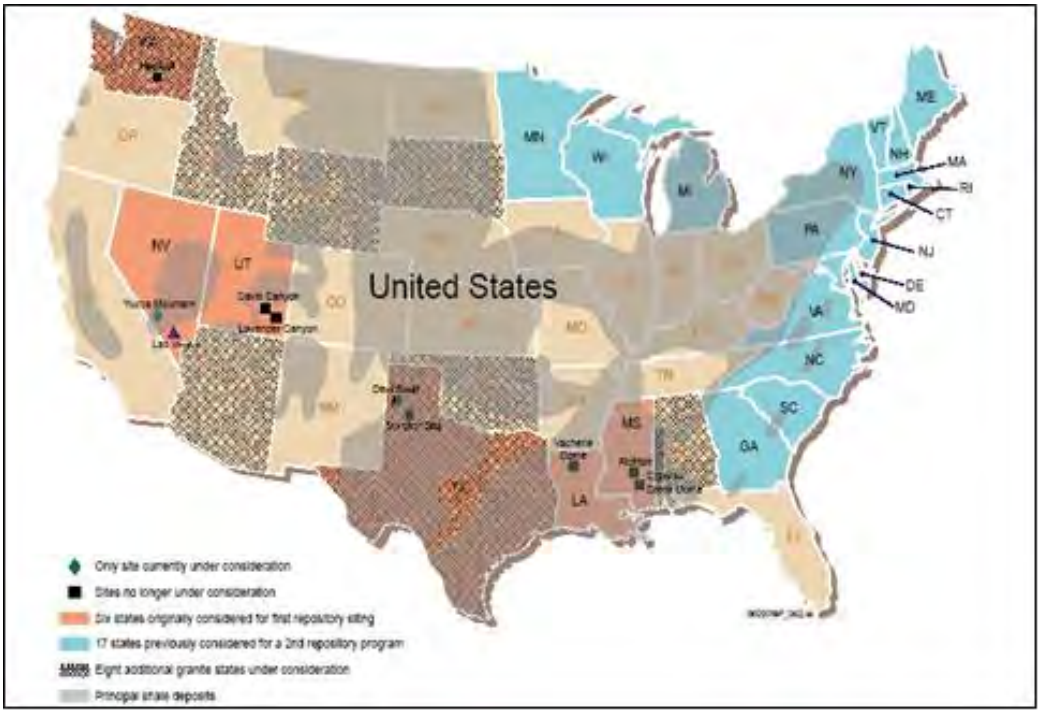

Fig. 2. Schematic illustration of locations, areas, states, and rock types considered in the contiguous USA during the hitherto more than 55-year-long, search for SNF and HLW repositories.

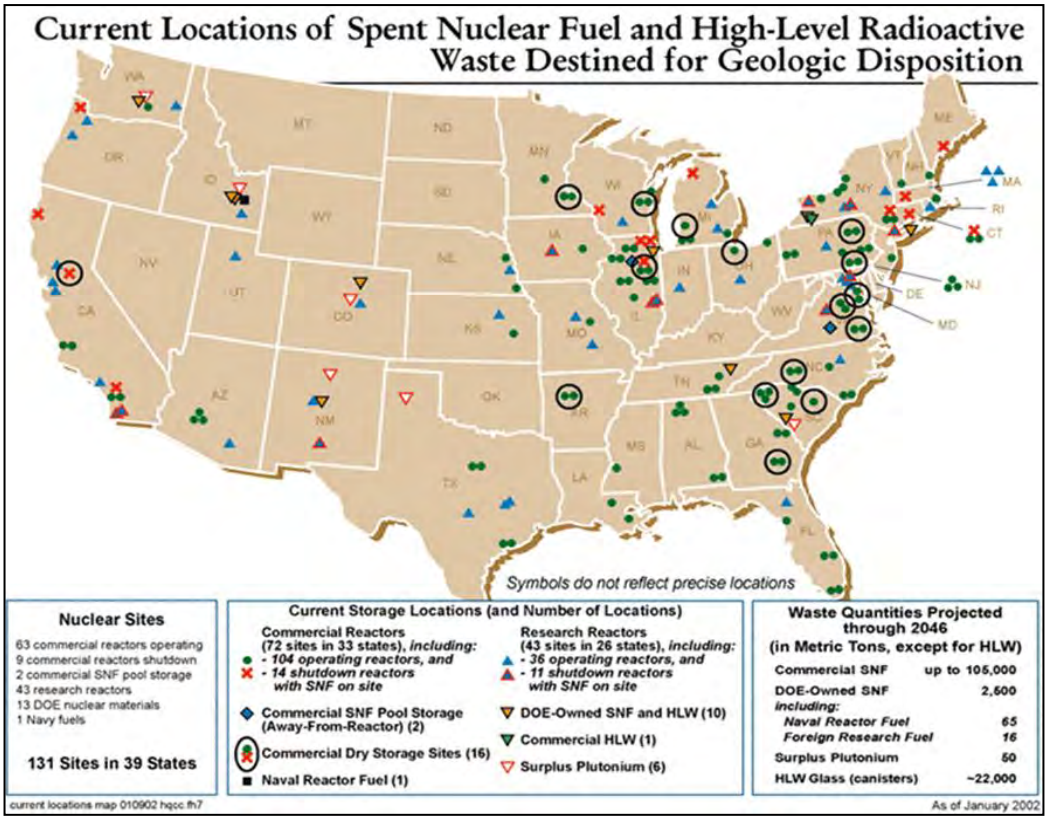

Fig. 3. Schematic illustration of 131 sites in 39 states containing SNF and HLW in January 2002.

DESCRIPTIONS

The strategy/plan for the back end of the nuclear fuel cycle (Figure 1) recommended by the BRC in its January 2012 final report [1] emphasized the following eight key elements:

1. A new, consent-based approach to siting future nuclear facilities.
2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.
3. Access to the funds nuclear ratepayers are providing for the purpose of nuclear waste management.
4. Prompt efforts to develop one or more geologic disposal facilities.
5. Prompt efforts to develop one or more consolidated storage facilities.
6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.
7. Support for continued US innovation in nuclear energy technology and for workforce development.
8. Active US leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.

While we agree with virtually all of BRC's recommendations, we believe *the intuitively-appealing qualitative term "consent-based" in Key Element 1 must be defined quantitatively.* Otherwise, its beauty will remain in the eye of the individual beholder and likely promote, rather than mitigate or minimize, the controversies, litigations and protracted delays that have plagued the US nuclear waste management and nuclear power programs, and eroded USA's international standings in the past. In addition to being indeterminate and nebulous, another fundamental shortcoming of the term "consent based" is that one simply cannot appease 100% of the population in any given county, state, Domestic Dependent Nation, or country considered for hosting a nuclear facility. In order for it to serve as a transparent, rational, starting point for the siting of any given nuclear facility, "consent-based" also must define:

1. Whose "consent" is needed?
2. How many of the related votes constitute "consent"?

Due to the fact that each nuclear facility, typically, is governed by federal and state requirements based on the type of nuclear activity and/or materials involved, *we chose Key Element 4 as the "upper bound" example for future applications of Key Element 1* because SNF and HLW: a) Pose the greatest and longest radiation risks; and b) Might urgently need domestic disposition solutions. Although Key Element 6 is integral to the successful implementation of Key Elements 1, 4, and 5, we did not elaborate upon it herein due to the fact that transportation of SNF and HLW, as well as many other LLRMs, has already been safely done in the USA and abroad for more than 40 years. We also chose to describe a set of ***facility host incentives*** (***FHIs***) already used successfully to plan, manage, and advance domestic and foreign programs for safe and secure deep geological disposal of LLRM at e.g., the WIPP site in New Mexico, USA (www.wipp.energy.ws), the Olkiluoto site at Eurajoki in Finland (www.posiva.fi),[15] the Meuse/Haute-Marne site in France (www.andra.fr), and the Forsmark and Oskarshamn sites in Sweden (www.skb.se) during the past 20 years. As follows, described and discussed herein are: ***one set of measurable, social-equity-enhancing, criteria*** (***SEECs***); and ***one set of already proven FHIs***. Whereas ***the SEECs*** *are hard-linked* ("fused"), ***the FHIs*** *can be can be selected or rejected on an individual basis by the host parties* shown in green on Figure 4. Furthermore, the described ***SEECs*** and ***FHIs*** are only considered *potential starting points for the siting of future nuclear facilities*. ***Integral to the proposed approach is that both the SEECs and the FHIs are defined on a facility-specific basis before being implemented and then re-evaluated periodically and updated, if required, during the nuclear-facility siting and development processes as more detailed data and information become available with time.***

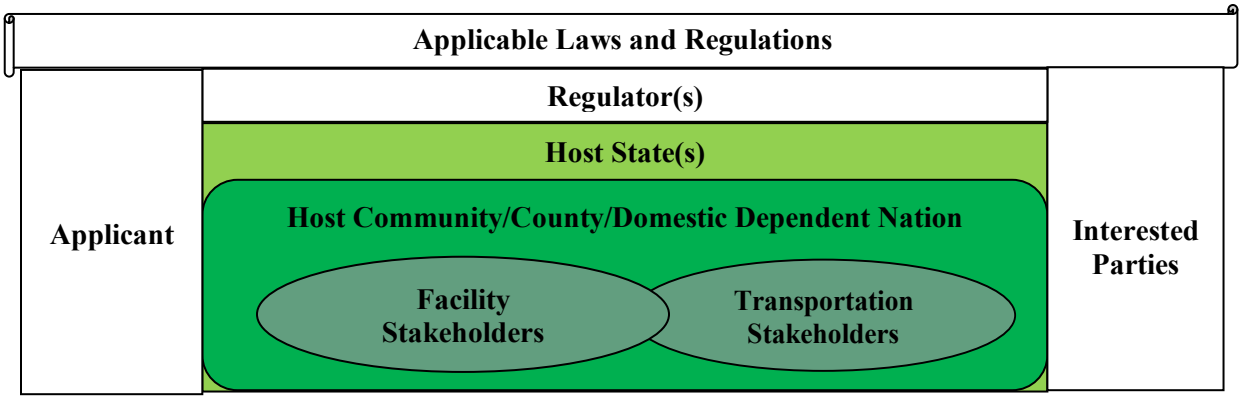

Fig. 4. Schematic illustration of the main *nuclear-facility-siting and -development building blocks* embodied in ***the SEECs*** proposed in this paper with the "voting groups" shown in green colors, but it does not show the interested parties' continuous access to the applicant ant the stakeholders.

Societal-Equity-Enhancing Criteria

The following, generic, ***SEECs*** were designed to provide simple, rational, defensible, tools for identifying and dealing with different population groups when siting a given nuclear facility in a societally-equitable manner. In other words, they were designed to ensure the voices and opinions of the people subjected to potential risks from a proposed nuclear facility and its waste-transportation routes are identified and prioritized from the outset, and timely informed of that fact and their substantial role in Federal policy.

1. *Geographically-based distinctions between people:*
   a. *Subjected to projected radiation and other health risks* from the proposed facility or residing within a given distance* from the proposed facility (**facility stakeholders**);*
   b. *Subjected to projected radiation and other health risks* from the proposed waste-transportation routes or residing within a given distance* from them (**transportation stakeholders**); and*
   c. *Not subjected to a projected radiation risk* or residing outside a given distance* from either the proposed facility or its proposed transportation routes, respectively (**interested parties****).*
2. *"Majority consent" is presented as a guiding principle with these parameters:*
   a. *Only required of **stakeholders**; and*
   b. *Defined as at least 60 percent (%) of the related **stakeholder group(s)** shown in green color on Figure 4 and applying to both votes "in favor" and "against".*

* Values remain to be determined (TBD) and then periodically updated.

The fundamental underpinnings of SEEC 1 are: 1) Radioactivity and its related health effects and risks are quantifiable; and 2) They decrease with time. Simply stated, they are functions of the *amount and characteristics* (e.g., age and half-life) *of the radioisotopes*, their respective *travel distance* to the radiation target, and the type and amount of *shielding* located between the radiation source and the radiation target. Although the "generic" information and models required for defensible calculations are already readily available, important site-specific parameters and their respective ranges that ultimately are required for this determination to be acceptable to the regulator(s) may not be available until well into the site characterization program. We thus referred to both the ***facility- and transportation-stakeholder areas*** and the related radiation-exposure/dose limits as TBD above. *The a-priori representation of radiation risk in the proposed **SEECs** is tied to an assumption that the applicable regulation(s) will be*

met, which adds confidence that the determining entity will be the EPA and NRC; not the facility advocate. Another fundamental underpinning is thus *that the definition of adequate public and environmental "protection/safety" in the legal and regulatory frameworks is not modified during the siting process. Such modification, however well-intentioned, can convey a notion that safety margins have been reduced* and, as illustrated at the YM site, can result in severe adverse effects on public and political confidence in the inherent natural barriers provided by the site. Similarly can a late design change introducing a $16 billion drip shield. ***The fundamental objectives of SEEC 2 are to: 1) Provide a transparent, quantitative, definition for "consent-based"; and 2) How it can be applied. The nexus for all proposed SEECs is logic based on risks that, in turn, identifies affected and non-affected parties.***

Facility-Host Incentives

The following ***six FHIs*** were mainly adopted from similar components used to successfully site and/or develop, and certify/license LLRM-disposal facilities in the USA, Finland, and Sweden:

1. *"Independent" facility-host subject-matter expert-groups.*[2]
2. *A multi-state organization made up by the Governors in states with waste-transportation routes.*[3]
3. *A comprehensive, forward-looking, fully-integrated, periodically-updated Facility Siting and Development Plan (FSDP) that also commits the facility-siting entity to issue a related status report at least every third year, that is available to* ***stakeholders****,* ***stakeholder hosts****, and* ***interested parties*** *and their respective elected representatives at county, Domestic Dependent Nation, state, and national levels (Figure 4).*[4]
4. *Several annual public meetings in which the* ***stakeholder groups*** *and* ***interested parties*** *have the opportunity to learn about the status of the program and to interact in real time with the implementing organization(s), key participating scientists, and the related regulators.*[5]
5. *Veto right by* ***stakeholder hosts*** *(Figure 4) until the license application to receive nuclear material has been docketed by the regulator(s).*[6]
6. *A standing national advisory board made up of representatives from academic disciplines that could contribute to the formation of a set of moral, ethical and scientific guidelines by which the problem of nuclear waste disposition is to be addressed and resolved.*[7]

The main common intended objective of the six proposed FHIs is to gain and maintain majority stakeholder acceptance and support. They embody the related, hitherto largely-neglected, fundamental ethical and moral obligations of ensuring that the risks the ***stakeholders and stakeholder hosts*****, also** jointly referred to herein as **the affected parties,** may be exposed to from a proposed nuclear facility are understood, adequately safeguarded against, and can be irrevocably rejected by ***a majority of them*** until all information required for opening the facility had been subjected careful evaluation by all concerned.

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[2] Based upon but not limited to the now dissolved New Mexico Environmental Evaluation Group (EEG).

[3] Based upon but not limited to the Western Governors' Association (WGA), which still oversees TRUW shipments to the Waste Isolation Pilot Plant (WIPP) repository (Figure 5) (www.wipp.energy.ws).

[4] Based upon the Swedish Nuclear Fuel and Waste Management Company's (SKB's) (www.skb.se) Research, Development, and Demonstration Plans and SKB's, Posiva of Finland's (www.posiva.fi), and the US's Nuclear Waste Technical Review Board's (NWTRB's) Annual Reports (www.nwtrb.gov).

[5] Based on how WIPP communicate in a timely, transparent, interactive manner with ***stakeholders*** and other ***interested parties*** that enhanced public acceptance and support, and rate of progress. The nexus for this successful process was the 1994-1998 WIPP Disposal Decision Plan (DDP) shown on Figure 6.

[6] Based largely upon the Swedish approach (www.skb.se).

[7] We envision something like this growing out of the BRC beginnings but taking on the scale and scope of the Swedish National Council for Nuclear Waste (KASAM) in Sweden (www.karnavfallsradet.se), but it would have to have its remit coordinated with that of the NWTRB to avoid overlap.

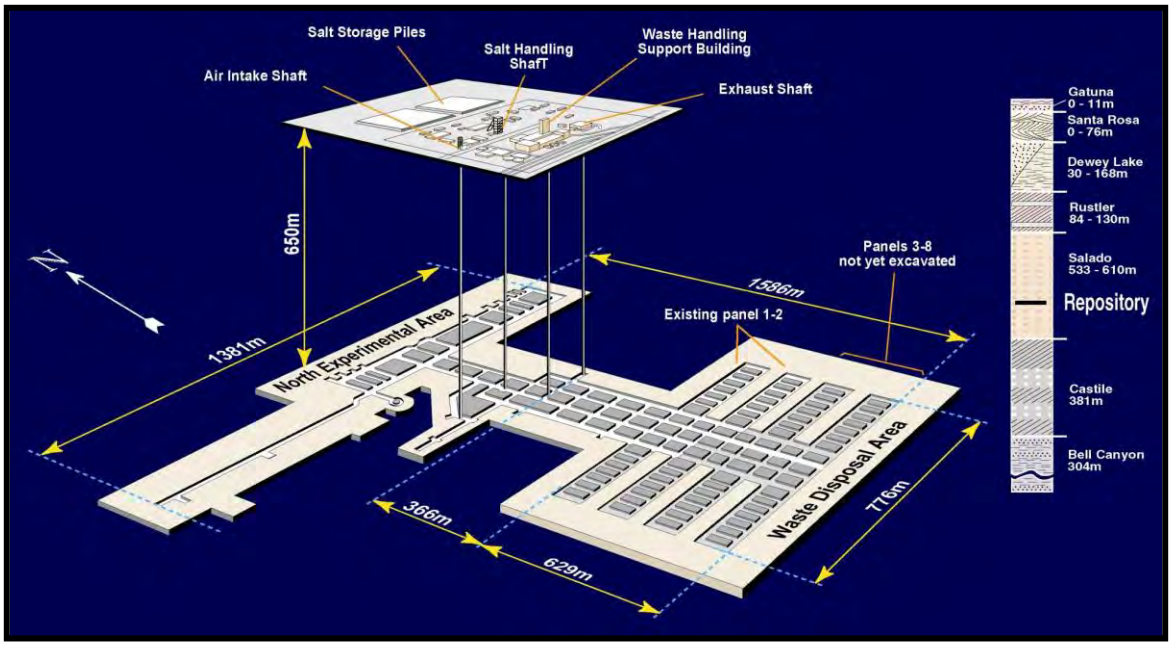

Fig. 5. Schematic illustration of surface and subsurface facilities and the stratigraphy at the WIPP site.

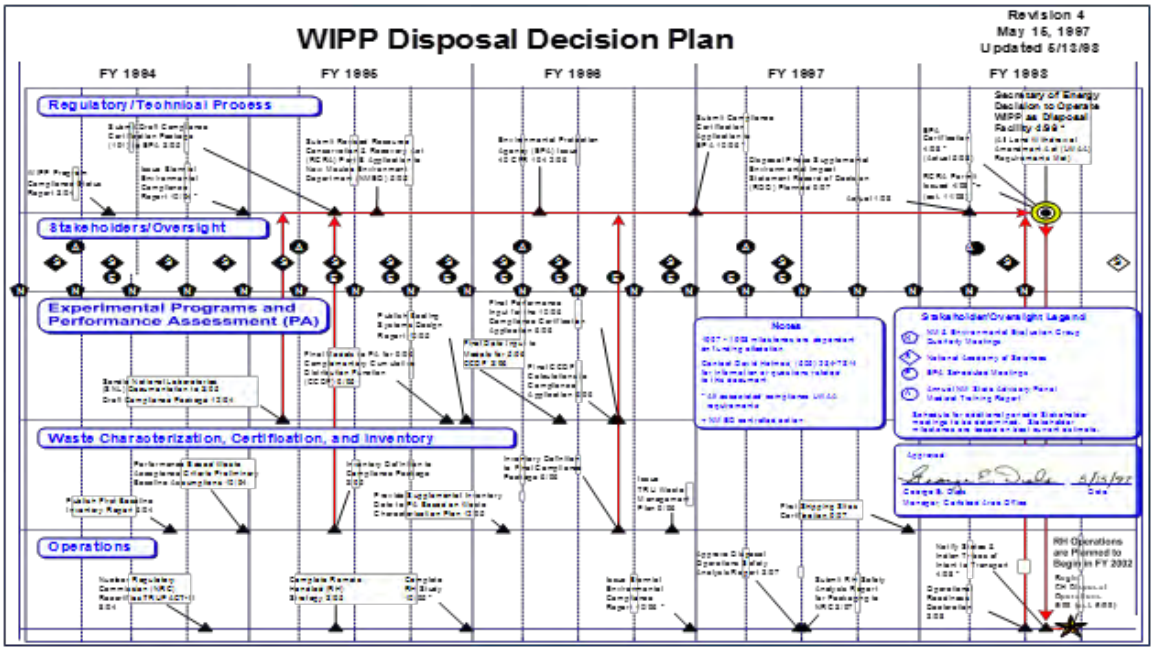

Fig. 6. The 1994-1998 WIPP Disposal Decision Plan.

DISCUSSIONS

Although ***the SEECs*** and ***the FHIs*** described above are "generic" and apply to a broad range of nuclear facilities, the subsequent discussions (and descriptions) focus on their respective applications in support of BRC Key Elements 1 and 4. Based on our related relevant experiences, in addition to recent actions by the Obama Administration and its sycophants, seven long-standing root causes for the opposition and the repeated delays to the siting of SNF- and HLW-disposal facilities in the USA during the past 30 years are:

1. The lack of a fully integrated national nuclear waste management policy.[e.g., 5]
2. No distinction is generally made as to whether the party expressing the concerns and/or objections would be exposed to a radiation or other health-risks from the proposed facility.
3. The lack of a balance between the risks posed by the proposed nuclear facility and its related societal needs, benefits, options, and consequences.
4. LLRM repositories, by their nature (centralized disposal at sites selected for uncommon safety), will be few in number and thus are vulnerable to complaints of "inequity." Fairness must be achieved by the balance of benefits and perceived risk among the population seeing itself as "affected".
5. The "incomprehensible" temporal and spatial scales, and the-state-of-the-art scientific and engineering concepts involved.
6. The long-standing lack of political will [12] to:
    a) Fund the OCRWM program as requested by the DOE; and
    b) Amend or replace the Nuclear Waste Policy Act of 1982 [12] after its disposal schedule failed on 1 February 1998 with no other SNF-disposition solution in sight for > 10 years.

As illustrated by Key Element 1, the BRC recommendations reflect a long-overdue increased domestic awareness of and attention to the critical importance of both early and sustained support by affected populace and units of government, like those successfully achieved for LLRM-storage and disposal facilities for TRUW in the USA, and for multiple ILW-LL, SNF and HLW storage and disposal facilities in Finland, France, and Sweden. However, again, Key Element 1 is indeterminate and its meaning thus remains in the eye of the beholder. Of particular concern is that the historical record shows that almost *all "ideological eyes" are rigidly myopic and all "political visions" change with time*. We thus concluded that the term "consent-based" must be defined to the point to where it would be logical, *measurable*, and compliant with the Constitution in order for it to serve as a viable, rational, politically-acceptable, starting point for Key Elements 4, 5, and 6. Select portions of the reasoning, logic, and justifications employed in support of the ***SEECs*** and ***FHIs*** described herein are elaborated upon in the subsequent text.

With respect to "consent" in Key Element 1, the BRC envisioned that communities might volunteer to be considered at the outset and that the facility developer might also approach communities hosting potentially favorable locations. Negotiated partnership agreements, including flexible and substantial incentives and meaningful consultative roles for affected parties, were cited by the BRC as a means toward stable "legally enforceable" commitments.[1] As follows, Key Element 1 is the BRC's intended common underpinning and starting point for Key Elements 4 and 5, both of which are directly linked to Key Element 6. This was another reason we deemed the six "proven" ***FHIs*** promising catalysts for attaining and sustaining ***stakeholder*** support before and during the siting and development of a proposed nuclear facility that, in turn, also would reduce both the timeline and the cost for the opening of the facility. The manner of implementation and the related acceptance and progress of Key Elements 4-6 were also deemed to govern the timeline for achieving and sustaining Key Element 8 abroad.

With regard to Key Element 8, the selection of a globally-unique SNF/HLW-repository host rock in 1987 [14] and the DOE's subsequent prompt termination of virtually all international "hands-on" repository-science-exchange involvements have adversely affected the USA's standings in the international nuclear waste management community. One related reason being, the US SNF/HLW-disposal program has had very little, if any, state-of-the-art repository science or engineering information of interest to offer other nations, since they all were targeting other geological settings. Another is the repeated delays and currently, politically-manipulated, uncertain status of the YM SNF/HLW repository program. Simply stated, USA's "leadership" status in the SNF/HLW-disposal area in the international radioactive waste management community has been eroding since 1987. One or more SNF/HLW-repository paradigms are thus promptly needed to restore and then maintain USA's "leadership" standings in the international radioactive waste management community, which the proposed S***EECs*** and ***FHIs*** could accomplish.

Societal-Equity-Enhancing Criteria

As illustrated on Figure 4, the proposed voting rights belong to **the affected parties**. It may not equally clearly illustrated that the intended concept/approach is that ***all interested parties*** would still be able to voice their concerns and opinions throughout the siting and facility-development processes to the regulator(s) and **all affected parties** and their respective elected representatives, and to take legal action at any time if not satisfied with the related response. The main related underpinnings in US law are:

1. All US citizens have the undeniable right to hold and express personal opinions.
2. All US citizens also have a right to seek adjudicated relief when one's rights are damaged or threatened by the actions of another. The concept of "standing" guarantees that those affected by a threat or experiencing a harm (that is, having cause to seek relief) will not have their case skewed or diluted by participants who are not affected.

Figure 4 also embodies the recognition that ***the stakeholders*** defined by radiological risk will not be the only voters to whom the Governor of the affected state is answerable because many of those who would not be a party to negotiated consent on any basis of risk exposure will in fact have a forceful presence due to the host-state Governor needing their vote. She/he will thus carry their proxy to the negotiating table, even if they are not there through another affected ***stakeholder-group*** or ***stakeholder-host*** representative.

The fundamental ethical, moral, and safety concerns governing the set of ***SEECs*** described above and schematically illustrated on Figure 4 are:

1. Historically, interest-groups opposing civilian and military applications of the atom have successfully opposed the development of the related LLRM-storage and, in particular, -disposal solutions regardless of the related adverse consequences on current and future generations. This indiscriminate, "constipate-nuclear-energy-to death-at-all-cost" strategy embodies grave societal injustices because it has prevented safer LLRM-disposition solutions from being developed Of particular concern are: a) *It is not necessarily representative of the majority opinion held by* ***the affected parties***; and b) *It unnecessarily extends the risks for the safe management and disposition of LLRMs to both more people and future generations.* One common key objective of the ***SEECs*** described herein is thus to provide quantitative yardsticks for "objectively" establishing the opinions held by ***the affected parties***; however, as mentioned in the preceding text, the proposed initial yardsticks in ***SEEC 1*** will require periodic re-evaluations and, likely, modifications with time as the related databases evolve from generic to site-specific.
2. As illustrated on Figure 3, the nation's stockpiles of SNF and HLW are large and dispersed all over the US. Furthermore, whereas some of this waste may be treated and the related volume requiring disposal may shrink, *there will still be a residual volume of LLRMs that will require safe and secure disposal*. However, several current SNF-storage facilities are almost filled to capacity and the NRC-licensed "Private Fuel Storage" facility in Utah pursued by eight nuclear utilities was cancelled in December 2012. *As follows, several LLRMs will require "new" storage and disposal solutions, and in some SNF-storage cases, time is of utmost importance.*

As mentioned above, the amount of radiation and its related health hazards from any given radioactive source are functions of time, shielding, and distance to the target. The "radiation-risk" zone for any given nuclear-disposal facility can therefore be defined numerically based on the intended radionuclide inventory, the proposed disposal concept, and the inherent and perceived future characteristics of the potential host rock for the repository. Although the site-specific ***facility-stakeholder*** area for a potential near-field radiation risk posed by a nuclear facility can be calculated at a very early stage, for SNF and HLW-disposal systems these calculations typically embody significant uncertainties pending the subsequent detailed definition of the radionuclide inventory, the initial and long-term characteristics of

the host rock(s), and the disposal concept. Simply stated, *the siting of an SNF and/or HLW repository is an iterative catch-22 endeavor*. We thus advocate surrounding each ***stakeholder area*** with a TBD "buffer zone" to ensure that subsequent radionuclide-inventory, site-conditions and design modifications would not extend the "***stakeholder***" area into an "***interested party***" area, because it would compromise and possibly void the preceding efforts. Applicable guidance can be found in the US Code of Federal Regulations, Title 10, Part 60 (10 CFR 60), "*Controlled area means a surface location, to be marked by suitable monuments, extending horizontally no more than 10 kilometers in any direction from the outer boundary of the underground facility, and the underlying subsurface, which area has been committed to use as a geologic repository and from which incompatible activities would be restricted following permanent closure."*[16]

A much simpler and faster, yet deemed conservative and empirically-defensible, siting approach would be to defer the radiation-risk-based *definition of the* ***facility-stakeholder area*** and instead using a 25-km-diameter circle centered at or near the potential facility location until a reasonable amount of *site-specific* demographic, hydro-geologic-chemical, waste-inventory, and design-specific data are available. This approach would provide an at least 10-km-wide buffer zone outside of the perimeter of any portion of the repository if the repository-layout foot print does not exceed 5 km in any given direction. If it does exceed 5 km and/or a wider buffer zone is deemed required, the shape of the siting foot print should be adjusted accordingly. Suffice it to mention here as empirical reference points that the *"controlled area"* at WIPP, which is certified to contain up to 175,584 m^3 of TRUW, is a square with 6.44-km-long sides and the related diagonal, which would be the equivalent to the 25-km diameter proposed above, is 9.11 km. Furthermore, the longest (diagonal) distance from perimeter to perimeter of the entire underground facility, i.e., the repository, the shaft pillar, and the adjoining URL on Figure 5, is 2.1 km.

Though both of the above initial area-definition approaches may require subsequent refinements, they would serve to conservatively identify the following three radiation-risk-based, nuclear-facility-related population domains, of which **the first two domains depict "affected parties" with voting rights**:

1. ***Facility Stakeholders***;
2. ***Stakeholder hosts***; and
3. ***Interested parties***.

The first two domains could and should then also be prioritized during the pre-opening process. With regards to the aforementioned distinction between ***stakeholders, i.e.,*** **affected parties,** and ***interested parties***, and their proposed subsequent respective roles in a future nuclear-facility-siting process, the January 2012 BRC recommendations included a new "consent-based" process (Key Element 1) to be used for selecting and evaluating sites and licensing new nuclear facilities, including consolidated storage (Key Element 5) and disposal (Key Element 4) facilities,[1] but it did not define that process in administrative detail. The BRC did, however, suggest that *"all affected units of government, including the host state or tribe, regional and local authorities, and the host community, [be] willing to support or at least accept a facility",*[1] which, in our opinion, embodies the following tacit understandings:

1. Not everyone is affected by the siting or operation of a nuclear-waste-disposition facility.
2. Not everyone should have equal access to the negotiated terms of consent, including the "flexible and substantial incentives" envisioned by the BRC.[1]

As elaborated upon in the subsequent examples, this language of "**affected parties**" parallels the concept of "standing" in civil courts. Any party that can show that there is significant possibility of future harm to him/her through the actions of others has "standing" before a civil law court and can seek injunctive (or equitable) relief. However, the future harm must be the loss of a recognized right (security of person or property, right of companionship, etc.). In other words, the harm or loss must be a real harm or loss, not a

hypothetical or fictitious harm or loss. As an example, assume a resident of New Mexico learns of someone in the Maine woods periodically firing a hunting rifle into the air, and he/she seeks an injunction to stop the shooter in Maine. Any court would tell the New Mexico resident that he did not have standing to bring the suit because "No hunting rifle can hurl a bullet 3,400 km (2,100 miles)". However, when it comes to the siting of disposal systems for SNF and/or HLW the USA, social-science research has found widespread a priori belief that risks extend for several hundreds if not thousands of kilometers.[e.g., 7,17] *Program outreach simply must put some semblance of reality ahead of such spurious opinion formation.*

The determination of a list of affected parties and the negotiation of the terms of consent agreements will be an administrative and not judicial process, but the concepts of standing are the same. This administrative process must be substantive, logical and fair or else it can be attacked as arbitrary and capricious in a judicial proceeding. We thus propose a means herein, i.e., ***SEEC 1***, consistent with these concepts of common law equity, to identify and bound the universe of affected parties to a number that can reasonably be served with due process. Our tool to do this is the best available estimate of the radiological and other health risks that might be imposed upon anyone in proximity to the proposed nuclear facility operations. As in the case of civil law, ***SEECs 1 and 2.a.*** seek to focus the attentions of the authorities on those who suffer some risk of harm, no matter how small, and to prevent their voices and interests from being diluted or overridden by distracting and specious claims from ***interested parties***.

SEEC 2.b. proposes the percentage of a given ***stakeholder group*** that would be required for a "consent-based" decision. Based on the premise it had to more than 50% and would never reach 100%, we looked at related data from the WIPP site in the US, the Oskarshamn site in Sweden, and the Olkiluoto site in Finland. We also solicited advices from esteemed US colleagues. Based on the related information, we concluded that 60% of the ***stakeholder*** votes would be less than those attained in Finland and Sweden the past 20 years at the aforementioned sites, but sufficient to be viewed as substantial majority. *Clearly, this number is arbitrary but it is not capricious*. The main paradigm embodied in ***SEEC 2.b.*** using the proposed or any other percentage for defining "consent" is that *it applies to both votes for and against*.

It is re-emphasized that ***the SEECs*** outlined herein will not lock out or eliminate the suggestions, concerns, issues, or objections expressed by ***interested parties***. In addition to the continuous access to the regulator(s) and **affected parties** shown in green on Figure 4, another integral component of the proposed siting approach is that all ***interested parties***, as well as all ***stakeholders***, would also have continuous access during and after the repository pre-opening period to other entities overseeing the siting, design, licensing, development, opening, and safe and secure operation of a new SNF- or HLW-disposal facility. These entities currently include the NWTRB, the NRC, and the EPA, as well as state agencies and multi-state political groups such as the WGA, all possessing subject-matter expertise in at least one relevant discipline. ***All interested parties, as well as all stakeholders,*** not satisfied with the response to or action on a given issue would also be able to file legal challenges both during and after the pre-opening period.

In summation, the integrated, majority-consent- and health-risk-based, *quantitative*, nuclear-facility-siting concept embodied in the proposed ***SEECs*** would ensure societal equity by requiring majority-consents in each ***stakeholder group*** (shown in green on Figure 4). It also includes the opportunity for ***all interested parties*** to express their concerns and opinions in periodic public meetings hosted and/or attended by representatives from the siting entity, the regulator(s), t***he stakeholder groups***, and the oversight entity(ies). Indeed, ***the SEECs*** described herein are only intended as a transparent, societally-equitable, starting point for the siting of nuclear facilities. The ***SEECs*** thus need to be periodically revisited and modified, as appropriate, based upon the additional information and experiences obtained with time.

Based on our experiences, the most common historical challenges to the siting and development of new nuclear facilities in the USA and abroad are: a) Wide-spread "fear of the unknown"; b) The "perceived" radiation and other risks posed by the proposed facility; and c) "Self-serving" opposition. With regards to

challenges a) and b), whereas the scientific and engineering experts directly involved in the siting, design, development, etc. of deep geological disposal systems for LLRMs understand some, but not necessarily all, of the involved concepts, components, and risks, conservatively estimated, less than < 1% of the general public and their elected representatives and their sycophants in the USA, as well as in any other nation for that matter, has the education and experience required to grasp all of the following key concepts of LLRM-repository science:

- The huge spatial and temporal scales;
- The scientific and technological/engineering concepts;
- The safety/risk-assessment codes, models, and methodologies involved in the siting, design, operation and decommissioning, and post-closure performance; or
- The health risk(s) posed by the projected radionuclide releases.

Clearly, members of the general public cannot be expected to understand or to accept carte blanch the risks of a proposed nuclear facility that forces them into very unfamiliar terrain. As history shows, their initial reaction is to oppose anything that sounds like it will present a threat to their health, their community's health, or their property values. The siting of LLRM-disposition systems has thus experienced broad-based, public, ideological, and political opposition resulting in repeated project delays and cost increases both in the USA and abroad during the past 30 years. This is a rational reaction when knowledge is limited. Communication of risk and LLRM-repository technology with members of the general public and their elected representatives will therefore need to respectfully, timely, and legibly deal with layers of misunderstanding that can be any of the following:

1. Things that are true which they reject.
2. Things that are true of which they are uncertain.
3. Things that are untrue of which they are uncertain.
4. Things that are untrue which they nonetheless believe.
5. Things that are untrue which they see as such.

As follows, in any given country, ***the acceptance of a LLRM repository is essentially based upon either trust in the "messenger(s)" or the perceived personal risks and/or benefits***.[7,11,15,17] This condition has provided and will likely continue to provide fertile ground for various interest groups to seed the public's minds with misinformation resulting in doubts and fears causing opposition requiring attention and adversely affecting the schedule and cost for the siting and development of nuclear facilities for safe and secure disposal of SNF and HLW. The related societal needs, domino effects, and adverse consequences are often not an integral part of the related evaluation and decision-making process. Furthermore, the indeterminate term "consent-based" in Key Element 1 may serve as an unintended catalyst for a new venue for time-consuming debates and legal challenges that may have very little to do with actual radiation- or health-risks, or public safety unless it is more precisely defined. Two integral components of the nuclear-facility-siting approach described herein are thus:

1. All s***takeholders***, ***stakeholder hosts***, and ***interested parties*** are provided *trustworthy* information and feed back in a timely manner; and
2. The scientists and administrators who undertake this daunting task must be able and willing to inform and engage the public and their elected representatives in the needed conversation on the path to consent in a manner the general public and the political community and its sycophants comprehend and/or trust.

Typically, considerable public and political trust is vested in the regulator(s) and/or in one or more "independent" subject-matter expert groups such as e.g., the NWTRB and the now dissolved EEG.

However, neither the regulator(s) nor the "out-of-state" independent review groups have historically had the manpower or financial resources required for a timely, inter-active, dialogue even with **the affected parties**. Furthermore, although the NWTRB has the pre-requisite subject-matter expertise, it is a politically-appointed, federally-funded, entity located in the District of Columbia chartered to advise Congress, which might raise independence and objectivity concerns (and reservations) among both **affected** and ***interested parties***. We thus provided other "independent" options in **the *FHIs***.

Facility-Host Incentives

Relative to past LLRM-repository-siting processes in the USA where everyone's opinion purportedly is treated equally, but the loudest and the politically-powerful voices typically get most attention*, the proposed **SEECs** embody the paradigm of prioritizing the **affected parties'** suggestions, concerns, issues, and objections and having **interested parties** funnel theirs through the respective **stakeholder group(s).*** This societal-equity- and health-risk-based streamlining of the nuclear-facility siting and development processes would, in turn, allow the implementing organization(s) to focus its resources on the task at hand rather than, as has been the case hitherto, having to divert significant time and resources in addressing non-health-risk-related suggestions, concerns, issues, and objections. However, in order for this concept to work, it is imperative that one or more of the host(s) for the proposed facility is(are) provided adequate financial resources to assemble and then maintain a core group of subject matter experts that may change in composition during the different stages of the historically, at least 25-year-long, pre-opening period for a deep geological repository for LLRMs in the USA.[7] It is also deemed imperative that all ***stakeholder hosts*** will receive benefits *similar to* those granted New Mexico for the WIPP TRUW repository and the host communities for Finland's and Sweden's candidate final SNF repository, with two modifications. A priori, the economic compensation to the facility-host(s) (FH) should neither be time- nor amount-limited as it was for WIPP. It should continue on a periodically-renegotiated milestone-achievement basis until the facility closes or is terminated. Pro secondo, to entice timely progress, milestone achievement bonuses should also be considered. Three such readily-identifiable SNF and HLW-repository milestones deemed to deserve special recognition are the FH's "formal" majority-consent acceptance of: 1) *Hosting the search for a new facility*; 2) *The proposed disposal concept*; and 3) *The licensing application(s)*. In both Sweden and Finland, an incentive/benefit approach was negotiated at the local level for the respective nation's first SNF repository and then used as part of the domestic siting processes. A related "Vuojoki Agreement" was signed in Finland in 1999 and an "Added Value Agreement" was signed in Sweden in 2009.[15] These agreements represent "locally-negotiated", *evolving*, incentive approaches.

The FHIs described herein would provide the ***affected parties*** significant long-term benefits in return for accepting the inherent and implied risks of hosting a nuclear facility. Their respective underpinnings are summarized in the foot notes on page 6. With regards to ***FHI 5***, clearly, the proposed irrevocable host-state authority to veto the "project" up to the point the license application to receive nuclear materials is docketed by the regulator(s) embodies significant financial and schedule risks. But, as demonstrated for more than two decades in Sweden, it can also serve to build and maintain a very knowledgeable "in-house" subject-matter stakeholder group that serves as: 1) A trustworthy information source for other ***stakeholders***; 2) An effective sieve for suggestions, concerns, issues, and objections raised by ***interested parties***; and 3) An effective bulwark against "self-serving" suggestions, concerns, issues, and objections. In addition, both prior to and after this veto point all US citizens, i.e., both ***stakeholders*** and ***interested parties***, can use their unalienable civic obligation and right to present and promote their suggestions, concerns, issues, and objections to the cognizant regulator(s) and their respective elected representatives or interest group, and to pursue legal action if unsatisfied with the response to their concerns.

With regards to ***FHI 6***, we envision this group to include theology, philosophy, psychology, and sociology, as well as the physical science disciplines. We also envision the group having the goal of fostering a national majority consensus on all of the issues that have been raised in the past to challenge

and derail nuclear facility siting and development attempts in the US thus far, and being given the funding and capacities to reach the population at large, to conduct public interactions of every sort and format, and to distribute consensus documents nationwide, particularly through electronic means. For example, *a relational database* explaining *in layman terms* the risks of leaving the TRUW where they were relative to disposing them more than 600 m below the ground surface in a 600-m-thick, virtually-impermeable, salt formation (Figure 5) was instrumental in gaining both public and political acceptance and support. From Swedish experience, we can say that this group should have the influence to insert public demands of notable merit into the siting, planning, design, and operation of disposal facilities. It would be the trusted third party mediating the social forces holding sway on the engineering project. This is a delegation of some project control over costs and schedule, but so is the acceptance of "consent" as a prime directive. We believe the ***FHI 6*** mechanism will strongly assist the building of necessary trust.

SUMMARY OF MAIN OBSERVATIONS, CONCLUSIONS AND RECOMMENDATIONS

At the end of 2012 the historical record either showed or indicated that the US:

1. Already had stockpiles of SNF and HLW exceeding 80,000 MTU that will continue to increase by more than 2,000 MTU per year until a large-capacity SNF-storage or -disposal facility opens.
2. Lacked an SNF-disposal solution acceptable to the Obama Administration despite more than 55 years of costly national efforts in compliance with applicable laws and regulations.[11]
3. At the very earliest may open its first SNF- and HLW-repository 8-12 years after the YM-repository project is re-started, provided the US Court of Appeals for the District of Columbia rules "favorably" on two current law suits; one not scheduled for ruling until 2014.
4. Would need at least one new SNF repository if either: a) The legal MTU capacity of the YM repository is not increased; or b) The YM repository is aborted.
5. May not open its first SNF-repository in another 25-40+ years in the event the YM SNF/HLW-repository project is terminated.
6. Had experienced repeated losses of public confidence in the current SNF/HLW disposal concept and its management that in turn has compromised and adversely affected public confidence in deep geological disposal of LLRMs both in the US and abroad, and will continue to do so until: a) The merits of the WIPP LLRM repository is better understood and appreciated in the USA and abroad; and/or b) Another ***pedigreed*** SNF- or HLW-disposal solution/concept is pursued.
7. Had experienced repeated losses of credibility in the international radioactive waste management community that in turn had eroded the foundation for the USA being considered a leader in this area. This erosional process will continue every time politics: a) Ignore, override, or suppress sound science and engineering; and b) Ignore or disregard existing laws or due process.

Accordingly, the BRC concluded in its 2012 report to the Secretary, that *"America's nuclear waste management program is at an impasse"* and recommended a new strategy for managing the back end of the nuclear fuel cycle.[1] Although the Obama Administration has not yet responded to the BRC report and has no legal obligation to do it, if national security and sound science prevail, future searches for one or more new SNF and/or HLW disposition sites will be based upon the 2012 BRC report. While we agree with and support virtually all of BRC's recommendations, based on our more than 100 years of combined involvement in and monitoring of nuclear waste management programs in the US and abroad since the early 1970s, we believe Key Element 1 must be promptly quantified to: a) Serve as a rational starting point for the siting of any given LLRM-disposition facility; b) Ensure/provide societal equity; c) Garner and maintain majority acceptance and sustained support by the parties affected by the proposed facility; d) Mitigate or minimize non-radiation-risk-related challenges; and e) Achieve Key Elements 4, 5, 6, and 8 in a defensible, timely, and cost-effective manner. We thus designed and described herein: 1) *A set of "fused" SEECs* quantitatively defining the term "consent" in Key Element 1 *based on radiation risks and societal equity that, in turn, identify areas and populaces affected by the proposed nuclear*

facility (and its related infrastructures), and those that/who are not; and 2) *A set of selective FHIs already used successfully at WIPP in the USA and abroad to garner and maintain public and political acceptance and support of nuclear facilities.* Provided they are timely implemented, adequately funded, shielded from spurious ideological, career, and political ambitions and agendas, and benefitting from trustworthy program/project governance, *the proposed SEECs and FHIs* would significantly reduce the time and effort required in the past by the implementing organization to address issues raised by individuals and parties not subjected to any identifiable radiation-related health-risk from the proposed nuclear facility or its infrastructures, i.e., **they would expedite the accomplishment of BRC Key Elements 4, 5, 6, and 8.**

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Status of HLW Disposal in the USA and Rational, Progressive, Paths Forward Based Upon Lessons Learned In the USA and Abroad Since 1973 – 15103 (E.2)

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ABSTRACT

The development of the USA's only *candidate* (since 1987) HLW-repository at the Yucca Mountain (YM) site, Nevada, was halted by the Obama administration in 2009. Four years later, the Obama administration proposed a new strategy for the back end of the nuclear fuel cycle that would open a ***consent-based*** HLW repository "by 2048". At the end of 2014, both the YM HLW repository and the new HLW-disposition (storage and disposal) strategy remain on hold due to lack of enabling legislation.

With this as background, and based upon our active involvement in, monitoring of, and reporting on HLW management programs in the USA and abroad since 1973, we submit that:

1. Politics, political will, and legal actions and outcomes will continue to govern progress.
2. Public acceptance and sustained support (PASS) may influence politics and political will.
3. PASS is time-dependent and governed by:
    a. Ideologies;
    b. Perceived benefits and risks;
    c. Level and equity of radiation protection provided by applicable regulations;
    d. Perceived robustness/safety of the proposed disposition concept; and
    e. Perceived credibility and competency vested in the involved organizations and their respective leaders (= **TRUST**).

We therefore recommend that the USA concurrently pursues at least two, "centralized" HLW-storage and -disposal solutions based upon best-available relevant knowledge and majority-PASS at facility-host locations. Furthermore, safe(r) and more secure disposal of defense/government-generated HLW could probably commence at least 15 years earlier than "by 2048" in/at:

1. The YM repository/site.
2. The WIPP repository/site.
3. "Local" deep boreholes.

INTRODUCTION AND BACKGROUND

At the end of 2014, the future of nuclear energy in the USA is more closely tied to *public acceptance and sustained support* (PASS) of safe and secure disposition (storage and disposal) solutions for the resulting long-lived radioactive residuals/isotopes (LL-RR) than it has ever been [1,2,3]. However, while a broad range of safe and secure LL-RR-storage solutions exist in the USA (Figure 1) and abroad, the 2023 projected opening of the world's first disposal solution for HLW[1] in Finland is still eight years away. As described in the subsequent text, such an event was at least 9, but more likely 13, years away in the USA. Actually, despite more than 55 years of effort [4], the opening of the USA's first HLW repository could be more than 35 years away [2] contingent upon the content and the time of enactment of the pending enabling legislation required to take action on one or both:

[1] Although their respective legal definition differs in the USA, in this paper, the acronym HLW includes used nuclear fuel (UNF) and spent nuclear fuel (SNF), but it does not include any other LL-RR, such as transuranic radioactive waste (TRUW) or intermediate-level radioactive waste (ILW).

- Continue licensing of the Yucca Mountain (YM) site in Nevada (Figures 2 and 3) [5,6], which was declared "not workable" in 2009 by the Obama administration [7] and then aborted in 2010 (http://en.wikipedia.org/wiki/Yucca_Mountain_nuclear_waste_repository); and/or
- Implement the new DOE strategy for the management of HLW proposed by the Obama administration in January 2013 [2].

For the purposes of the forward projections made in this paper, we assumed enabling legislation would be enacted for both of them by the end of 2015 and that it would then take another year to establish one or more implementing organizations and consent-based siting procedures. In other words, 2017 would be T_0.

Fig. 1. Non-government-operated storage sites for commercial HLW in the USA (= 83 sites in 34 states). (Please note that ~ 30 government-owned/operated storage sites are not shown on the figure.)

In the following paragraphs, we have identified and commented upon a few selected root causes of the 55+ years [4] of failures to site, develop, and open "central" storage and disposal facilities for HLW generated by commercial (CHLW) and defense/government (DHLW) related activities [5,6]. These and other root causes are also addressed in greater detail in another WM2015 paper [8] and in a WM2013 paper [9]. Whereas both of these papers focus on the quantitative definition of the qualitative term "***consent-based"***, this paper focuses on solutions that might allow a HLW repository in the USA to open before 2048. The underlying themes for all three papers are: time (= $) is of the essence; we know how to safely site LL-RR repositories (Figures 2-4) and dispose of LL-RR (Figure 4); and ***the growing elephant in the room, fed by lack of political will, is the increasing volume of HLW requiring ultimate disposal.***

Our subsequent discussions include projections on the future of HLW disposition in the USA based upon our long (40+ years) involvement in and monitoring of radioactive waste management programs in the USA and abroad. The following three disposal concepts are discussed herein: 1) Deep geological disposal (DGD); 2) Deep mine/repository disposal (DMD); and 3) Deep borehole disposal (DBD). Both the DMD concept and the DBD concept are DGD solutions/systems (DGDSs).

Our initial focus is on the following two fundamental HLW-disposal issues, but it includes peripheral views on the status of several mature HLW-management and -disposal programs and issues abroad:

1. How did the USA's HLW-disposal program get to where it is currently?
2. What can be done in the future based upon the lessons learned in the USA and abroad during the past 40+ years to avoid or minimize past adverse impacts on the schedules and costs for HLW-repositories in the USA?

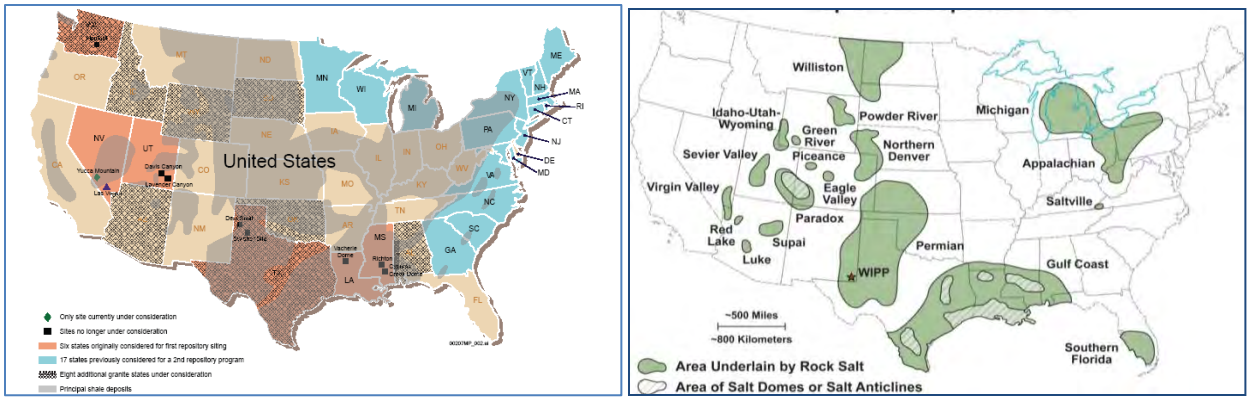

Fig. 2. Schematic illustration of locations of sites, areas, regions, states and some of the rock types (the right figure shows rock salt) evaluated prior to 1987 for suitability to host a U.S. HLW repository.

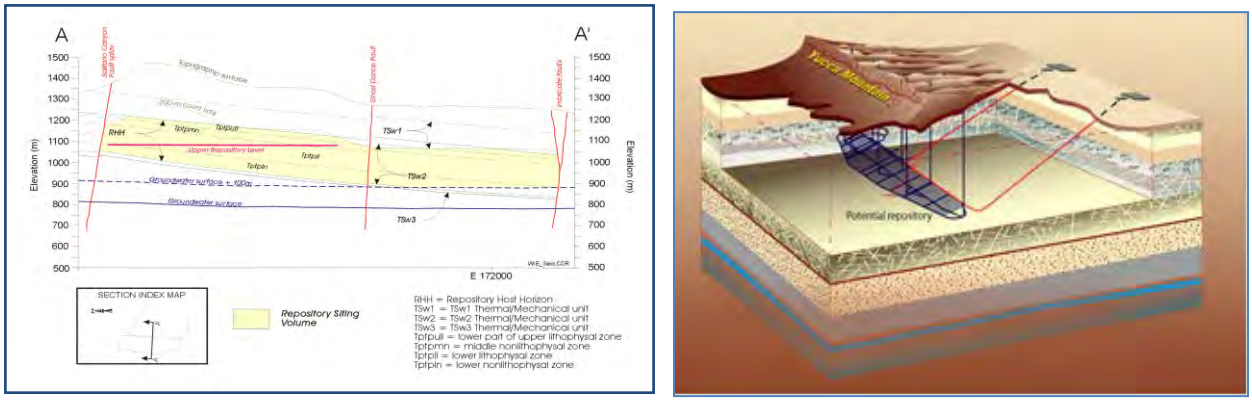

Fig. 3. Schematic illustrations of the stratigraphy and the repository location in a west-east cross section (to the left) and the proposed layout for the USA's only candidate HLW-repository since 1987 at the Yucca Mountain site in Nevada (Figure 2 shows its location). Layout tunnels shown in red have already been constructed and used for full-scale in-situ test, but they were closed in 2008.

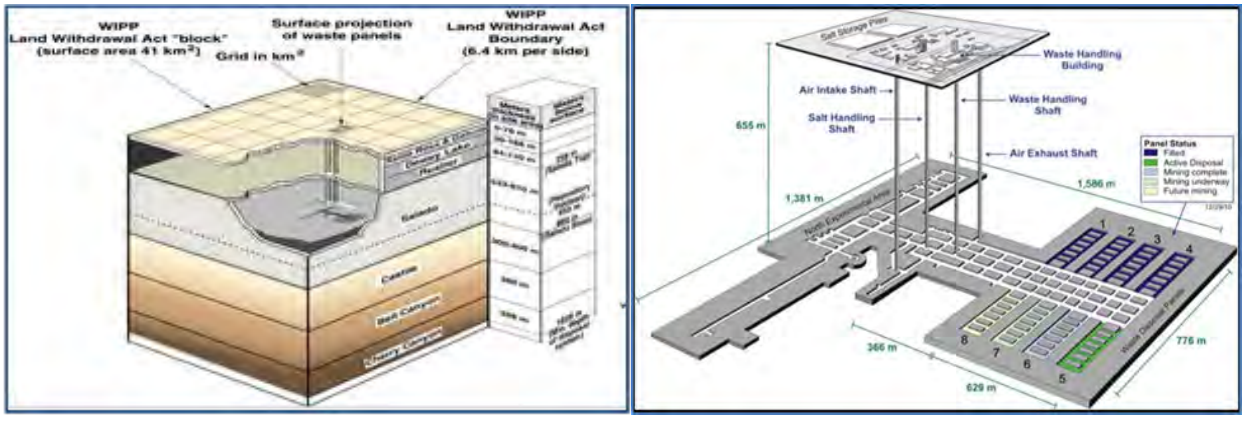

Fig. 4. Schematic illustrations (to the left) of the 41 km^2 (4x4 miles [mi]) controlled area and its current 1.6 km (6,000 feet) depth limit at the WIPP site, and (to the right) of the TRUW-repository and its adjoining four shafts and underground research facility (URF); the North Experimental Area. At the end of 2014, panel 1 through 6 had been filled, panel 7 was partially filled, panel 8 was partially mined, and 91,000 m^3 of TRUW had been disposed of in the WIPP repository.

Main Events Contributing to the End of 2014 Status of the USA's HLW-disposal Program

The following annotated chronological summary of post-1982 domestic events is deemed by the authors to be of particular importance to the current status and potential future of HLW disposition in the USA:

- In January 1983, the U.S. Secretary of Energy (the Secretary) was directed by the Nuclear Waste Policy Act of 1982 (NWPA) to open its first HLW repository no later than 31 January 1998 [5]. At that time, it was more than 10 years earlier than any other country was scheduled to have an operating HLW repository.
- While States with sites under consideration for a HLW repository were promised the "right of refusal" of the HLW repository, in December 1987, the Secretary was directed by an Amendment to the NWPA (NWPAA) to only evaluate the YM site for the nation's first HLW repository and to terminate all other HLW-repository-siting activities within 90 days [6]. Under strong opposition (pressured by Las Vegas casino interests), Nevada promptly rejected the selection of the YM site, but its rejection was overruled by the U.S. Congress in 2002.
- In December 2008, the YM HLW repository schedule was revised with a projected opening date no earlier than 2017, but more likely 2020 [12]. At that time, it would still open earlier than any other country's HLW repository.
- In February 2009, the Obama administration announced its intention to abort the YM HLW-repository project [7].
- In January 2010, the Obama administration appointed a Blue Ribbon Commission on America's Nuclear Future (BRC) to evaluate domestic and foreign nuclear waste management policies and programs and then recommend a new U.S. policy for the back end of the nuclear fuel cycle within 24 months. The BRC was also directed that it was not to serve as a siting body [1]. Accordingly, it did not evaluate the YM or any other location as a potential site for the disposal of HLW [1].
- In March 2010, the Secretary submitted a motion to the U.S. Nuclear Regulatory Commission (NRC) for withdrawal of the June 2008 construction license application (CLA) for a 70,000 metric tonnes repository at the YM site (Figures 2 and 3) containing ~63,000 metric tonnes of CHLW and ~7,000 metric tonnes of DHLW. The NRC rejected the motion, and its legality and the Obama administration's related termination of the YM HLW-repository project were promptly challenged in court by several directly affected parties (DAPs) and interest groups.
- In January 2012, he BRC presented its recommendations on a new strategy/policy for HLW management and disposal in the USA [1]. Again, it did not address the YM HLW repository site.
- In January 2013, the Secretary/DOE released a 14-page report purportedly based upon the BRC recommendations. It projected that a new HLW repository would open "by 2048" [2], which would be at least 20 years later than the 2023, 2025, and 2027 opening dates projected at that time for the Finnish (http://www.posiva.fi), French (http://www.andra.fr), and Swedish (http://www.skb.se) HLW-repositories, respectively.
- In June 2013, a Bill (S.1240-IS) [3], referred to as the "Nuclear Waste Administration Act of 2013" (NWAA), was introduced in the U.S. Senate to:
    - *"Establish a new nuclear waste management organization" … "to discharge the responsibility of the Federal Government to provide for the permanent disposal of "nuclear waste*[2]";
    - *"Establish a new consensual process for the siting of nuclear-waste management facilities"*;
    - *"Provide for centralized storage of nuclear waste pending the completion of a repository"*; and
    - *"Ensure adequate funding for managing nuclear waste, and <u>for other purposes</u>*."

[2] Although several laws cited in S.1240-IS refer to HLW and other LL-RR, S.1240-IS is not clear on the nuclear waste categories it applies to, because it extensively uses the generic term "nuclear waste".

However, the NWAA will not be implementable until after it has been passed by the U.S. Congress and then signed by the U.S. President, and, of course, has been adequately funded.

- In August 2013, the U.S. Court of Appeals for the District of Columbia Circuit (the A Court) ruled [13] on the legal challenges to the Obama administrations 2010 attempts to terminate the YM HLW program that *neither the U.S. President nor a federal agency could unilaterally reject or deviate from a statutory mandate without prior approval by the U.S. Congress*.
- In November 2013, the A Court ruled on another lawsuit [14] that the strategy proposed in January 2013 for the siting and development of a new HLW repository was a *"pie in the sky"* proposal, and directed the Secretary to relieve the nuclear utilities from paying annual fees into the Nuclear Waste Fund (NWF) [14] until the DOE was able to take title to their CHLW.
- On 16 May 2014, the fee payments into the NWF were halted.
- At the end of 2014, the status of HLW management in the USA was as follows:
    - More than 76,000 metric tonnes of HLW were stored at > 100 sites in > 40 states;
    - The CHLW stockpiles will continue to increase at an annual rate of ~ 2,000 metric tonnes until they are depleted by treatment and/or disposal solutions;
    - The YM HLW repository was still the USA's only legal HLW-disposal option; but it remained on hold pending enabling legislation;
    - The new HLW-management and -disposition strategy proposed by the Obama administration in January 2013 [2] was also on hold pending enabling legislation;
    - The nuclear utilities were not required to pay into the NWF until the DOE is able to take title to their CHLW, or has a credible plan or facility for storing or disposing it; but
    - The annual penalties being paid by to the nuclear utilities since 1 February 1998 (by the taxpayers) due to DOE's failure to timely dispose of or take title to its HLW will continue until the DOE takes title to the CHLW.

DESCRIPTIONS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

From our perspective, it is important that the primary reasons (root causes) for the 2014 status must be understood so as to illuminate the potential keys to future progress. We also believe that critique without one or more potential solutions is not constructive. Although we assumed herein that both the YM and the Obama-administration-proposed HLW repository would survive and that all related legal, regulatory, and financial instruments, and organizational structures needed for their respective implementation could be in place by the end of 2016, this very-likely will not be the case. For example, utilization of the YM HLW repository project might be foreclosed due to the long-standing, very-strong, political opposition it has garnered at the state level. However, in light of the extensive knowledge already acquired and the financial investment already made in the YM site, *we don't think the very substantial financial and scientific investments should be so easily or completely forfeited.* Therefore, we are also outlining potential alternative utilizations of the YM site in the subsequent text.

Fundamental Challenges to and the Path Forward for Opening a HLW Repository in the USA

The disposal of all LL-RR involves state of the art repository-sciences and -engineering concepts, features, events, and processes (FEPs), and non-related nuclear events that often lead to decisions being made based upon fears and a related desire to promptly eliminate them [8]. Based upon our active involvement in the consent-based Swedish HLW-repository program since 1978 and the consent-based WIPP-repository project since 1993, we would like to emphasize the importance of the proponent's spokespeople having the requisite relevant experience, credentials, reputation, and credibility to be trusted on issues beyond the comprehension of the recipient(s). They must also be able and willing to present the information in contexts and terms readily understood by laypeople [15-18]. We believe this is most effectively done in public meetings where the members of the audience can ask for clarifications in real time, because, there will still be grey areas that need to be addressed. A related cornerstone is the

receiving party's perception or understanding of the credibility of the presenter/communicator/messenger. Simply stated, information received from a friend or a source deemed to possess the desired knowledge and integrity often trumps the information received from an unknown person with an impressive title and/or education.

A long-recognized root cause (to the current status of HLW-disposal) in the USA is the wide-spread reluctance among the elected representatives, their supporters and staffs, and people with political ambitions, to champion or support a HLW repository due to the perceived risks (short-term and long-term) and related re-election, job security, and election risks, respectively. However, as demonstrated in France and Sweden, this long-standing tide can be turned when the majority of the DAPs become fully informed of repository performance and the related public-health risks. They can in fact become supportive of hosting a HLW-repository, because, logically, it would then be counterproductive to the election and/or the re-election of their elected representatives to oppose it.

The Proposed Nuclear Waste Administration Act of 2013 (NWAA) of 27 July 2013 (S.1240-IS)

S.1240-IS [3] was the first political action at the national level to establish a path forward for the enactment and enabling of the recommendations provided by the BRC in January 2012 [1], and the related HLW-disposition strategy envisioned by the Obama administration in January 2013 [2]. However, all of these documents were released prior to the August 2013 ruling by the A Court [13] that revived the prospect for the YM HLW repository. The A Court ruling means that the U.S. Congress must take another look at if and how it wants to shape the future of HLW-disposition in the USA.

The U.S. President, who must sign or veto the proposed enabling legislation, has been on record since early 2009 of opposing the continued development of the YM HLW repository. As a result, the most convenient and expeditious option for the U.S. Congress at this time is to approve S.1240-IS and then amend the NWPA again to continue or eliminate the YM HLW repository project. However, as explained in another WM2015 paper [8], as initially written, S.1240-IS failed to incorporate several fundamental lessons-learned in the USA and abroad on how to conduct a successful, consent-based, siting of a DGDS for LL-RR. It is, therefore, deemed highly-likely that, *as initially written, S.1240-IS will delay rather than advance progress on future new HLW-storage and -disposal solutions due in large part to its lack of timely active and meaningful, DAP involvement in the planning and decision-making processes*. It could, however, represent a politically irresistible concept similar to the 1985 "geologic-media diversification" concept that resulted in three candidate repository sites in different geologic media, i.e., basalt, rock salt, and tuff, and the abandonment of six rock-salt sites.

Another historical HLW-disposal concept that has received renewed attention and interest during the past five years in the USA and abroad, although not addressed in S.1240-IS, is DBD [19]. It could be a promising concept for localized disposal of limited quantities of HLW based upon generic predictive modeling results. This option embodies a reduction in HLW-handling and -transportation risks and cost, but it lacks the empirical database and site-specific analyses required for implementation that are abundant for the HLW-repository concept. The DBD concept will also require the promulgation of new, time-consuming, HLW-disposal and environmental radiation protection criteria/standards. In principle, we support the continued evaluation of the DBD concept, but we do not consider it a mature, near-term, solution for safe and secure disposal of large quantities of HLW at this time. Nonetheless, on paper [19], the DBD concept appears virtually ideal for disposal of small quantities of LL-RR at existing generator and storage sites, and should receive (deserves) appropriate local consideration.

Best-Available Repository-Sciences and -Engineering Knowledge

In our evaluation, we applied the term "best-available" as encompassing the current "state-of-the-art". A related pre-requisite was the existence of a comprehensive data base that included full-scale, in-situ, tests

in the intended host-rock formation, encompassing specially-designed tests conducted in an underground research facility/laboratory (URF/URL). A listing of URFs/URLs and their respective host-country and repository host media is provided in Table I (http://en.wikipedia.org/wiki/Deep_geological_repository).

TABLE I. Countries Hosting or Having Hosted URFs and URLs at the end of 2014.

Country	URF/URL name	Location	Host Media	Depth	Status
Belgium	HADES	Mol	plastic clay	223 m	in operation 1982
Canada	Pinawa	Pinawa	granite	420 m	1990-2006 (closed)
Finland	Onkalo	Olkiluoto	granite	400 m	in operation 2004
France	Bure	Meuse district	mudstone	500 m	in operation 1999
Japan	Horonobe	Horonobe	sedimentary rock	500 m	under construction
Japan	Mizunami	Mizunami	granite	1000 m	under construction
Korea	Korea Underground Research Tunnel (KURT)	Daejeon	granite	80 m	in operation 2006
Sweden[a]	Äspö	Oskarshamn	granite	450 m	in operation 1995
Switzerland	Grimsel	Grimsel Pass	granite	450 m	in operation 1984
Switzerland	Mont Terri	Mont Terri	claystone	300 m	in operation 1996
USA[b]	Yucca Mountain (Figures 2 and 3)	Nye County	welded tuff, ignimbrite	200+ m	1997-2008

[a] Prior to1995, international HLW-disposal research, development and demonstrations (RD&Ds) in *crystalline/igneous ("granitic") rocks* had been conducted for two decades in a dedicated portion of an abandoned iron mine at Stripa.

[b] Prior to 1987, the USA also had conducted deep underground HLW-in-situ tests in the Climax *granite* formation on the Nevada Nuclear Safety Site, in a near-surface facility in *basalt* located in the Gable Mountain on the Hanford Reservation in the state of Washington [20], and in *rock salt* at the WIPP site in New Mexico [21], and in several domal-salt mines in Louisiana.

Due to the fact that the USA has only conducted, full-scale, in-situ, HLW-related RD&D in tuff and salt since 1987, the current state-of-the-art repository-sciences and -engineering expertise and experiences in other repository host-rocks are to be found in other countries. At this time, the seven most advanced/mature HLW-repository programs in terms of repository sciences and engineering are to be found in Belgium, Finland, France, Germany, Sweden, Switzerland, and the USA. Summarized below are our views about the current status and prospects of these seven programs in alphabetical order.

Belgium - Has evaluated an *over-consolidated clay* (soil) formation, the Boom clay, at Mohl-Dessel for more than 30 years, in which it continues to operate a URF. The construction of the HLW repository is projected to begin in 2050 **(**http://www.eu-decom.be/contacts/belgium/ondrafniras.htm). We deem it unlikely that over-consolidated clay would be considered in the USA in light of the abundance of other promising repository-host media.

Finland - Has evaluated *crystalline/igneous ("granitic") Pre-Cambrian basement rocks* for more than 30 years. Posiva Oy (http://www.posiva.fi) is responsible for the siting, licensing and safe and secure development and operation of the required centralized HLW-disposal facility. It is also responsible for the safe, secure, and timely transportation of the HLW from the two domestic NPP sites with operating nuclear reactors; namely at Loviisa (close to the Russian border) and at Olkiluoto (at the coastline of the

Baltic Sea), to the appropriate disposition facilities. The HLW-generators are responsible for storing it until the HLW repository can receive it. At the end of 2014, Posiva operates the Onkalo URF at the depth and location of the intended HLW repository, which is ***projected to open in 2023***. The related data bases and experiences, in combination with those of Sweden's, constitute the state-of-the-art on DMD of HLW in crystalline rocks. This joint-state-of-the-art "ownership" is founded upon the joint use during the past 20 years of the KBS-3 disposal concept and related collaborative research and development (R&D) efforts; *a borderless collaborative approach highly recommended by the authors*.

France - Has evaluated several different HLW-repository host-rock types during the past 40 years. Andra (http://www.andra.fr) is responsible for the siting, licensing and safe and secure development and operation of the required centralized HLW-disposal facility. During the past 20 years, the focus has been on *a clay-rich, lithified, sedimentary rock (argillite/mudstone/claystone) formation* in the Meuse and the Haute Marne districts, in which it currently operates a URF at Bure in the Meuse district (Table I). The French repository (Cigéo), which will contain both long-lived intermediate-level (LL-ILW) and HLW, is currently ***projected to open in 2025***. The related data bases and experiences, in combination with those of Switzerland's, constitute the state-of-the-art databases and experiences on DMD of HLW in sedimentary rocks. However, they may not be applicable to shale, which was one of the potential repository host rocks considered in the USA prior to 1983 (Figure 2).

Germany - Has also evaluated different rock types during the past 40 years, but the focus during the past 30+ years has been on a salt anticline at Gorleben. Although no safety issues preventing its safe use have been identified hitherto, the evaluation and development of the Gorleben HLW-repository was halted between 2002 and 2012, and then halted again in 2013 to accommodate a political re-evaluation of other HLW-repository host rocks. As a result, *neither the final host rock nor the projected opening of Germany's first HLW repository has been identified at the end of 2014.* Notwithstanding the holds on the Gorleben HLW repository, the state-of-the-art HLW-repository sciences and engineering expertise in many rock salt areas are still vested in Germany. The Science Advisor on the WIPP project since 1975, Sandia National Laboratories (SNL), has collaborated closely with German repository scientists for more than 25 years, so the nexus for the state-of-the-art HLW-repository collaboration already exists.

Sweden - Has evaluated *crystalline/igneous ("granitic") Pre-Cambrian basement rocks* for more than 40 years. The Swedish Nuclear Fuel and Waste Management Company (SKB) (http://www.skb.se), which is owned by the nuclear utilities operating Sweden's four NPPs, is responsible for the siting, licensing and safe and secure development and operation of the required disposition facilities. During the past 23 years, *the HLW-repository siting process was limited to voluntary host-communities*, and the detailed site investigations were limited to two communities in 2002; namely, Oskarshamn and Östhammar. In 2010, SKB recommended and the Swedish government approved a site adjacent to the Forsmark NPP site with three operating reactors in the municipality of Östhammar for the development of the nation's first HLW repository. The municipality of Oskarshamn was selected to host the nation's only HLW-encapsulation facility (Cink). At that time, the municipality of Östhammar already hosted the nation's only (underground) disposal system for short- lived LLW and ILW (the SFR) and the municipality of Oskarshamn already hosted an NPP site with three operating nuclear reactors, a second-generation URF at Äspö, a long-term, underground , monitored-retrievable, HLW-storage facility (Clab), and the HLW-encapsulation laboratory (Inka). Similar to Finland, Sweden has a fully integrated nuclear waste management program that also includes the state-of-the-art on consent-based siting of nuclear facilities in several locations. *The Swedish HLW repository is currently projected to open in 2027.*

Switzerland - Spent fuel (SNF) from the Swiss NPPs and vitrified fission product solutions from reprocessing will be disposed of in a HLW repository. It will also have tunnels for LL-ILW and is projected to be operational around 2050. As shown in Table I, Switzerland has operated a URF in *crystalline/igneous rocks* at Grimsel since 1982, but its HLW-repository focus during the past 20 years has been on sedimentary rocks that included full-scale, in-situ, tests in *claystone* in the Mont Terri URF.

USA - As indicated on Figure 2, the USA has evaluated a broad range of potentially-suitable HLW-repository host rocks and locations during the past 60 years. The aforementioned evaluations included Columbia Basin *basalt* intrusions and flows at the Hanford Reservation in the state of Washington, *crystalline/igneous ("granitic") rocks* in two large regions in the eastern portion of the USA, *lithified sedimentary rocks* (e.g., shale) across the USA, *bedded and diapiric/domal rock salt* across the USA, and *volcanic effusive/ash layers* (e.g., *welded tuff/ignimbrite*) at the YM site in Nevada (Figures 2 and 3). As listed in Table I and its two footnotes, some of the aforementioned surface-based evaluations were augmented by full-scale-in-situ tests in an URF/URL.

Consent-Based Siting

With regards to consent-based siting and development of HLW-repositories, at the end of 2014, Finland, France, and Sweden are the furthest advanced nations. However, when it comes to consent-based siting of a DMD for LL-RR, the WIPP repository in New Mexico, USA, is still the leader by more than 35 years. Based upon our global observations and experiences, we believe that *majority PASS among the DAPs is an imperative pre-requisite for a societally-equitable siting, development, and operation of future HLW-storage and -disposal facilities in a democratic country*. However, as discussed further in other places in this paper, the term *"consent-based"* used in the 2012 BRC report [2] and in the Obama administration's 2013 strategy [2], as well as the term *"consensual"* used in the June 27, 2013 Senate Bill (S.1240-IS) [3], which currently govern the siting of a new HLW repository in the USA, are qualitative terms (catch-phrases) that need to be defined in measurable terms to serve a constructive purpose.

As discussed in our WM2013 paper [9] and in another WM2015 paper [8], the term/concept "consent-based", as well as its qualitative derivatives, need to be more clearly defined as to whose consent is needed and what constitutes "consent" (> 50%?), to serve any meaningful purpose in making progress on the siting of new HLW-storage and -disposal facilities in the USA. Without it, the term/concept "consent-based" will surely remain a fertile target for prolonged public and judicial arguments to delay the siting and opening of the USA's first centralized HLW-storage and -disposal solutions. For example, notwithstanding that the host county (Nye) for the YM site and six adjacent counties are willing to host the HLW repository (http://en.wikipedia.org/wiki/Yucca_Mountain_nuclear_waste_repository), its opening has been successfully opposed and delayed since 1987 by the state, ignored by the U.S. Congress, and disregarded by several U.S. Presidents. The primary related root cause is the U.S. Congress' failure to maintain support for opening the YM subsequent to its site selection approval in the face of strengthened political opposition in Nevada, and the support of that position by the Obama administration. This, in turn, raises the following sociopolitical issue: ***who, besides the designated regulator(s), should have the final say in accepting or rejecting a HLW repository location?***

As discussed in the aforementioned WM2013 [9] paper, we believe the legal residents in the facility-host community, also referred to as the DAPs, to be the primary decision makers on whether or not to host a HLW-disposition facility, i.e., a bottoms-up, rather than a top-down decision-making process. Likewise, the legal residents adjacent to the proposed HLW-transportation routes should be the primary decision makers on the acceptability of those routes and related transportation risks [9].

Projections About HLW-disposal Solutions in the USA

At this time, the USA's HLW-disposition programs are still on hold pending enabling legislation formulated as a result of the BRC report. Our most optimistic, yet speculative, projection is as follows:

1. The enabling legislation will be enacted no later than at the end of 2015.
2. It will then take at least another year to establish and populate the implementing organizations and to write the new siting criteria required pursuant to S.1240-IS.

Based upon this projected scenario, if the YM HLW-repository survives the pending legislation, the 2017-2020 opening dates suggested for it in the December 2008 report [12] would be delayed at least seven years and the "by 2048" opening of the hypothetical HLW-repository proposed by the Obama administration in January 2013 [2] would be delayed at least four years. Therefore, the YM HLW repository could mathematically open as early as in 2024, but more likely in 2027, whereas the HLW repository proposed by the Obama administration in January 2013 [2] would open "by 2052".

There are, however, options based on "best-available technology" that could expedite the opening of a HLW repository in the USA. For example, the DOE released a noteworthy report in October 2014 [25] that outlined the benefits of establishing separate disposal solutions for CHLW and DHLW. Two of the anticipated benefits were that such a separation would greatly simplify disposal and advance the opening date for the DHLW repository relative to the "by 2048" opening date projected in January 2013 [2].

In our opinion, additional time and cost-savings would conceivably be possible if either the mission of the WIPP repository was expanded to also facilitate disposal of DHLW or if the mission of the YM HLW repository was limited to DHLW. For example, several statements by the NRC through December 2014 on four of the five volumes of the DOE's 3 June 2008 license application to construct a 70,000 metric tonnes HLW repository at the YM site, strongly suggest that it can safely accommodate up to 63,000 metric tonnes of CHLW and 7,000 metric tonnes of DHLW under the site-specific disposal regulations [26,27]. Since, DHLW is both much smaller in total volume and less "thermally-hostile" to the near-field environment than CHLW, logically, it should not raise the same post-closure-safety and health issues or concerns as those related to the commingled CHLW and DHLW.

The historical record shows that the YM HLW-repository concept was accepted and supported in Nevada until it was prematurely mandated as the one and only option for the disposal of HLW in 1987. Conceivably, a drastic reduction in the amount of HLW that would be disposed of, its more benign thermal characteristics and the commencement of the search for a consent-based CHLW-repository site could be compelling reasons for Nevada to reconsider its current position and contribute to the partial resolution of a significant national problem/obligation. After all, the YM site already represents a rate- and tax-payer investment during the past 30 years alone on the order of 16 billion U.S. dollars ($16B) that deserves serious consideration before it is abandoned. Such consideration can include a changed mission. In our opinion, long-term storage of commingled HLW and disposal of DHLW are the two most viable options to ensure that rate- and tax-payers get some return on their investments. It would also improve the USA's standings in the international radioactive waste management and non-proliferation communities.

The DBD concept could also advance the disposal of both DHLW and CHLW, but, unfortunately we don't think it would do much, if anything, to increase public confidence in the disposal of HLW in large man-made/mined underground openings, i.e., repositories.

Can WIPP Replace the Yucca Mountain Repository?

In Dr. Frank L. Parker's November 4, 1999, Plenary Session presentation at the National Academies Workshop on "*Disposition of High-Level Radioactive Waste Through Geological Isolation: Development, Current Status, and Technical and Policy Challenges*", he chronicled the repository successes of the time with WIPP's March 26, 1989 opening and the DOE's decision to vigorously pursue the licensing and opening of the YM HLW repository (Figures 2 and 3). The subsequent delays to the opening and successful attempts by the Obama administration, begun in 2009, to abandon the YM HLW repository, have brought forward the question whether WIPP could *replace* it? Given the current laws at the end of 2014, i.e., the NWPA of 1982 [5], as amended in 1987 [6], and the WIPP Land Withdrawal Act of 1993 (LWA) [22], as amended in 1997 [23], ***the short answer is still an unambiguous no***.

Clearly, laws can be amended or replaced, provided there is a political will in the U.S. Congress to do so and the U.S. President will not veto them. But the Obama administration's track record through 2014 on the YM site is discouraging. The legality of the USA's first HLW repository site was reinforced in the August 2013 [13] and November 2013 [14] rulings by the A Court. The August ruling also affirmed that the U.S. President could not unilaterally change or disobey a statutory mandate without prior consent of the U.S. Congress. It is, therefore, deemed important that the U.S. Senate demonstrated political will in June 2013 [3] to replace the current statutory-mandated implementing organization of the USA's HLW-disposition program, and also institute a new, "consensual", siting process for future HLW-disposal and -storage facilities. With regards to the siting of a new HLW repository, assuming that:

a). The future, consent-based-siting, process for HLW-disposal facilities will be based upon relevant, state-of-the-art, domestic repository-science and -engineering experiences in safe and secure disposal of LL-RR; and
b). Time, money, and local support will be important criteria in the future; then

the WIPP repository would be by far the most promising option for a successful HLW-repository program with rock salt being a close second. Following are the main underpinnings for these conclusions:

- The only two repository host rocks pursued since 1987 in the USA and thus credibly can claim state-of-the-art repository science- and engineering knowledge are *rock salt* and *unsaturated tuff*.
- The domestic availability of rock salt formations with large lateral extents and, in particular, thicknesses is much more abundant than that of unsaturated tuff.
- No other nation has found tuff of interest to host a LL-RR disposal system, whereas several other nations, most prominently Germany, have pursued rock salt. Indeed, Germany continues to evaluate rock salt and possesses some of the state-of the art in disposal of heat-generating waste.
- All rock properties vary directionally in space and also react differently to both human-imposed and naturally-imposed changes. When it comes to the human induced impacts of HLW, the National Academy of Sciences – Natural Research Council concluded in 1957 that rock salt was the most promising host rock for a HLW-repository [4]. Subsequent R&D in the USA and abroad has emphatically corroborated this conclusion [e.g., 10,11,14].
- Nevada has opposed the development of the YM HLW repository since 1987, whereas New Mexico and residents adjacent to the WIPP site have supported the WIPP repository since 1972, when it was first proposed as a HLW repository.
- The WIPP site has been evaluated for safe disposal of LL-RR since 1973. That evaluation includes more than 15 years of full-scale in-situ tests in the North Experimental Area (Figure 4) to establish the prevailing rock salt's response to HLW-disposal, before the TRUW repository opened in 1999. These in-situ tests were preceded, succeeded, and augmented by surface-based data acquisition well below the Salado Formation (Figure 4) that included extensive off-site laboratory tests and detailed analyses of rock salt by the WIPP Science Advisor, SNL, with a keen eye on both TRUW and HLW disposal. Between 1973 and 1983, the Umtra-Cowden portion of the Salado Formation, located ~ 135m (~ 450 feet) below the candidate TRUW-disposal horizon at a depth of ~ 820 m (~ 2,690 ft) below the ground surface, was the designated HLW-disposal horizon. SNL also developed, updated, and maintained the related algorithms, codes and models used for stochastically evaluating prevailing rock mass conditions and then superimposing a wide range of FEPs during the 10,000-year-long post-closure period.
- In May 1998, the U.S. Environmental Protection Agency (EPA) certified that the proposed WIPP TRUW repository complied with all applicable post-closure environmental radiation protection standards [28]. The EPA has since corroborated this ruling three times.

On a side note, the TRUW-disposal operations were halted in February 2014 and may remain on hold until 2018 following an underground truck fire on 5 February and the unrelated release of a small amount

of radionuclides on 14 February requiring remediation and the review and update of off-site and on-site waste-handling procedures. However, both of the aforementioned events were due to human and operational errors and failures; one off-site and one on-site. It is therefore important to recognize that neither of them negates rock salt's excellent radionuclide containment and isolation characteristics [4], nor do they diminish the viability of disposing TRUW at WIPP or HLW in rock salt. In fact, they inadvertently demonstrated the proof of concept by containing and isolating most of the released radionuclides within the underground facility despite the underground ventilation system's attempt to suck them out of the repository. However, the longer it takes for WIPP to re-open, the greater is the risk that the entire disposal concept will be compromised in the eyes of the public.

Notwithstanding the overwhelming evidence that rock salt is the most promising host rock for HLW-disposal, and that the WIPP site is the most promising consent-based option at this time, expanding the WIPP mission to include HLW involves complex legal and regulatory challenges that will delay and might even prevent its expanded mission. In this regard, our concerns are influenced by the following:

1. Neither the EPA nor the DOE is the main regulator for disposal of HLW; the NRC has that responsibility under current law. The U.S. Congress would thus have to reconcile how HLW could be added to the current WIPP mission, pass the enabling legislation, and present that solution to the U.S. President, for approval or veto.
2. The EPA-standards governing the WIPP site are very different from those governing the YM site. For example, the WIPP standards include periodically-updated, borehole-density-criteria per unit area based upon non-sustainable assumptions that could exclude HLW disposal. Of particular concern is that the most recent, very-high, drilling rates (during the past 100 years) for natural hydrocarbon resources, mainly oil and gas, in the region have to remain linear for the entire 10,000-year post-closure period in the repository performance and risk/dose analyses. In reality, none of the extracted natural hydrocarbon resources are renewable and the drilling rates are therefore, by necessity, going to decline with time. An extension of the post-closure period at WIPP to 1,000,000 years, as it is at the YM HLW repository, would exacerbate this concern.
3. The controlled area at the WIPP site is (only) 41.4 km^2 (16 mi^2) and the shortest distance between the current perimeter of the underground facility (repository) and the accessible environment is (only) 2.4 km (1.5 mi). Furthermore, it is currently surrounded by either the U.S. Bureau of Land Management or privately-owned or -leased land that limits a lateral expansion, at least for a considerable period of time. Therefore, the prospects for a prompt expansion of the horizontal footprint of the WIPP site or the WIPP repository are not viewed as promising.
4. The DOE agreed with the state of New Mexico in 1982 to limit the depth of the WIPP disposal system to 1,828 m (6,000 ft). An appreciable expansion of the disposal capacity in the near term, whether for TRUW or HLW, would thus be more promising at another, either shallower (TRUW only) or deeper elevation within the current controlled area (Figure 4). In terms of HLW disposal, the Umtra-Cowden horizon in the Salado formation is deemed very promising based on available data, existing modelling capability, and domestic subject-matter expertise.

However, even without the use of the WIPP site, we still believe that rock salt represents by far the most promising alternative path forward for a new HLW repository. On that note, we would like to mention that there are at least five other promising locations in the New Mexico portion of the Delaware Basin for an HLW repository.

The most apparent disadvantage of establishing a new repository site in New Mexico, as opposed to expanding the WIPP site/mission, is the additional time and costs required for infrastructure development, site characterization, and public and political interactions. But, based on the historical record during the past 50 years, the other side of the coin is that the time and cost required to develop an HLW repository site in a state with a long-standing nuclear history and with the surrounding population already very

familiar with the concept and potential consequences of deep geological disposal of LL-RR, is very likely several years, perhaps decades, shorter than if a new HLW-repository site was to be developed in a state lacking or being short on this experience. This is especially true if it is in another host-rock in another state willing to host an HLW repository. The time and cost savings would be even greater if the elected representatives in a potential host state are against the development of a local HLW repository. As illustrated in Nevada, host community acceptance and support there during the past 18 years have not been enough to sway state politics. However, the 2014 elections changed the national political fabric that might lead to future policy changes at local, state, and/or national levels. Conceivably, or perhaps ideally, such changes could include the revival of Nevada's pre-1987 support of the YM HLW repository site and the U.S. Congress' will to effect a solution to this significant national problem by devising and enabling a rational, fully-integrated, national HLW management and disposal program.

In summation, we believe the WIPP mission could and should be expanded. But, for reasons summarized herein (as well as for reasons not summarized herein due to publication-space limitations), we recommend such an expansion initially focuses on DHLW, rather than CHLW. DHLW is significantly less challenging to add to the current waste inventory in terms of both ownership and inherent waste characteristics than CHLW would be.

SUMMARY OF CONLUSIONS AND RECOMMENDATIONS

Following are our main conclusions (C):

C-1. Given the documented status and findings from multiple URL and HLW repository programs in many countries (Table I), the state of the art for repository-sciences, repository-engineering, and repository-licensing standards are fully and sufficiently established to enable the defensible opening of safe, and effective repositories for both CHLW and DHLW in four major groups of rock, namely:
   a. Evaporites (e.g., bedded and diapiric/domal rock salt);
   b. Lithified volcanic ash (e.g., welded tuff);
   c. Sedimentary and low-grade metamorphic rocks (e.g., mudstone. claystone, and argillite); and
   d. Igneous/crystalline rocks (e.g., gneiss and granite).

   As indicated in Table I, it also exists in soil (e.g., over-consolidated clay).

C-2. The USA has applied state-of-the-art science, engineering and licensing expertise to the siting and design of the YM HLW repository for its approval and operations since 2001 [26,27]. But, it was prematurely foreclosed in 2010 during the licensing process, despite being supported by the repository-host county and six adjacent counties.

C-3. The USA's repeated failures to demonstrate progress and political leadership in safe and secure disposition of HLW to the rest of the world for more than 15 years has and will continue to erode its standing as a leader and credible spokesperson in the international radioactive waste management and non-proliferation communities. This will persist until this trend is reversed and actual progress is made.

C-4. Existing HLW stockpiles already exceed the legal disposal capacity of the YM HLW repository. Another large-capacity HLW repository would thus provide assurance that adequate disposal capacity is available whether or not the YM HLW repository survives the pending legislation.

Following are our main recommendations (R):

R-1. Enabling legislation supportive of quantifiable or quantitative, consent-based, siting criteria should be introduced, passed, and implemented by the U.S Congress and the Obama administration in 2015.

R-2. Quick actions to consider an expansion of WIPP's mission to include DHLW should be vigorously pursued.
R-3. The applicability of the YM site for centralized storage of UNF and HLW should be evaluated and actions should be initiated to license the facility for that purpose.
R-4. Given the national extent and international acceptability of bedded salt formations for HLW disposal, consideration of siting a new HLW repository for both CHLW and DHLW should be a priority of the new U.S. Congress and the Obama administration.

Let's all address the enormous "Elephant in the Room" that while we meet and collaborate here once again on the nation's nuclear waste issues, the volume of HLW and UNF continues to grow adding to associated costs and risks awaiting a rationalized repository solution. This problem of a continually growing quantity of CHLW, DHLW, and other LL-RR requiring deep geological disposal deserves our immediate attention; it will not go away nor fix itself. *Let's all collectively engage to solve this problem by taking advantage of the lessons learned in the USA and abroad during the past 40 years, and by pursuing the options posing the most promising outcomes. It is a long-overdue responsibility of this generation and we have the scientific and engineering knowledge to do it safely.*

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Robust Disposal Concept, Uniform Regulations, and Trust in the Messenger; Three Fundamental Building Blocks for Consent-Based HLW-Disposal Solutions in the USA - 15104

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ABSTRACT

Pending enabling legislation, the USA's HLW-disposal program had been held in political abeyance since 2009 at the crossroads to one or both of the Yucca Mountain candidate (since 1987) HLW-repository in Nevada and/or ***the consent-based siting*** of the new HLW-disposal and centralized HLW-storage facilities proposed in 2012; ***a road not previously travelled***. The consent-based siting approach would require the following gap between the reality (A) and the requirement (B) for public trust, acceptance and sustained support (PASS) to be bridged:

A. Less than 1% of the general public in any given country fully comprehends the scientific-underpinnings and the projected health risks imposed by a HLW repository.
B. More than 50% of the general public in a given geographical area would have to accept to host it from start to end.

The following PASS-building blocks, successfully used at the WIPP-site in New Mexico and abroad to get from A to B during the past 30+ years, are thus highly recommended:

1. *Defining the consent footprint upon host-county/state boundaries and/or radiation/health-risks and/or to identify/designate the directly affected parties* (DAPs).
2. *Using databases and lessons-learned by other repository programs to advantage.*
3. *Presenting the information in terms and/or by examples more readily understood by laypeople*, because both their acceptance and opposition/rejection are influenced by:
    a. The type, number, problems, and status of "similar" disposal concepts; and
    b. The level of
        i. Radiation protection provided by applicable regulations;
        ii. Involvement and decision-making authority vested in the DAPs; and
        iii. ***Their trust in the "spokesperson/messenger"***.

INTRODUCTION AND BACKGROUND

Despite more than 60 years of costly efforts to site and develop (S&D) deep geological disposal systems/solutions (DGDSs) for HLW [l], the USA had been on a new, aberrant, path since 2009 [2-5] to enact legislation enabling "***consent/consensual-based siting"*** of new HLW-disposition (storage and disposal) facilities; ***a road not previously travelled***. At that time, 71 breaches of "standard-contract" claims had been filed against the U.S. Department of Energy (DOE), resulting in approximately $1.2 billion (B) in damages awarded thus far, and estimates for the total potential liability incurred by the DOE as a result of the Yucca Mountain (YM) litigation ranged as high as $50 B [6].

Moreover, after decades of political, legal, administrative, and environmental delays, the Obama administration (OA), with the support of Congress, defunded the YM project for FY2010, and announced an intention to pursue other alternatives for the disposal of HLW. But, following a ruling by the U.S. Court of Appeals for the District of Columbia Circuit (the A Court) in August 2013 [7], the at the end of 2014 still pending legislation for the new strategy proposed by OA in January 2013 [4] and in the U.S. Senate Bill (S.1240-IS) proposed in June 2013 [5], also has to address the fate of the USA's only candidate HLW-repository since 1987 at the YM site in Nevada (NV) (Figures 1 and 2) [8,9], which the OA declared "not workable' in 2009 [2] and then did not fund, closed and aborted in 2010.

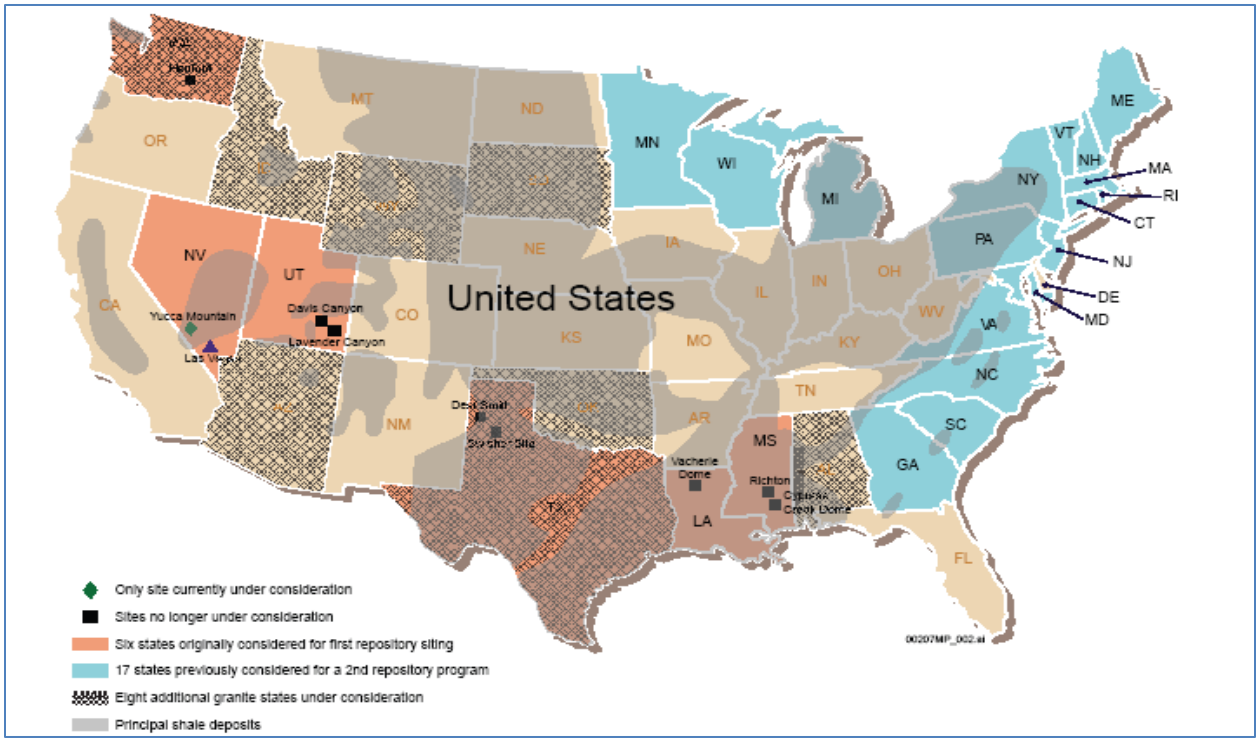

Fig. 1. Schematic illustration of regions, areas, site-locations and rock-types evaluated in the USA since 1982 for deep geological disposal of high-level radioactive waste.

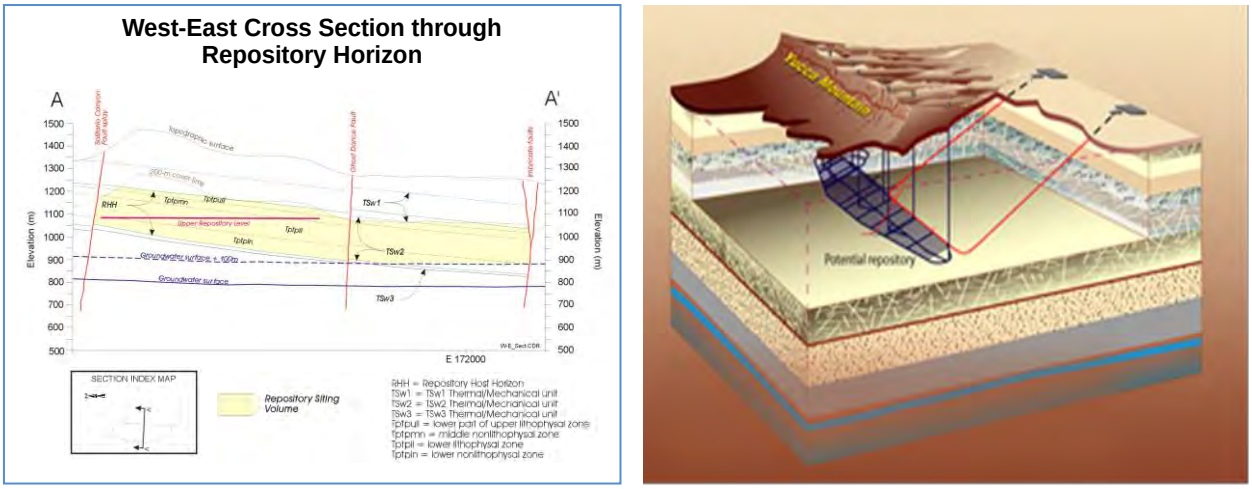

Fig. 2. Schematic cross section and stratigraphic column at the Yucca Mountain site (to the left), and schematic illustration (to the right) of the proposed layout of the HLW repository (in blue). The now closed underground Exploratory Studies Facility and its two access tunnels are shown in red.

The opinions, conclusions, and recommendations presented in this paper are based upon the lessons learned by the author from his active involvement in, monitoring of, and reporting on approaches to and features, events, and processes (FEPs) used in the USA and abroad for safe and secure management and disposition of long-lived radioisotopes (LL-RI) since 1978 [e.g.,10-28]. This paper highlights a set of FEPs used by mature programs for S&D of DGDSs for LL-RI in the USA and abroad during the past 30+ years. Clearly, consent-based siting is only one piece in the very complex, controversial, emotionally-

fraught, HLW-disposition puzzle that needs to be pieced together for timely and cost-effective progress in the USA. Another WM2015 paper, co-authored with G.E. Dials [28], focuses on another important piece of the same puzzle; namely, *promising options for safe and secure disposal of HLW in the USA earlier than "by 2048"* [4]. A WM2013 paper, co-authored with G.E. Dials and C.H. George [26], *elaborates upon potential definitions of consent-based for both new HLW-disposition facilities and their related transportation routes*. All data sources shown by bracketed Arabic numbers [1-41] are listed in the REFERENCE section at the end of the paper, and a few selected key acronyms and terms follow here:

C&C	Consultation and Cooperation
CHLW	Commercially-generated HLW
DGDS	Deep geologic disposal system/solution
DHLW	Defense/government-generated HLW
ER	Elected representative
HLW	Includes used nuclear fuel (UNF), spent nuclear fuel (SNF), and high-level radioactive waste
LL-RI	Covers all radioisotopes requiring deep geological disposal, including, but not limited to, HLW, long-lived ILW (LL-ILW), and long-lived transuranic radioactive waste (TRUW)
NWAA	Nuclear Waste Administration Act of 2013 (proposed June 2013 in Senate Bill S.1240-IS)
NWAB	Nuclear Waste Advisory Board (proposed in Senate Bill S.1240-IS)
PASS	Public acceptance and sustained support
RC	Root cause
S&D	Site and develop

The focus herein is on consent-based S&D of DGDSs for HLW, because the term "***consent***", and its derivatives, are qualitative and their respective meanings are thus in the eyes of the beholder. They may therefore serve as a volatile fuel for pro-longed discussions and lawsuits, rather than as keys to progress, until they are defined in measurable terms [26-28]. For reasons concisely described in the subsequent text, the author's assessment is that > 99% of the members of the general public in any given country, *including this author*, do not have the special education and expertise required for fully comprehending the underpinnings and the results of the post-closure performance/safety analyses for a DGDS for LL-RI and the related projected health risks. This population group is referred to herein as "***laypeople***". Similar to this author, they may also benefit from a second opinion from a "***trusted messenger***". Whereas the terms '***trusted***" and "***trust***" solely reflect the recipient's perception, the term "***messenger***" is used herein for people, organizations, and institutions presenting an opinion, conclusion, ruling, or recommendation on DGDs for LL-RIs. The terms *"**directly-affected party***" (DAP) and "***interested party**"* (IP) are used herein to distinguish between people, organizations, and institutions exposed to an apparent/real radiation-related health risk from a proposed LL-RI-disposition solution, and those who are not, respectively.

Notwithstanding that both successes and failures provide valuable lessons learned in support of rational, informed, decision making, in the past, successful FEPs have been more readily shared with the general public than failure FEPs. In the opinion of this author, this ***"see no evil, hear no evil, talk no evil" practice/tenet is counter-productive to maintaining trust and majority public acceptance and sustained support* (MPASS) *of a given project in a democratic nation***. Based upon the forward-looking notion that it is less time-consuming and less costly to ensure a ship, before launch, is properly designed and has no apparent defects that might cause it to slow down, capsize, or sink when it is in the water, the following three documents, comprising the currently known justifications for the consent-based siting of a new HLW-repository, were evaluated and commented on in the spirit of how the "*Devil would read and comment on the bible*":

1. The January 2012 Blue Ribbon Commission (BRC) Report [3].
2. The January 2013 Strategy for the Management and Disposal of Used Nuclear Fuel and High-level Radioactive Waste [4].

3. The Nuclear Waste Administration Act of 2013 (NWAA), as introduced (proposed) to the U.S. Senate on 27 June 2013 [5] and also referred to herein as S.1240-IS. (If there is a corresponding U.S. House of Representatives' Bill, it is not known to the author.)

Actually, the still pending enabling legislation for the NWAA could be a blessing in disguise, because:

a. The YM HLW-repository had already been evaluated for 30+ years and it could offer significant time- (25+years?) and cost-savings relative to the HLW repository proposed in January 2013 [4], as well as relative to other HLW-disposition options; and
b. S.1240-IS [5] failed to address major lessons-learned in the USA and abroad during the past 30+ years on how to gain and sustain MPASS of a DGDS for LL-RI [e.g.,16,18,19,22,23-28].

Following several failed S&D attempts, on 7 January 1983, the U.S. President signed Public Law 97-425 [8], also referred to as the Nuclear Waste Policy Act of 1982 (NWPA). The NWPA stated *"Federal efforts during the past 30 years to devise a permanent solution to the problems of civilian radioactive waste disposal have not been adequate"* and defined a new process, organizational structure, funding mechanism, and schedule for the S&D and staggered opening of two deep repositories for commercially-generated HLW (CHLW), also referred to as the first and second HLW-repository programs, respectively. The first HLW repository was to open no later than on 31 January 1998 and its capacity could not exceed 70,000 metric tons (MT) of heavy metals or an equivalent amount of uranium. The second HLW repository was to open no more than three years later. The NWPA also directed the Secretary of Energy (the Secretary) to establish a dedicated federal office within the DOE to accomplish these objectives, the U.S. Nuclear Regulatory Commission (NRC) to develop, promulgate, and oversee compliance with the related licensing criteria, and the U.S. Environmental Protection Agency (EPA) to promulgate applicable environmental radiation protection standards. In response to their respective NWPA mandate, the DOE established the Office of Civilian Radioactive Waste Management (OCRWM), the NRC promulgated licensing criteria for HLW-disposal under Title 10, Part 60 in the U.S. Code of Federal Regulations (10 CFR 60) [29] and the EPA promulgated the related environmental radiation protection standards under 40 CFR 191 [30]. In 2001, both of them were voided for the YM site by site-specific licensing criteria (10 CFR 63) [31] and environmental radiation protection standards (40 CFR 197) [32].

On 22 December 1987, the NWPA [8] was amended by Public Law 100-203 [9], also referred to as the Nuclear Waste Policy Amendments Act of 1987 (NWPAA) and "*the screw Nevada Act*", because it directed the Secretary to orderly phase out two of the then three *candidate* HLW-repository sites; the Hanford (basalt) site in the state of Washington (WA) and the Deaf Smith (rock salt) site in the state of Texas (TX) shown on Figure 1 within 90 days, and only continue the evaluation of the YM site shown on Figures 1 and 2. It also cancelled the second HLW-repository program. NV promptly vetoed the "premature" selection of the YM site, but the U.S. Congress overrode this veto in 2002, and the S&D of the YM site continued until the OA terminated all work on and funding of it in 2010, and transferred the OCRWM staff to other DOE offices; most of them to the Office of Nuclear Energy (NE).

In January 2012, the BRC submitted a report to the Secretary recommending ***prompt***, ***consent-based***, S&D of both a consolidated HLW-storage facility (Key Element 5) and a HLW repository (Key Element 4) [3]. These recommendations were based on an 18-month-long evaluation of the USA's HLW- and other LL-RI-management policies and programs, i.e., the Waste Isolation Pilot Plant (WIPP) transuranic radioactive waste (TRUW) repository program (Figure 3), and a couple of mature European HLW-management programs employing consent-based S&D of their DGDSs for HLW/LL-RI. As illustrated on Figure 3, the WIPP TRUW repository is located in the lower half of a 250-million-year-old, ~ 600-m thick, virtually-impermeable, bedded-rock-salt formation. The current disposal capacity is 175,584 m^3 of TRUW [12,16]. Although the WIPP repository cannot accommodate HLW-disposal at the end of 2014, it can be expanded [17,21,23] and embodies the following FEPs and lessons learned making it *the most applicable domestic example on MPASS-based siting of a DGDS for HLW in the USA*:

1. The WIPP repository has benefitted from local and state MPASS since early 1970.
2. The WIPP site was also evaluated for HLW disposal into the 1990s [e.g.,12,16,17,21,33,34].
3. The WIPP site is governed by the same environmental radiation protection standards [30] as all HLW-disposal sites outside of the YM site are, and it has already demonstrated compliance with these standards three times. As described and discussed in the subsequent text, to the best of the author's layman understanding, the WIPP standards [30] are also more compliance-point restrictive than their site-specific YM-site counterparts [31,32].

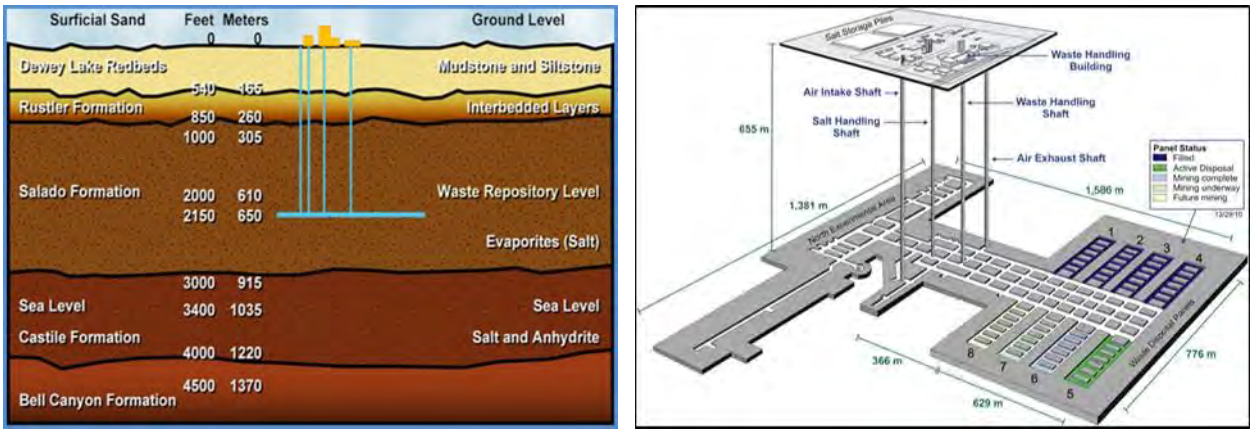

Fig. 3. Schematic illustrations of the cross section and stratigraphic column at the WIPP site (to the left), and (to the right) the layout of the WIPP TRUW-repository, the four shafts, and the North Experimental Area that hosted the underground in-situ-research laboratory.

Although the author harbors a long-standing bias in favor of rock salt being the most promising host-rock for long-term containment and isolation of gases, liquids, and long-lived radionuclides and heavy metals, he is also convinced other rock types can provide the required containment and isolation of LL-RI, *provided the disposal site is carefully selected and the disposal concept is robust and minimizes human-induced disturbances to the host rock* [12-14,17,20,24,25,35], as stated more eloquently in the following 1985 statement by Prof. Dr. Carl-Olof Morfeldt [35]:

"*The art is not to overmaster nature by means of technology, but - with a deeper knowledge of geology - to adapt the engineering to nature.*"

In January 2013, the Secretary/DOE purportedly responded to the 2012 BRC recommendations [3] with a new, 14-page, national HLW-management and -disposal strategy [4]. This strategy projected the USA's-first-of-its-kind, consent-based, yet-to-be-sited, HLW-storage and HLW-disposal facilities would open "by 2023" and "by 2048", respectively, but also stated the new strategy could not be implemented until the enabling legislation was in place [4].

In June 2013, the NWAA/S.1240-IS was introduced to the U.S. Senate. It outlined a proposed path forward for HLW-disposition based upon the recommendations provided by the BRC in January 2012 [3], and the related new HLW-management and -disposal strategy proposed by the Secretary/OA in January 2013 [4]. Its main stated purposes were to:

a. ***Ensure adequate funding*** for managing nuclear waste[a], *and for other purposes;*

[a]. Although several laws cited in S.1240-SI refer to HLW, the author is not clear on the nuclear waste categories it could apply to, because the generic term "nuclear waste" is used more often in it than HLW is and some of the regulations evolving from these laws also apply to other radioactive waste categories than HLW.

b. ***Establish a new "nuclear waste management organization***"…"***to discharge the responsibility of the Federal Government to provide for the permanent disposal of "nuclear waste***";
c. **Establish *a new consensual process*** for the siting of *nuclear-waste management facilities*; and
d. ***Provide for centralized storage of nuclear waste*** pending the completion of a repository.

In August 2013, the A Court ruled that neither the U.S. President nor any federal agency could abandon a statutory program without the consent of the U.S. Congress [7]. This ruling revived the YM HLW repository that the OA had tried to abandon since 2009 [2], but it also left the U.S. Congress with the dilemma of having to re-consider and decide upon how to pursue future HLW-disposal solutions. At the end of 2014, the three main options were to cancel the YM HLW-repository or to develop it concurrent with or prior to the "consensual" siting of the new HLW-repository proposed in 2013 [4,5].

DESCRIPTIONS, DISCUSSIONS, COMMENTS, AND RECOMMENDATIONS

In January 1983, the USA was to open its and the world's first HLW-repository no later than on 31 January 1998 [8]. In December 2008, it was projected to open at the YM site (Figures 1 and 2) no earlier than in 2017, but more likely in 2020 [36]. In January 2013, it was projected to open "by 2048" at a new site [4], which would be a 50-year delay in the opening of a HLW repository in the USA in 30 years. However, the January 2013 projection [4] did not account for the potential schedule- and cost impacts of the USA's only *candidate* HLW-repository since 1987 at the YM site (Figures 1 and 2) [8,9], which was the sole basis for the 2008 projections [36]. Assuming that both the YM HLW repository and the S&D of new HLW repository start in 2017, it would add nine years to the 2017-2020 opening-range projected for the YM HLW repository in 2008 [36], and four years to the "by 2048" opening projected for the HLW repository envisioned in January 2013 [4]. For comparison, at the end of 2014, Finland was projected the open its HLW repository in 2023 (http://www.posiva.fi), France its in 2025 (http://www.andra.fr), and Sweden its in 2027 (http://www.skb.se); all being governed by consent-based-S&D. In addition, Canada and the United Kingdom (U.K.) were in the process of implementing consent-based S&D of their respective HLW-repository, whereas the USA was trying to define what consent-based S&D of HLW-DGDSs might involve and then decide on its implementation. As follows, the USA would no longer going to open the world's first or perhaps not even one of its first three domestic HLW-repositories.

The aforementioned six national programs have experienced multi-year delays of different duration and for different reasons. For example, during the past 30+ years, the USA's HLW-disposal programs have suffered from a broad range of political interferences that have caused significant program delays (> 25 years hitherto) and cost increases in excess of $500 million per year (M/a) that could increase to > $1B/a contingent upon when the DOE takes title to CHLW. The combination of delays and their common overlay of political actions and inactions have caused concerns and loss of public and international confidence in the pursued HLW-disposal concepts, the implementing organizations, the political will of the U.S. Congress [24,37], and the OA [7,38]. As a firm believer that *"time is money*", "*the past holds the key to the future*", and "*there is none so blind as the one who doesn't want to see*" themes are very relevant to the S&D of both new and existing HLW-repositories, the subsequent text focuses on:

1. Five long-standing root causes (RCs) to the USA's repeated spirals of failure during the past 30+ years to open a DGDS for HLW, because they are deemed to also affect and perhaps even increase in importance for future DGDSs for HLW based upon MPASS.
2. The June 2013 S.1240-IS, because it is the only visible, potential, political action/key in the USA at the end of 2014 to the S&D of a new, consent-based, HLW-repository and it needs additional U.S. Senate and U.S. Congress attention to facilitate MPASS and programmatic progress.

Root Cause 1

The primary radionuclide containment and isolation components of all DGDSs for LL-RI are:

1. The Natural System (NS), i.e., the host rock and its inherent characteristics; and
2. The Engineered Barriers System (EBS).

The combined performance of these two systems in response to a wide set of envisioned, time-dependent, FEPs, some with distinct anisotropic spatial variations and including human-induced FEPs, e.g., construction-induced NS damages, are analyzed to indicate the post-closure performance of the DGDS and the related radiation/health risks to a member of the general public located at a given distance from the perimeter of the disposed LL-RI who behaves in a given way during a given time-period. But, again, *< 1% of the members of the general public and their elected representatives* (ERs) *in any given municipality, county, state, country or sovereign nation (Indian Tribe) have the education and experience required to fully grasp the complexities of the following sub-components of all DGDSs for LL-RI:*

- *The huge spatial and temporal scales;*
- *The state-of-the-art scientific and technological/engineering concepts;*
- *The codes, models, and other analytical methodologies used; and*
- *The health risk(s) posed, including the units used.*

Consequently, > 99% of all *individuals presented with the option of hosting or rejecting a DGDS for LL-RI in their backyard* face one or more of the following repository-sciences/engineering and personal-risk and benefit FEPs that she/he:

a). Knows she/he knows.
b). Thinks she/he knows.
c). Knows she/he doesn't know.
d). Thinks she/he doesn't know.
e). Doesn't know she/he doesn't know.
f). Knows she/he knows, but doesn't.
g). Thinks she/he knows, but doesn't.
h). Knows are true or false, but reject.
i). Thinks are true or false, but reject.
j). Has been told by a "trusted" source.

The end result is therefore often fear-based, negative responses, because it is much easier to say no to something perceived as potentially-risky and thus get rid of it, than it is to invest a lot of time trying to understand it. A related negative domino effect in the USA is the wide-spread reluctance among ERs to support the S&D of a new HLW repository due to the related "job-security/re-election" risks. However, this political trend/stigma/tenet could and should change when the majority of the DAPs support the hosting of a HLW-repository, because it would then be counterproductive to both the election of new and the re-election of ERs to oppose it. It is thus deemed imperative for obtaining the MPASS by the DAPs that the proponent's messengers have the requisite credentials, reputation, and credibility/serenity to be trusted on issues beyond the comprehension of the recipient, and also are able and willing to present the information in contexts and terms understood by laypeople. At WIPP, a set of reference cases were developed to FEPs that were familiar to laypeople, e.g., the projected dose was compared to x-ray doses.

For those of us who are unable to fully comprehend the state-of-the-art concepts and analytical methods and processes involved, the evolution of the initially-envisioned disposal concept and the EBS provide more-readily-comprehended yardsticks on the radionuclide containment and isolation provided by the NS. For example, the KBS-3 disposal concept employed in Finland and Sweden has gradually reduced the wall thickness of the HLW-container from 10 cm to 5 cm, which conveys a strong message to laypeople that the igneous/crystalline NS at the three candidate HLW-repository sites performed better than initially expected. At the YM site, the initially-envisioned disposal concept has repeatedly increased its reliance upon the EBS. For example, surface water reached the repository level in less than 40 years, which resulted in the design of a state-of the-art ~ $16 B drip shield that conveyed a very strong message to laypeople that the NS at the YM site "underperformed" relative to the initial expectations [39].

The 2001 promulgation of site-specific regulations [31,32\] for the YM site 25 years into the S&D process exacerbated rather than mitigated DAP, IP, and other laypeople concerns, because they, inter alia,

extended the distance to the post-closure compliance point. In the 1983 nation-wide regulations, the maximum distance between the compliance point and the boundary of the disposed LL-RI was 5 km [29,30], whereas it became > 16 km (10 mi) at the YM site [31,32]. Actually, it was only 2.4 km (1.5 mi) at WIPP when it complied with the nation-wide standards [30] in 1998. Another change was the extension of the minimum post-closure period for which repository performance and safety assessments had to be conducted. At WIPP, it was and still is 10,000 years, whereas it is now 1,000,000 years at the YM site. However, among us laypeople already harboring concerns about the ability to credibly project the performance of any DGDS for LL-RI even 10,000 years with a high-degree (90+%) of statistical confidence (whatever that means), the 990,000-year time extension was nonsensical rather than comforting, because the relevance of the post-closure repository performance assessment and public-health risk analyses results for a DGDS for LL-RI are:

A. Always anisotropic-host-rock, construction-methodology, radionuclide-inventory, temperature, and time dependent.
B. Governed by:
    a. The assumptions made;
    b. The boundary conditions used; and
    c. The degree to which the used algorithms, codes and models "mimic" the actual prevailing NS and EBS conditions from the outset and then through the regulatory post-closure period, because *garbage in results in garbage out regardless of the number of decimals*.
C. Likely to include more than one irrelevant number. In particular, when people responsible for item B lack or are short on relevant, hands-on, site-characterization, underground-in-situ-testing, design and construction experience.

Second opinions and feedback from sources deemed qualified by the members of the general public and the ERs have played and are deemed to continue to play an important role in clarifying otherwise incomprehensible repository-sciences, -engineering, and -radiation risks to laypeople. Whereas both the already existing Nuclear Waste Technical Review Board (NWTRB) and the Nuclear Waste Oversight Board (NWOB) proposed in S.1240-IS with their politically-selected and -appointed members serve the members of the U.S. Congress in this capacity, there is no in-state advisory group available to the DAPs as it was for the WIPP TRUW repository in New Mexico (NM).

Based on the author's active involvement in and the related lessons learned since 1993 in connection with the consent-based S&D, the 1988 certification , the 1999 opening, and the subsequent operation of the WIPP TRUW repository (Figure 3) [e.g.,16-19,21,22,25], augmented by four independent-expert reviews of the consent-based Swedish HLW-repository program between 1978 and 2010 [e.g.,24], an independent oversight entity in states considered for hosting one or both of the pending HLW-disposition solutions with a charter and *populated by professionals with excellent subject-matter relevant education and experiences at the top without term limits*, similar to those of the (now dissolved) Environmental Evaluation Group (EEG) in NM, could conceivably serve this currently missing DAP, IP, and other laypeople need very well [e.g., 16,18,19,25,26]. However, although the financial resources required for a potential host state to partake in the S&D process are available in S.1240-IS, it is only incumbent upon the proposed new S&D implementer, ***the Nuclear Waste Administrator*** (Administrator), to have the related Consultation and Cooperation (C&C) Agreement in place at the time a potentially-suitable site has been identified by the Administrator in a given state. The onus in S.1240-IS is thus on the potential host states to pursue a C&C Agreement if they want financial support to partake and have early/timely access to an independent advisory group before the S&D process has already reached a critical decision point.

Root Cause 2

As mentioned in the preceding text, *current licensing regulations and environmental radiation protection standards for HLW-disposal are not uniform across the USA*. One set of regulations applies to the YM

site only [31,32] and the other set applies to the remainder of the USA [29,30], which conveys the following two MPASS-counterproductive "generic/universal" messages:

- A given site cannot meet an existing regulation/standard; and
- All population groups and demographics do not deserve the same radiation-protection.

One set of the aforementioned regulations may thus justifiably be considered arbitrary, capricious, and societally-unjust [26], which, conceivably, will adversely affect public trust in it and the related regulator(s). Fortunately, the mitigation of RC2 is simple; one nationally-uniform set of HLW-disposal regulations and standards.

Root Cause 3

In the past*, no distinction/priority has been given to whether or not the messenger, might by be a DAP or an IP* [24,26]. During the past 30+ years RC3 has thus allowed IPs to skew, misrepresent, and overshadow the opinions and issues of concern to the DAPs. As suggested in 2013 [26], this long-standing societal inequity should and could be mitigated by a distinction in priority between opinions and issues expressed by the DAPs and the IPs, respectively. In addition to serving as a trusted messenger, based on experiences in Sweden [14], the independent NM-state group EEG mentioned in connection with RC1 could also serve as a bulwark against the implementer having to waste energy, time and money on ideologically- and/or interest-group-motivated issues and topics raised by the IPs, because the IPs will always be in majority and be greatly cause- and/or financially-motivated.

Root Cause 4

Proponents of LL-RI disposition (and HLW storages) had to present extensive documentation supporting their cases, whereas the opponents generally only had to raise an issue, which then became the "property" of the proponents to subsequently prove or disprove. However, RC4 is difficult to resolve due to the specific subject-matter expertise and large amount of money typically needed to address non-existent and very-low-probability performance/safety issues over their related period of potential health impact. One time- and cost-saving approach to addressing new HLW-repository performance/safety issues would be to resolve them by conducting probability-based scoping analyses for a variety of conservatively-selected parameter values using top-down models, e.g., GoldSim and/or its sibling Predicus, rather than time-consuming, bottoms-up, first-principle models and their underlying, quality-assured, data bases. Another is the independent host-state-advisory organization mentioned in RC1.

Root Cause 5

In the past, the DAPs and their ERs in the communities and states considered for hosting a HLW-repository have had virtually no say in either how to design or conduct the S&D program or in the related decision-making process, which, unfortunately, and perhaps unnecessarily, only left them with legal options to ensure that their concerns were seriously considered. Typically, the related legal processes resulted in multi-year project delays. For example, the legal challenges filed in 2010 by DAPs and IPs against the Secretary's 2010 motion to the NRC for withdrawal of the 2008 construction license application (CLA) for the YM HLW repository were not resolved until August 2013 [7]. In the meantime, the implementing organization for the U.S. HLW-disposition program; the OCRWM, had been de-staffed and de-funded by the OA.

The critical importance of mitigating RC5 in future consent-based S&Ds of DGDSs for LL-RI in the USA is also very-clearly demonstrated by the long-standing string of negative host-state reactions and actions in NV that followed the U.S. Congress' selection of the YM site in 1987 as the nation's only candidate HLW-repository site and its 2002 override of NV's related veto.

U.S. Senate Bill S.1240-IS

As currently understood by the author, S.1240-IS will adversely affect and might even be terminal to obtaining the MPASS from the DAPs that will be required for finding a voluntary site and then to make progress. As elaborated upon in the subsequent text, S.1240-IS contains FEPs that fail to ensure public transparency and timely, active/meaningful, participation by the DAPs in siting and decision-making processes. It may thus exacerbate rather than mitigate the current prevalent distrust of the U.S. government among the members of the general public and further delay the opening of new HLW-storage and –disposal solutions, unless several amendments are made in the enacted and enabled version of S.1240-IS. Following are the author's current concerns and preliminary observations, comments, and recommendations on S.1240-IS.

Based upon the global historical record at the end of 2014, three fundamental generic building blocks for consensual siting of a DGDS for LL-RI in *a democratic country* are:

1. A robust LL-RI-disposal concept that meets all applicable regulations and standards.
2. Sufficient MPASS (50%+?) by the DAPs.
3. Sufficient national political will (makes or breaks building blocks 1 and 2).

There were also abundant examples in the USA and abroad, e.g., Finland, France, and Sweden that sufficient MPASS is attainable locally when the DAPs:

A. Have a definitive say throughout the site selection/qualification/development process.
B. Consider the disposal concept "safe/robust".
C. Trust the messenger(s).
D. Perceive that the proposed solution provides some kind of near-term and/or long-term benefit(s), which, with the potential exception of the ERs, does not necessarily have to be to the individual/DAP.

In the context of these observations, it is not clear to the author how the organizational structure and decision-making processes outlined in S.1240-IS would improve public confidence in the new organizations (the Administrator) or make a positive change to the schedule and cost of future HLW-disposition solutions relative to those available under the existing legal framework [8,9]. S.1240-IS outlines two new "nuclear waste" management entities; the Administrator and the NWOB populated by seven Principal Officers with varying term limits "*appointed by the U.S. President, by and with the advice and consent of the U.S. Senate*" [5]. In addition, the Administrator will have a likewise appointed Inspector General without term limit. As follows, the proposed organizational structure would be both more politically-remote-controlled by the U.S. Congress than the OCRWM ever was, and also be more unstable by imposing unprecedented statutory term limits on the two Principal Officers of the Administrator and all five mandatory members of the NWOB that could compromise and even jeopardize the acquisition and retention of qualified candidates and institutional memory. Also, whereas S.1240-IS *defined some of the DAPs and how they would be* ***asked for recommendations*** *during the siting processes for pending "****nuclear waste****"-storage and -disposal solutions,* it did not:

a.) Define the term "consensual" in terms that could be tracked and/or measured.
b.) Include continuous active/meaningful participation of the DAPs in the planning and implementation of the siting processes or the related decision-making processes. As currently written, the Administrator would only have to interact/communicate with the municipalities, counties, and Indian Tribes in states considered and selected by the Administrator to host a potential HLW-disposition site and then again before initiating the on-site evaluation program, having the related jurisdictional authority. Although, the Administrator also has to establish a C&C Agreement with these parties including financial support, the decision-making was

exclusively assigned to the Administrator. The treatment of NV's veto on the conjectural selection of the YM site in in 1987 left a legacy of distrust of the political will and political process in many quarters [24,37,38] that very-likely will adversely affect their interest and willingness to host a DGDS for LL-RI unless they also have the final say in this matter. Simply stated, why should they, because their involvement outlined in S.1240-IS does not convey a political interest in making them active participants in either the siting or the decision-making processes? Further diluting confidence and trust in the proposed organizational structure are the short, staggered, term limits imposed on the five members of the NWOB, i.e., 1, 2, 3, 4, and 5 years, respectively. These as well as the 6-year-maximum, term limits, imposed on the two upper managers of the Administrator organization will not necessarily prevent, but they will very-likely, complicate and compromise the acquisition, build-up and retention of relevant expertise and institutional memory. It also makes the proposed organizational structure vulnerable to changes in the political fabric of the U.S. Congress. As demonstrated by the November 2014 elections, the political fabric of the U.S. Congress can change every other year.

Based on the author's observations on and the feedback received in the USA during the past 30+ years, a large portion of the general public do not readily trust politicians or federal/state agencies. The two 2013 A Court rulings [7,38] exacerbated this distrust. They also affected public confidence in the law abidance of the Executive Office. *One of the lessons learned during the past 30+ years is that, in the USA, the S&D process needs to be protected and insulated from time- and ideological-dependent, unpredictable and uncontrollable, often self-serving interferences from politicians and IPs to minimize time-consuming and costly delays and, instead, actively and meaningfully engage the DAPs from the outset in both of them to gain the critical MPASS by the DAPs required for progress, which was done and still is being done successfully at the WIPP site* (Figure 3).

c.) Address the relationship between the NWOB and the existing NWTRB that already served the U.S. Congress in a similar position since late 1980, as well as that of the long-standing National Research Council's Board on Radioactive Waste Management (BRWM). Otherwise, the NWOB could be perceived by the general public to be another FEP devised by the U.S. Congress to remain the sole co-driver of the new S&D organization/process.

Following are the main conclusions on or directly-related to the initial version of S.1240-IS:

1. The proposed organizational structure and decision-making process will not receive MPASS outside of the U.S. Congress and its dependents.
2. If enabled as currently written, it will delay the opening dates for the HLW-storage and -disposal facilities proposed in the 2013 strategy [4].
3. The content of the final NWAA will provide a very-strong indication on whether or not:
    a. The term "consensual" is quantitatively defined;
    b. It recognizes the value of lessons learned and ensures that the DAPs are active participants throughout the S&D and the ultimate decision-makers; and
    c. The opening of the USA's first HLW-disposal solution is considered a national priority and an imminent threat to Homeland Security.
4. If the YM HLW repository does not survive the pending legislation, or ongoing and future NRC reviews, or future lawsuits, the opening of the USA's first repository would be delayed at least another 35 years [4]. It would also extend the duration and amount of the current penalties the DOE is obliged to pay for its failure hitherto to comply with the terms of the post NWA Standard Contracts it signed with the nuclear utilities in the 1980s that might amount to $1 B per year until the U.S. government takes title to the CHLW. One option for the DOE to reduce these payments and also benefit from the > $10B already invested in the YM site [6,36] would be to negotiate a compromise with NV to use the YM site for other utilizations than CHLW disposal, such as e.g., long-term storage of CHLW and/or disposal of DHLW [23,27,28].

SUMMARY

At the end of 2014, the opening of the world's first HLW-disposal solution in Finland was at least nine years away, and the opening of the USA's first HLW repository was at least 9, but more likely 14 years away, and it could be more than 35 years away contingent upon the content of the pending enabling legislation for one or both of the following two HLW-disposal options:

1. Its only legal candidate HLW-repository since 1987 at the YM site in NV [8,9].
2. The hypothetical HLW-repository proposed by the OA in January 2013 [4].

However, the NWAA/S.1240-IS proposed in June 2013 [5] did not include the YM HLW repository, which was revived by the August 2013 A Court ruling [7]. It also failed to take advantage of several lessons-learned during the past 30+ years of consent-based S&D of DGDSs for LL-RI in the USA and abroad. Indeed, three potentially-terminal shortcomings were:

A. It failed to engage/involve the DAPs as active participants in the siting process.
B. It excluded the DAPs from the decision-making process.
C. It outlined a revolving-door, key-personnel, organizational structure that was both more remote-controlled by the U.S. Congress than its 1983-2011 predecessor, the DOE OCRWM, and more adverse to gaining and maintaining relevant subject-matter experts and institutional memory.

The author's main related conclusions at the end of 2014 were as follows:

1. S.1240-IS will delay the opening of the USA's first consent-based HLW repository, unless the DAPs are given more active roles throughout the S&D and decision-making processes from the outset/get go in the pending enabled version.
2. S.1240-IS will not increase:
    - Public confidence in DGD of LL-RI;
    - Public trust in a new implementing organization because it is even more bureaucratic, politically-remote-controlled and susceptible to be side tracked by the U.S. Congress than the DOE OCRWM ever was;
    - Public willingness to host a HLW-disposition solution in one's backyard; or
    - The USA's credibility and standing in the international radioactive waste management community.
3. Due to the very-long, post-closure, liability period, the ultimate responsibility for the safe and secure disposal of LL-RI must remain with the U.S. Congress at all times; but, by definition, consent-based S&D of HLW- and LL-RI-disposition solutions require continuous active involvement by both the HLW-generators and the DAPs.
4. The CHLW generators have an apparent conflict of interest in the opening of a centralized HLW-storage facility due to the breach of the standard contract compensation they receive until the DOE takes title of their HLW. They should thus not be in a position affecting the schedule.
5. DAPs not locked into ideological or other positions will likely consider and be affected by:
    a. The robustness of the disposal concept;
    b. The level of radiation protection they are provided relative to other domestic regulations and, perhaps, abroad, and last but not least; and/or
    c. Their trust in the messenger(s), which includes the implementing organization(s), involved regulatory agencies, and independent advisory groups.
6. The YM HLW repository offers by far the least time-consuming HLW-disposal solution.
7. A large government-owned and -operated, storage facility for CHLW is still the most expedient disposition solution for the DOE to take title to CHLW and reduce future penalties being paid to the utilities, *but it is not a final solution for HLW disposition*.

8. Premature selection of a single candidate HLW-disposal site could result in more than 35 years of delay to the opening of a replacement HLW-repository.

The author's main recommendations were:

1. Revise S.1240-IS as needed to ensure continuous active and meaningful involvement by the DAPs in the S&D processes and a joint say in the related decision-making portion.
2. Staff the S&D organization with professionals having relevant subject-matter education and hands-on experience unencumbered by term limits, as done in Finland and Sweden.
3. Shield the S&D organization and process from extraneous political and IP interferences.
4. Relax the current commingling requirement for CHLW and defense-generated HLW (DHLW) [40,41], and then consider disposing of:
    a. Commingled CHLW and DHLW, or only DHLW, at the YM site [23,24,27,28];
    b. DHLW at or adjacent to the WIPP site and/or in deep boreholes at or adjacent to current HLW-storage and/or HLW–generator sites benefitting from MPASS; and
    c. CHLW at the YM site, in a new repository in rock salt, and/or in deep boreholes.
5. Pursue at least two HLW-disposal solutions until one of them has been licensed, because it provides a potential 35-year-plus, time-loss, insurance. It also facilitates the option of staged openings of two sizeable HLW repositories, ensuring the timely and adequate availability of domestic HLW-disposal capacity for another 50 years or longer.
6. Co-locate the HLW-storage and -disposal facilities whenever possible, because it reduces HLW-transportation and -handling risks to workers and members of the general public, and costs [23,28].

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U.S. Senate Bill S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting of New HLW-Repositories - 16019

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ABSTRACT

At the end of 2015, the USA's HLW-disposal program had been on hold since 2010 pending the enactment of enabling legislation for one or both of: 1) The Yucca Mountain HLW repository; and/or 2) The law proposed in Senate Bill S.854-IS *"to establish a new organization to manage nuclear waste, provide a consensual process for siting nuclear waste facilities, ensure adequate funding for managing nuclear waste, and for other purposes."* But, S.854-IS does not acknowledge the existence of the Yucca Mountain HLW repository, which, if re-enabled, would affect both when another HLW repository would be needed and its disposal capacity. Furthermore, it neither timely nor meaningfully integrates waste generators, facility-host(s) and other directly affected parties with the new "implementing" organizations deemed to be more susceptible to political influence and interferences than those plaguing the Yucca Mountain HLW repository program since 1987 that resulted in a multitude of contentions, lawsuits, delays, and increased costs. For these and other reasons very compelling and conclusive to the author, *the legal status of the YM HLW repository should be "definitive" before a law based upon S.854-IS is enacted. Instead, the near-term focus should be on:*

1. *Defining "consent-based" quantitatively.*
2. *Promptly siting and opening at least one large, expandable, "consolidated" HLW-storage facility allowing the government to begin taking title to commercially-generated HLW; most-expeditiously accomplished by amending existing legislation.*
3. *Updating S.854-IS based on lessons learned about siting, developing, and licensing nuclear-waste-storage and -disposal facilities in the USA and abroad the past 30+ years*.

INTRODUCTION AND BACKGROUN

At the end of 2015, the USA's repeatedly-delayed, federally-managed, HLW[1]-disposal program had been on hold since 2010 pending the enactment of enabling legislation for one or more of the following, currently-considered, paths forward:

1. The mined repository for up to 70,000 metric tons (MT) of defense- (DHLW) (~10%) and commercially-generated HLW (CHLW) (~90%) evaluated since 1976 at the Yucca Mountain site in Nevada (Figures 1 and 2) [1-3][2].

[1] Herein, the acronym HLW often covers both used (UNF) and spent nuclear fuel (SNF), as well as CHLW and DHLW. It also refers to solid-state HLW, unless otherwise stated.
[2] Main data sources supporting the information, conclusions, and recommendations presented herein are indicated by Arabic numbers [1] (listed in full in the REFERENCES section) or an Internet address [http://www.nrc.gov] within brackets.

2. Separate disposal solutions for CHLW and DHLW (sites to be determined) [4], including deep borehole disposal (DBD) of DHLW. As shown on Figure 3, the existing amount of CHLW exceeds by far the amount of DHLW, and it is also stored at a much larger number of sites in the USA.
3. The "prompt" consent-based siting and development (S&D) of the new HLW-disposition (storage and disposal) strategy/policy recommended by the Blue Ribbon Commission on America's Nuclear Future (BRC) in January 2012 [5]. Adopted and adapted in January 2013 by the then U.S. Secretary of Energy (the Secretary) [6], and, most recently, in the March 2015 proposed law referred to as the Nuclear Waste Administration Act of 2015 (NWAA) in U.S. Senate Bill S.854-IS [7] (sites to be determined).

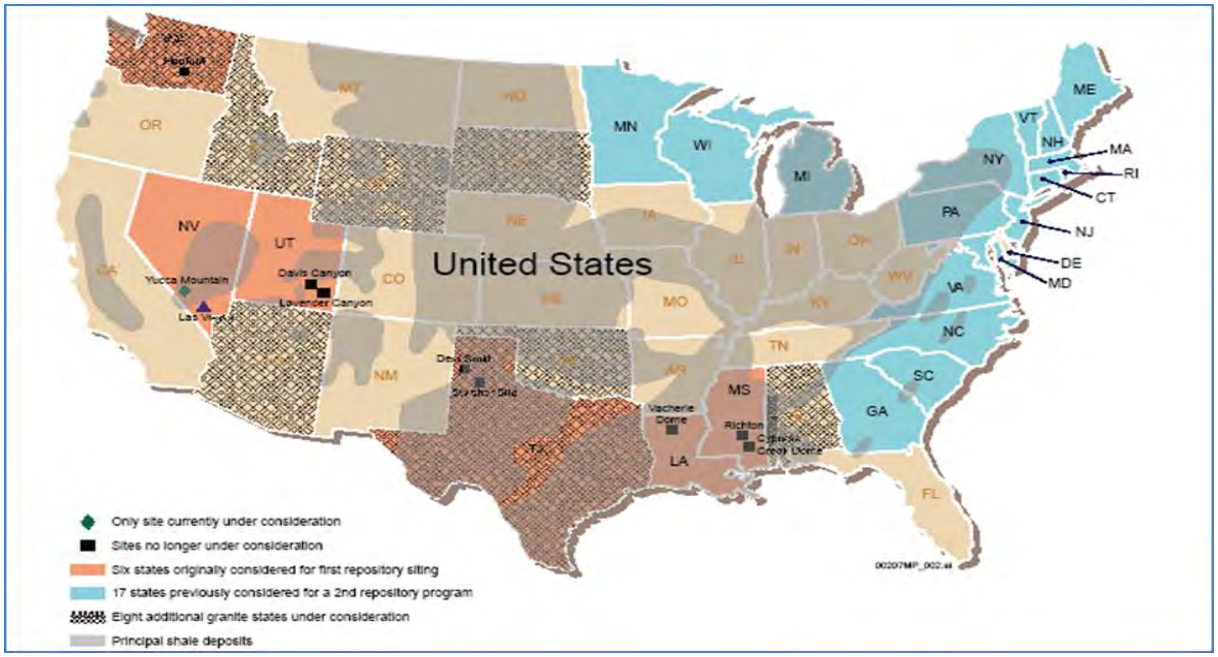

Fig. 1. U.S. states and rock types considered for HLW-disposal since 1982. (The candidate repository host rocks in - the six states shown in orange were basalt in WA, tuff in NV, and rock salt in UT, TX, LA and MS - the 17 states shown in blue were "granite". ***Shale deposits were not considered***.)

As described, discussed, and opined herein, S.854-IS does not account for several lessons learned in the USA and abroad during the past 30+ years that have proven to be imperative to timely and cost-effective S&D of HLW disposition facilities. This paper focuses on the organizational structure proposed in S.854-IS [7] (shown in TABLE I). It also highlights:

- Issues in S.854-IS [7] deemed to be missing or counterproductive to building trust and making timely and cost-effective progress in the future on the S&D, licensing, and opening HLW-disposal solutions in the USA; and
- Solutions that could mitigate or eliminate these issues, build trust, expedite progress, and reduce cost for future HLW-disposition facilities, including reducing the hefty penalties currently paid by federal-tax payers on behalf of the DOE since 1 February 1998 until it takes title to CHLW.

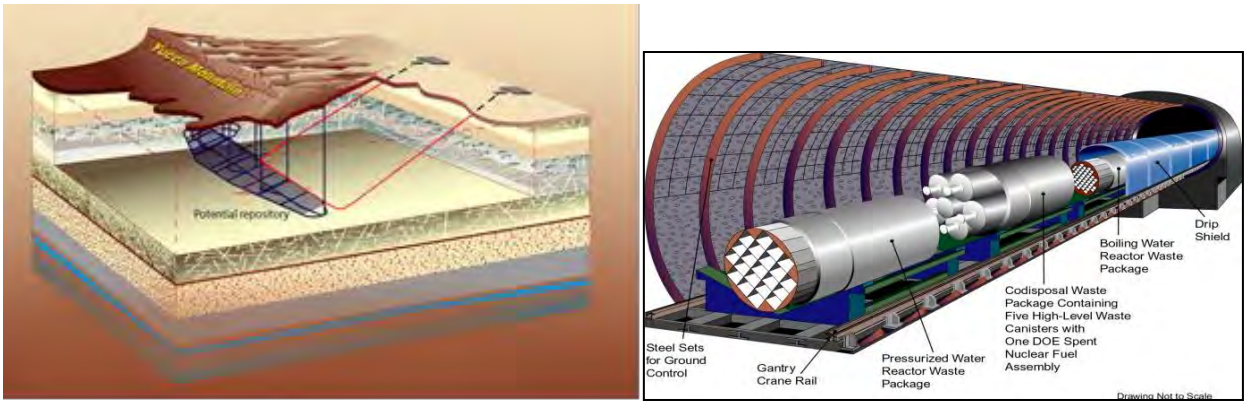

Fig. 2. Schematic illustrations of the layouts of (to the left) the Yucca Mountain HLW repository (in blue) and its existing, but since 2008 closed, access tunnels and underground research laboratory/niches (in red), and (to the right) the proposed disposal-room and HLW-emplacement configurations.

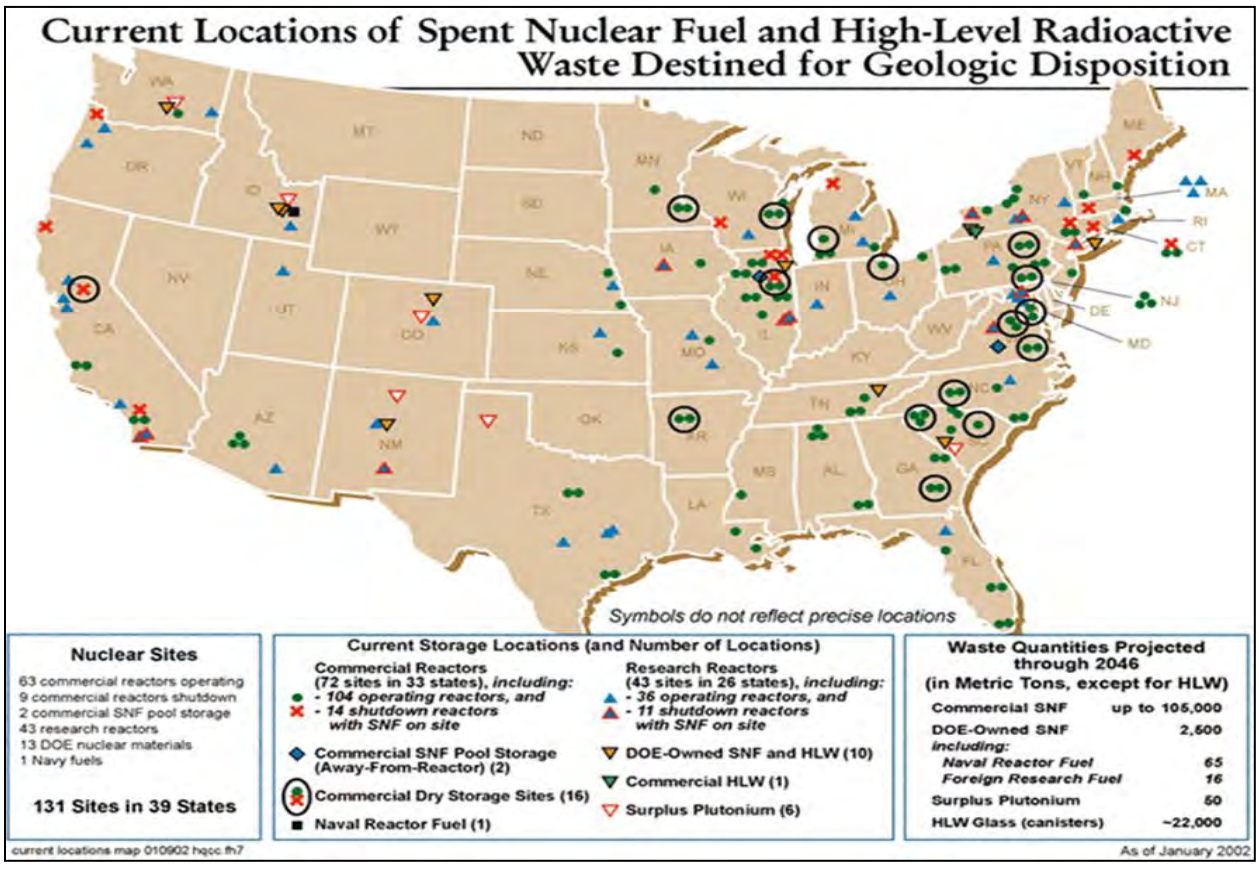

Fig. 3. Schematic illustration of storage locations in the USA for CHLW and DHLW destined for deep geological disposal in January 2002.

A supplementary WM2016 paper [8] elaborates on the application of the "consent-based" S&D process proposed in S.854-IS using the sites aborted under the Nuclear Waste Policy Act of 1982 (NWPA) between 1983 and 1987 recommended by the

then Secretary in December 2008 [9] as domestic examples. Both papers are based on the author's active involvement in and monitoring of, and reporting on nuclear S&D-related waste management, -storage and -disposal programs and activities in the USA and abroad since 1978 [e.g., 10-17] augmented by observations and recommendations by others [e.g., 1, 2, 4, 5, 9, 18-34]. They were prepared in the spirit of the following portions of the "A Gleam of Sunshine"* and "A Psalm of Life"**poems by Henry Wadsworth Longfellow (1807-1882):

"This is the place. Stand still, my steed, Let me review the scene,
And summon from the shadowy Past, The forms that once have been.
The Past and Present here unite, Beneath Time's flowing tide,
*Like footprints hidden by a brook, But seen on either side."**

"Lives of great men all remind us, We can make our lives sublime,
And departing, leave behind us, Footprints on the sands of time.
Footprints, that perhaps another, Sailing o'er life's solemn main,
A forlorn and shipwrecked brother, Seeing, shall take heart again.
Let us, then, be up and doing, With a heart for any fate,
*Still achieving, still pursuing, Learn to labor and to wait."***

TABLE I. Independent Agencies in the Executive Branch and Related Positions and Terms of Service Proposed in S.854-IS [7].

Agency	Position	Selected and Appointed By	Term Limit
Nuclear Waste Administration (NWA)	Administrator	U.S. President and U.S. Senate	6 years [a]
	Deputy Administrator		6 years [a]
	Inspector General		No Limit
	General Council	The Administrator	No Limit
	Financial Officer	The Administrator	No Limit
	Up to 3 Assistant Administrators	The Administrator	No Limit
	(? Clerical staff)	(TBD)	(TBD)
Nuclear Waste Oversight Board [b] (NWOB)	Member #1 [c]	U.S. President and U.S. Senate	1 year [d]
	Member #2 [c]		2 years [d]
	Member #3 [c]		3 years [d]
	Member #4 [c]		4 years [d]
	Member #5 [c]		5 years [d]
	Executive Secretary	The Oversight Board	No Limit
	Up to 10 Clerical staff	The Oversight Board	No Limit

[a] *"May serve more than 1 term."*
[b] *"The U.S. President designates the Chair of the Nuclear Waste Oversight Board." (May also "… remove any member for "inefficiency, neglect of duty, or malfeasance in office".)*
[c] *Not more than 3 members of the Nuclear Waste Oversight Board may be members of the same political party."* (*"3 members of the Oversight Board shall constitute a quorum for the purpose of doing business*."[7])
[d] *"A member of the Oversight Board may be reappointed for an additional term by the President, by and with the advice and consent of the Senate."*

DESCRIPTIONS AND DISCUSSIONS

Notwithstanding the aforementioned lofty intentions, portions of this paper are still biased, forward looking, speculative, and may go beyond the intended scope of S.854-IS. Following are some of the known author-biases embodied in this paper:

1. A scientific, engineering, or financial optimization for any given early stage of the back end of the nuclear fuel cycle needs to be considered in the context of the entire back end of the nuclear fuel cycle. The people involved in the related planning, decision-making, and oversight processes should thus: a) Possess relevant subject matter education and experience; and b) Be the same for as long as possible, to ensure relevant institutional knowledge is maintained and the disposal stage is not compromised or jeopardized by a preceding, "myopic" or "self-serving" decision.
2. The people and the entities directly affected by the proposed and candidate nuclear facilities should *"have a seat at the planning and decision-making table from the outset"* to ensure majority local support exists at all times.
3. The nuclear utilities are and will remain the pre-disposal custodians of the CHLW for at least another decade. The nuclear utilizes should therefore also *"have a seat at the planning table from the outset"* to facilitate a real-time dialogue among all directly affected parties (DAPs) ensuring that all DAPs know in a timely manner what the intended disposal solution(s) is(are) and what it(they) can accept or need.
4. ***TRUST HAS TO BE EARNED***. ***It does not come with the position or the organization, but DISTRUST does.*** But trust can also be lost due to lack of transparency and timely, fact-based, information. Hence, timely, factual, communication and transparency are keys to both building and maintaining trust, which, in turn, has and is expected to continue to govern acceptance and progress of any given HLW organization, entity, program, and activity.

Due to the unique evolution of and wide range of nuclear waste management and disposition issues faced by the USA's HLW-disposal program during the past 60 years, described and discussed below, in quasi-chronological order, are only events deemed by the author to have contributed to its dysfunctional status at the end of 2015 or that might affect its future. Trust, money, and time were the main selection criteria for the issues and events described and discussed herein.

In September 1957, in a report on land disposal of **liquid** HLW [18],the National Academy of Sciences-National Research Council made the following conclusions:

1. "Waste may be disposed of safely at many sites in the USA, but … ."
2. "Disposal in cavities in mined salt beds and salt domes is suggested as the possibility promising the most practical immediate solution of the problem."
3. "Disposal could be greatly simplified if the waste could be gotten into solid form of relatively insoluble character."

However, during the ensuing 25+ years, all attempts to S&D deep geological disposal solutions for liquid and solid HLW were unsuccessful, which precipitated the February 1983 NWPA [1, Sec.111(a)(3)].

In January 1983, the USA enacted a new law, the NWPA, mandating the then Secretary to establish an implementing organization within the DOE, the Office of Civilian Radioactive Waste Management (OCRWM), and charter it to take title to the nation's CHLW and open the USA's first HLW repository no later than on 31 January 1998 and its second repository no more than three years later [1]. At that time, they were projected to be the first two HLW-repositories to open in the world by a margin of >10 years and the USA's HLW-disposal program was an international role model and benefitted from tremendous global prestige. The Secretary could also take title to a limited amount of CHLW (300-1,900 MT) by providing storage for it [1, e.g., Secs. 131, 135, 136, and 141], but was discouraged in 1989 [20] and has not pursued this option by the end of 2015. There was, however, a very strong commercial interest in facilitating CHLW storage at non-government sites that could allow the Secretary to take title to it by an amendment [34] to the NWPA [1].

In December 1987, the U.S. Congress and the U.S. President directed the then Secretary by an amendment (the NWPAA) [2] to the NWPA [1] to only evaluate the Yucca Mountain site in Nevada for the nation's first HLW repository. The 1987 NWPAA, widely referred to as "the screw Nevada act", created intense public and political opposition that was exacerbated in Nevada when Congress, at the advice by the DOE, overrode the Governor of Nevada's veto in 2002.

In the second half of 1990, it became clear to the nuclear utilities that the DOE would not be able to open a HLW repository or otherwise begin taking title to their CHLW before 1 February 1998. Accordingly, they filed successful lawsuits that *entitled them to "breach of contract" penalties" until the DOE began taking title to a given utility's CHLW.*

In December 2008, the then Secretary advised the U.S. President and the U.S. Congress that the USA's first HLW repository would open no earlier than 2017, but more likely 2020 [9], i.e., at least 19 years, but more likely 22 years later than that mandated by the NWPA [1]. He also reported the USA's stockpile of HLW destined for deep geological disposal would exceed the legal disposal capacity of the Yucca Mountain HLW repository in 2010 and recommended its legal capacity be increased. Alternatively, he recommended the S&D of another HLW repository based upon the 6 potential (all in salt) and 2 candidate (in basalt and in salt) sites shown on Figure 1 abandoned between 1985 and 1987. But, none of the aforementioned options had been graced with enabling legislation at the end of 2015.

In 2010, the Obama administration, through the then Secretary:

1. Stopped the development of the YM HLW repository.
2. Defunded and dissolved the DOE's implementing organization; the OCRWM.
3. Motioned the NRC for withdrawal of the June 2008 construction license application (CLA) for the Yucca Mountain HLW-repository [3], which prompted several law suits. (The NRC subsequently rejected the Secretary's motion.)
4. Chartered the BRC to recommend a new national strategy for the back end of the nuclear fuel cycle.

In January 2012, the BRC issued its final report [5]. It contained the following introductory statement (*emphasis added*):

> *We approached our task from different perspectives, but with a shared sense of urgency. Put simply, this nation's failure to come to grips with the nuclear waste issue has already proved damaging and costly. It will be even more damaging and more costly the longer it continues: damaging to prospects for maintaining a potentially important energy supply option for the future, damaging to state-federal relations and public confidence in the federal government's competence, and damaging to America's standing in the world-not only as a source of nuclear technology and policy expertise, but as a leader on global issues of nuclear safety, non-proliferation, and security.*

The BRC also reported it had been directed to not comment upon the suitability or the future of the Yucca Mountain HLW repository/site. It then recommended a new national strategy for the back end of the nuclear fuel cycle based upon eight Key Elements (KEs) that included [5]:

a. A new consent-based approach to siting future nuclear waste management facilities. (KE 1)
b. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed. (KE 2)
c. Prompt efforts to develop one or more geologic disposal facilities." (KE 4)
d. Prompt efforts to develop one or more consolidated storage facilities." (KE 5)

In June 2012, the U.S. Court of Appeals for the District of Columbia Circuit (the A-Court) vacated the 2010 update of the Waste Confidence Decision (WCD), and the NRC stopped all related licensing and re-licensing of nuclear facilities shortly thereafter. The A-court referred to NRC's 2010 version of Finding 2 statement "*... a permanent geologic repository would be available in the first quarter of the twenty-first century*"[3] with "*when necessary", as "another in the growing line of cases involving the federal government's failure to establish a permanent repository for civilian nuclear waste."* [31].

In January 2013, the then Secretary released a 14-page DOE strategy for how the new, "consent-based", HLW-disposal and -storage facilities recommended by the BRC would be pursued by the DOE [6]. It included unsubstantiated projections the USA's first consent-based, *consolidated*, HLW-storage facility would open "by 2023" and its first consent-based HLW-disposal facility would open "by 2048", i.e., 50 years later than that mandated in the then still applicable 1983 law [1].

In June 2013, S.1240-IS [30] was introduced in the U.S. Senate in an effort *"to establish a new organization to manage nuclear waste, provide a consensual process for siting nuclear waste facilities, ensure adequate funding for managing nuclear waste, and for other purposes*" in response to the January 2012 BRC recommendations [5] and the related strategy proposed by the then Secretary in January 2013 [6], but, it did not pass the democrat-controlled Senate.

[3] Finding 2 in the 1984 WCD version stated "*… a repository will be available by 2007-2009."*

In August 2013, the A-Court ruled the U.S President and the NRC had violated the laws governing the Yucca Mountain HLW-repository program [1, 2] by stopping its development in 2010, and directed them to promptly continue developing it pending the enactment of a statutory basis for it to be aborted for other reasons than failure to comply with applicable regulations [32]. At the end of 2015, only the NRC had complied with this ruling, but it still lacked sufficient funds to complete the CLA-review process.

In November 2013, the A-Court ruled [33] the proposed 2013 strategy [6] was *"... based on assumptions directly contrary to law"*, and *"truly pie in the sky"*, and directed the then Secretary to ask the Congress to relieve the nuclear utilities from paying any nuclear-energy-generation-related fees into the Nuclear Waste Fund (NWF), which took effect in May 2014, *"until such time as either the Secretary chooses to comply with the NWPA as it is currently written or until Congress enacts an alternative waste management plan."*

At the end of 2014, according to the Nuclear Energy Institute (NEI) [https://en.wikipedia.org/wiki/Nuclear_Energy_Institute]:

- The stored CHLW amounted to 74,258 MT, which exceeded the legal disposal capacity of the Yucca Mountain HLW repository [1, 2] by 4,258 MT;
- The existing stockpile would continue to grow at an annual rate of 2,000-2,300 MT and the would exceed a total of 100,000 MT in 2028 unless the DOE began taking title to it before then; and
- The annual "breach-of-contract" penalties paid by the federal-tax payers on behalf of the U.S government since 1 February 1998 until the DOE begins taking title CHLW amounted to ~$500 million in 2014. The gross total amount of these fees was estimated to exceed $30 billion in 2028.

As shown on Figure 4, some nuclear utilities had already re-packaged CHLW in dry-storage-containers (DSCs). ***At the end of 2009***, 13,856 MT of CHLW (~22%) were already stored in dry casks and there were more than 65 NRC-licensed sites with DSCs ***in 2013***. The dimensions and weight of the DSC will govern its transportation and disposal option(s). The DSCs shown on Figure 4 are 1.7 m in diameter, 4.72-5.38 m high, and weigh 49.2 MT, but they may not be the biggest or the heaviest at the time a HLW repository opens.

Fig. 4. View of large vertical DSCs containing HLW.

In March 2015, S.1240-IS [30] was re-introduced in the then republican-controlled U.S. Senate as S.854-IS [7] by four U.S. Senators; three of whom had also introduced S.1240-IS. Pursuant to Sec.201 of S.854-IS [7], *"the purposes of the Nuclear Waste Management Administration (the Administration) are:*

(1) to discharge the responsibility of the Federal Government to provide for the permanent disposal of nuclear waste;
(2) to protect the public health and safety and the environment in discharging the responsibility under paragraph (1); and
(3) to ensure that the costs of activities under paragraph (1) are born by the persons responsible for generating the nuclear waste."

To accomplish the aforementioned purposes, S.854-IS proposed the establishment of a Nuclear Waste Administration (NWMA) in the executive branch comprised by the Nuclear Waste Administrator (NWA) and the Nuclear Waste Oversight Board (NWOB). TABLE I summarizes their respective positions, how the individuals serving in these positions would be appointed, and their respective term limit, if any. Following are some envisioned issues and reasons why S.854-IS does not outline a promising path forward for timely and cost-effective S&D of consent-based HLW disposition facilities in the USA based upon the author's related experiences:

A. The proposed organizational structure would be much more susceptible to political influence and interferences than the OCRWM ever was due to having all of its upper manager being selected and approved by the U.S. President and the U.S. Senate, whereas the OCRWM only had its Director selected and approved in this fashion. As follows, the staff selection and appointment procedure, and term limits proposed in S.854-IS do not convey the message that either the NWA or the NWOB, would be "independent" in the context recommended by the BRC [5]. Instead, it conveys the message that they could facilitate "reciprocity staff-selection" based on services rendered in the past. A message reinforced by the well-above the government pay-scale salary levels made available to the Administrator and the Deputy Administrator and the many term-limits. Also, none of them would be held accountable or incentivized for performance, i.e., they would not have an apparent vested interest in progress. The credibility, acceptance, and performance of the upper managers in the NWA and the members of the NWOB could therefore be stigmatized by suspicion, distrust, and disrespect for them being beholden to their selectors, whether they are or not.
B. S.854-IS transferred some, but not all, of the Secretary's responsibilities defined in the NWPA [1] and the NWPAA [2] to the NWMA, leaving "jurisdictional" uncertainties that may fuel politically-motivated and/or self-serving turf battles between affected executive branch and federal government entities and their respective staff. A related multi-faceted issue of concern to this author is that it would add two "virtually-autonomous" executive branch entities to the USA' already compartmentalized and fragmented nuclear waste management fabric [e.g., 13, 14, 19, 25]. Another issue is where the applicable subject matter (e.g., repository-sciences and –engineering, and public health and environmental protection) and regulatory and legal expertise would reside or come from, because the individual job descriptions for the positions described in

S.854-IS are managerial, legal, and fiscal (please see issue D. below for additional "subject-matter" comments).

C. Despite the A-Court's related rulings in 2012 [31] and 2013 [32, 33], S.854-IS neither acknowledges the existence of the YM HLW repository nor the potential impacts of its existence. As follows, the Yucca Mountain HLW repository would not be a viable S.854-IS option at the end of 2015. However, with time it could become a "consent-based" option if the current political opposition at the state level in Nevada changes, because its host community, i.e., Nye County, already supports it. But, of course, the Nye County's support can also change with time.
D. S.854 –IS limits the NWA to *"no more than 3 Assistant Administrators"* who *"shall be considered career appointees"*, but it does not require any of them to possess the subject matter education or experience referred to in issue B above, which, in turn, would be imperative *"to protect the public health and safety and the environment"* referred to above in purpose (2) for the NWA above, and, e.g., in Section 306, to ensure that the S&D program timely includes and pursues key elements and programs and promptly rejects or modifies or cancels elements and programs not contributing to the successful licensing of the pursued HLW-disposition facilities, where licensing is implied to also cover public health and safety and the environment.
E. Based upon the historical record, it is unclear to the author how any new organizational structure would be able "*to ensure that the costs of activities under paragraph (1) are born by the persons responsible for generating the nuclear waste."* Case in point, all federal-tax payers, whether they benefit from nuclear energy or not, have paid the breach of contract penalties due to the Secretary's failure since 1 February 1998 to comply with the "Standard Contracts" it signed with the nuclear utilities pursuant to the 1983 NWPA [1].
F. S.854-IS did not define the qualitative terms "*consensual*" or "*consent*" quantitatively, which was not a BRC recommendation, but still is bound to result in prolonged negotiations and lawsuits due to the inherent, subjective, "the beauty is in the eyes of the beholder", nature of qualitative terms and the prevailing opposition to anything nuclear-related, regardless of its respective merit or need. As follows, in order to save time and cost, and, perhaps even more so, based on the historical record for the HLW-repository sites considered in the USA under the NWPA, ***the pending law should define: a) The minimum percentage of eligible support and rejection votes required for "consent"; and b) Who the eligible voters are***.
G. Two related key issues are: a) The proposed planning and decision-making authority for the "consensual siting process", which is virtually-exclusively vested in the Administrator; and b) ***S.854-IS*** [7, Sec. 103.(2)] ***defines the term "Administrator" differently and incompatibly with the definition of this term in the NWPA*** [1, Sec. 2.(1)]. Conceivably, the NWPA definition will take precedence. Issue b) is only one of several examples on disconnects between S.854-IS and the NWA/NWPAA that need additional attention.
H. S.854-IS fails to accommodate the author's understanding of BRC's intent of KE 2, which is defined in the text portion of its report as follows(emphasis added) : "Move the Secretary's related responsibilities "*to a new, <u>independent</u>, government-chartered corporation …*" [5, e.g., page viii]. The term "independent" in the context of the current text of S.854-IS could easily be

inferred to mean "independent" of the will of the DAPs. As follows, one of the most important and challenging issues to reconsider and reconcile in S.854-IS is how the therein proposed politically-nominated and -beholden staffing protocol of the NWA and the NWOB shown in TABLE I, would allow any of these entities to be perceived as "independent" by the facility hosts and other DAPs. As mentioned herein, the respective rate of timely and cost-effective progress achieved by the implementing organizations in the USA and abroad during the past 20+ years was governed by how competent, transparent, and trustworthy the facility-hosts and other DAPs, including federal and state regulators, considered the implementing organization to be, and the pedigree/maturity of the proposed disposal concept. One way to enhance the independence of these entities would therefore be to drastically reduce the number of politically-appointed members on them and instead populate them with individuals possessing the relevant expertise and representatives selected by the host-entities and the nuclear utilities.

In September 2015, 14 U.S. House of Representatives introduced a bill, H.R. 3643, referred to as "the Interim Consolidated Storage Act of 2015" to a Congressional Committee for consideration. If accepted and enacted as proposed, it would amend the NWA [1] to: a) Authorize the sitting Secretary to enter into contracts for storage of certain HLW; b) *Take title to the aforementioned HLW*; and c) Make certain expenditures from the NWA. Regardless of the outcome of H.R. 3643, it shows that *the NWPA can be amended to expedite the transfer of CHLW to the Secretary in the presence of adequate political will* [25].

As of October 2015, the USA and 69 other "States" had signed the International Atomic Energy Agency's (IAEA's) [https://www.iaea.au] 1997 *"Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management"* (Joint Convention) [23] affirming that the ultimate responsibility for ensuring the related safety ultimately, rests with the "State". One related significant benefit is that organizational structures, procedures and processes employed in the 70 signatory nations, and their respective related effectiveness, are continually available to the both signatories of the Joint Convention and the IAEA to learn from and then take advantage of; an approached embraced and promoted in this paper.

Sample cases in point, at the end of 2015, Finland [http://www.posiva.fi], France [http://www.andra.fr], and Sweden [http://www.skb.se] hosted the world's most advanced HLW-repository programs. Their HLW-repositories were scheduled to open in 2023, 2025, and 2027, respectively. Three key reasons Finland and Sweden are among the current three global front-runners to open a HLW repository are:

A. They both have long-standing, fully-integrated, nuclear waste management programs that are successfully managed and funded by the nuclear utilities [13, 14, 29]. Put simply, the nationally-elected representatives do not control the staffing or the day-to-day operation of the implementing organizations or the regulators. But, consistent with the Joint Convention [23], they do approve both the proposed and final disposition solutions [14, 23]. They also set the related fee that needs to be set aside by the nuclear utilities to ensure that adequate funds exist for the safe and secure disposition of their respective HLW. The

Swedish Radiation Safety Authority (SSM) recommends this fee [http://www.stralsakerhetsmyndigheten.se].

B. Both programs continue to work closely, albeit in different ways [29], with their respective prospective and candidate HLW-repository host communities.
C. Finland adopted lessons learned in the then more advanced Swedish HLW-repository program more than 25 years ago and then promptly adapted them to domestic conditions. It also continued to collaborate with Sweden.

However, both the Finnish and Swedish HLW-disposal programs have experienced delays and cost-increases, and will continue to face both socio-political and scientific/technical challenges, as have and will all national programs chartered to S&D disposal solutions for long-lived radioactive waste. The related global historical record dating back to 1955 [e.g., 5, 11-29] shows beyond any reasonable doubt to the author that four ***long-standing imperatives*** for progressive and sustainable S&D processes for HLW-disposition facilities are:

1. The extent of which host entities and other DAPs TRUST the implementing organization, the regulator(s), and/or other "interested-party" sources.
2. The pedigree and perceived robustness of the proposed disposal concept.
3. The proposed disposal solution, i.e., public health and environmental radiation protection, is governed by stringent, nationally-uniform, licensing regulations promulgated and continually overseen for compliance by at least one independent, competent, regulator.
4. The DAPs in the host entities have a timely involvement and definitive say in the S&D process, and the candidate host entities also have a definitive say in licensing process, including a politically-irrevocable veto right up until a given point, e.g., one year, after the license to receive HLW has been approved by the NRC, and adequate funding to retain its/their own subject-matter experts.

At the end of 2015, the USA's HLW-repository program had been on hold since 2010 and it will remain on hold until such time enabling legislation had been enacted for one or both of the following paths forward:

i. The Yucca Mountain HLW repository; and
ii. The new, consent-based, HLW-disposition facilities proposed in S.815-IS that mirrors the strategy proposed by the Secretary in January 2013.

Furthermore, the projected opening of the USA's first and only candidate HLW repository since 1987 at the Yucca Mountain site [1, 2] was 17 years overdue and on hold since 2010 pending enabling legislation and the resolution of a large number of unresolved contentions and likely lawsuits. In the event it survives current and future challenges, and both the currently-missing, enabling legislation and a competent implementing organization are in place, based upon the most-recent, related, past prediction in December 2008 [9], it would open no earlier than 9 years later, but more likely 12 years later. In the event it does not survive, based upon the most-recent, related, past prediction in January 2013 [6], another HLW repository would open 35 years later. In both cases, the USA's continually-growing stockpiles of CHLW and DHLW (Figure 3) will have to be safely and securely stored and the federal-tax payers will have to continue to pay damage fees on behalf of

the government/DOE to the nuclear utilities until it takes title to the CHLW. As mentioned in the preceding text, the NWPA [1] allowed the DOE to take title to up to 1,900 MT of CHLW in a "Monitored Retrievable Storage" (MRS) facility, but decided against it. Conceivably, this option, including an increase in the amount to be stored, could be expeditiously accomplished by an amendment to the NWPA.

For these and other reasons very compelling and conclusive to the author, the organizational structure, staffing protocol, and term limits outlined in S.854-IS do not meet the aforementioned imperatives. The one-year term limit for one of the NWOP members (TABLE I) appears particularly unrealistic in light of the durations of the nominating and approval periods for several past Directors of the OCRWM. However, as opined herein, all term limits are counterproductive to retain both qualified professionals and institutional knowledge, and should be voided with one possible exception to ensure "State" involvement [23]; the "Administrator's".

No other nation has hitherto experienced delays of the duration (>29 years) or pushed the related hefty financial burden (projected to exceed $30 billion in 2028) resulting from the government's inability to comply with the law since 1 February 1998 on to the federal-tax payers without trying to amend the law or holding any party accountable. In addition, the nuclear utilities were relieved in 2013 from paying into the NWF until the Secretary had a viable plan/program for the safe disposal of the CHLW [33]. As follows, there is no apparent, near-term, financial incentive for the nuclear utilities to support an expeditious transfer of the title of the CHLW to the government. Furthermore, it could lead to increases in the size and weight of the DSCs due to related storage cost benefits, requiring subsequent opening of DSCs and repackaging the HLW with the associated incremental health and environmental radiation risks, in smaller containers/canisters due to transportation or disposal constraints.

As described, discussed, and opined herein, put simply, the organizational structure proposed in S.854-IS (see TABLE I) would further compartmentalize and fragment the existing "dysfunctional" HLW-management fabric in the USA, rather than integrating it into a cohesive, holistic, fabric. Particularly concerning to the author is the "consent-based" process outlined in S.854-IS, because it could marginalize the facility hosts and other DAPs even more than the current contentious process outlined 33 years ago in the NWPA [1], as amended in 1987 [2]. An integral component of this concern is the qualitative term "consent-based" introduced by the BRC in 2012 [5], because it still remains to be defined quantitatively or in another measurable form [16, 17] at the end of 2015 [6, 7]. Based on the historical record and its strong inherent litigious component in the USA, unless this term is defined quantitatively in a future law, it could, and likely would, feed a free-for-all debate that would seriously delay and, possibly, even jeopardize the S&D of future HLW-disposition facilities.

Another perceived, long-standing root cause to the lack of timely progress on the S&D of CHLW-disposal solutions in the USA is the lack of accountability and incentives for the "implementer" to make timely and cost-effective progress. Put simply, no "implementer" has been held accountable to date for overspending a given budget or grossly missing milestones. S.854-IS extends this "immunity".

The only parties with long-standing financial interest in progress are the nuclear-utility-rate- and federal tax-payers, and the nuclear utilities. Similar to past laws, the nuclear utilities would remain persona non grata in the S&D of future centralized CHLW-storage and −disposal facilities. This is counterproductive, because they have both the financial interest and the extensive, requisite, CHLW-storage expertise required to get it done in a timely and cost-effective manner, which, in turn, brings up another S.854-IS issue; the roles and responsibilities of the up to three Assistant Administrators (see TABLE I).

In addition to the S&D of centralized CHLW-disposition facilities, the scope of work the NWMA will have to deal with also includes their design, construction, and operation. But, the job descriptions for the Administrator and the Deputy Administrator of the NWA and the five members of the NWOB do not even require any nuclear or radiation-related scientific or engineering HLW-management and disposition education or experience. Consequently, unless the Assistant Administrators possess the requisite subject-matter education and experience among them, it could result in behind-the-scene control by the main contractors. Again figuratively speaking, flocks of hungry foxes would be guarding the hen houses if the NWA does not have relevant, resident (in-house), subject matter expertise. It could also result in decisions being made early in the S&D process requiring time-consuming and/or costly modifications at a later stage.

Another critical performance factor for the NWA and the NWOB is the access to funds over a longer budget period than one year. A five-year budget period being reviewed and adjusted as needed every third year would force long-term forward planning and accommodate interim adjustments. It could also be a job-stability factor incentivizing competent professionals to join the NWA. But, regardless of the qualifications and ambitions of the prospective members of the NWA and the NWOB, and their ease of access to money, progress cannot be accomplished in a projectable or controlled fashion unless the term "consent-based" is defined quantitatively so it that can be used as an unambiguous yardstick, which it is not in S.854-IS. This can be done in several ways in the pending law [e.g., 11, 12, 15, 16, 19, 20, 23, 27, 28], but regardless of how it is defined, a future law *should require that acceptance as well as rejection, whichever the case may be, are based upon the majority opinion of the facility hosts and other DAPs before taking effect*.

SUMMARY OF MAIN CONCLUSIONS AND RECOMMENDATIONS

S.854-IS purportedly commits to a consent-based S&D process of new HLW disposition facilities, but it neither defines the term "consent-based", nor a transparent S&D process for how potential and candidate facility-hots will interact in a timely and meaningful manner with the proposed executive agencies. Instead, it virtually excludes the facility hosts and other DAPs from timely participation and definitive say in the S&D process at any time. Based upon the historical record for similar activities in the USA during the past 30+ years, S.854-IS needs to be clarified, revised, or replaced. Otherwise, the resulting law will very likely serve as another broadly-contested, time-consuming, and costly, Ferris-wheel-like, pathway into another quagmire for a new HLW repository S&D process that, ultimately, may fail for one or more of the reasons highlighted in this paper. Oher key conditions

and conclusions supporting the recommendation that S.854-IS needs to be clarified, revised, or replaced are:

1. The legal status of the Yucca Mountain HLW-repository will have significant spatial and temporal impacts on future needs for disposal solutions. Siting a potential new HLW-repository before the legal status of the Yucca Mountain HLW repository is definitive would therefore be premature.
2. The organizational structure proposed in S.854-IS further compartmentalizes and fragments the management and disposition of the nation's HLW. It would also be vulnerable to instant distrust and rejection by the DAPs due to the inherent "reciprocity" embodied in the staff selection process, the related term limits, and the well-above federal pay grades made available to the Administrator and the Deputy Administrator.
3. At the end of 2015 the most acute current and future public health and national/homeland security issue in the USA is CHLW storage for which there are viable legal paths forward. HLW-storage has been safely done for more than 70 years in the USA and the related legal and regulatory frameworks are already in place. The opening of a sizeable, expandable, "centralized", CHLW-storage facility on government-owned and –operated land withdrawn from public use, is deemed by the author to offer the most promising, expeditious, solution for reducing and minimizing public-health and national/homeland security risks, and the burden on federal-tax payers for having to bail out the DOE until it takes title to CHLW.

In summation, the near-term focus should be on Conclusion 3 and the development end enactment of a law for consent-based HLW-disposal, should be deferred until such time the statutory future of the Yucca Mountain site has been finalized by law.

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Societal-Equity-Enhancing Criteria and Facility-Host Incentives Supporting Five Key Elements in the January 2012 Blue Ribbon Commission (BRC) Report

Presented by Leif G. Eriksson

On 25 February 2013

At WM2013

In Phoenix, Arizona, USA

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

ACKNOWLEDGMENT

- Two esteemed co-authors of WM2013 paper 13015
  - ✓ George E. Dials
  - ✓ Critz H. George

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Main Presentation Topics

1. Background information deemed relevant to the eight "Key Elements" in the 26 January 2012 BRC report
2. Comments on the BRC report
3. Wet-your-whistle description of a ***linked sample-set of measurable,*** societal-equity-enhancing ***criteria*** supporting Key Elements 1, 4, 5, 6, and 8
4. Wet-your-whistle description of a ***selective set*** of nuclear-facility-acceptance-enhancing ***incentives***
5. Main conclusions
6. Questions and Answers (time permitting?)

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

CAVEAT EMPTOR 1

- WM2013 paper 13015 precedes the Secretary of Energy's 14 January 2013 (14-page) response to the 26 January 2012 BRC report entitled

"Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste"

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

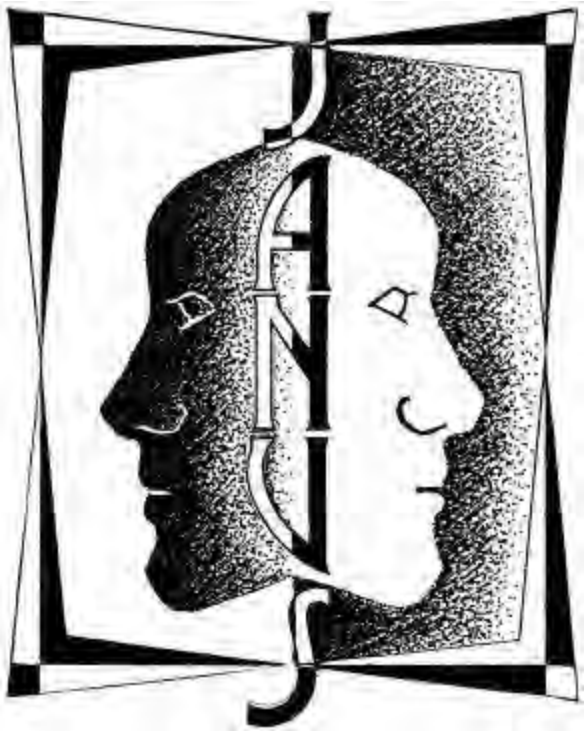
CAVEAT EMPTOR 2

- At the end of January 2013, the Yucca Mountain SNF/HLW repository in Nevada was still a <u>legal</u> SNF and HLW disposal solution; however, *it was not a recommended option/solution in either*
  - ✓ The 2012 BRC recommendations
  - ✓ The Secretary's 2013 "Strategy"

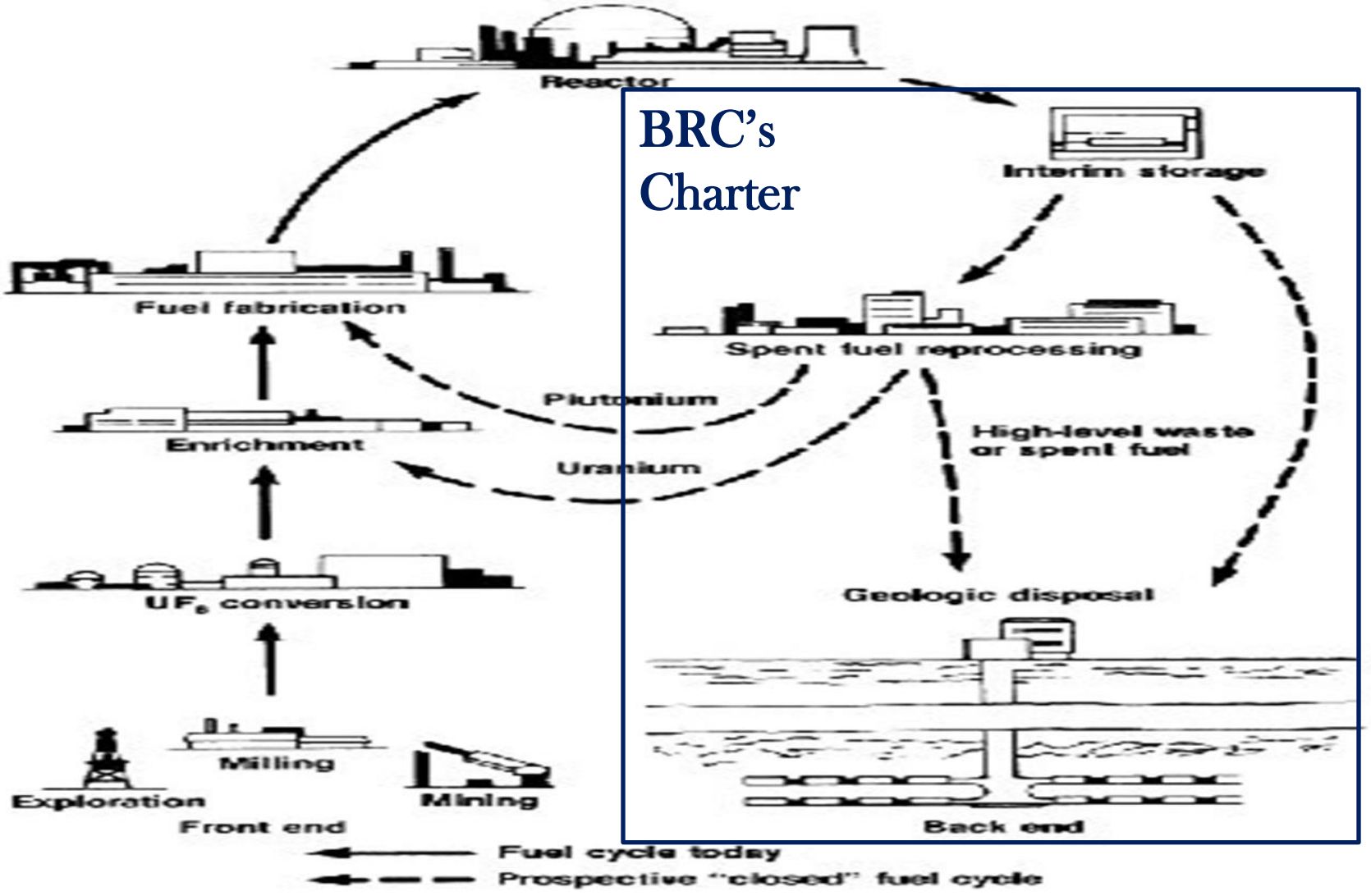
Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

CAVEAT EMPTOR 3

- On 13 February 2013 President Obama gave his "State of the Union" address. Whereas he talked about other clean-energy forms, *he did not mention nuclear energy or how he intends to deal with existing stockpiles of used nuclear fuel or other high-level nuclear waste*



Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report



BRC's Charter

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- BRC's Main Finding (page vi of the BRC report)

"America's nuclear waste management program is at an impasse."

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- BRC's Key Elements 1 , 2, and 3

1. ***A new, consent-based approach to siting future nuclear facilities****
2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed
3. Access to the funds nuclear ratepayers are providing for the purpose of nuclear waste management

* *Focus for presentation*

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- BRC's Key Elements 4, 5, and 6

4. ***Prompt*** *efforts to develop one or more geologic disposal facilities*
5. ***Prompt*** *efforts to develop one or more consolidated storage facilities*
6. ***Prompt*** *efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available*

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- BRC's Key Elements 7 and 8

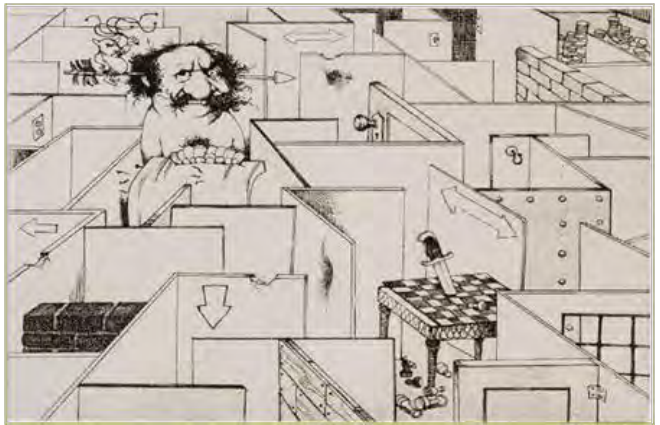
7. Support for continued US innovation in nuclear energy technology and for workforce development
8. *Active US leadership in international efforts to address safety, **waste management**, non-proliferation, and security concerns*

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Comments

1. Key Element 1 governs and/or affects the schedule and cost for achieving Key Elements 4, 5, 6, and 8
2. The term "**consent-based**" in Key Element 1 is intuitively appealing but highly susceptible to different interpretations and a maze of related legal challenges if not supplemented by quantitative or otherwise measurable criteria pre-defining

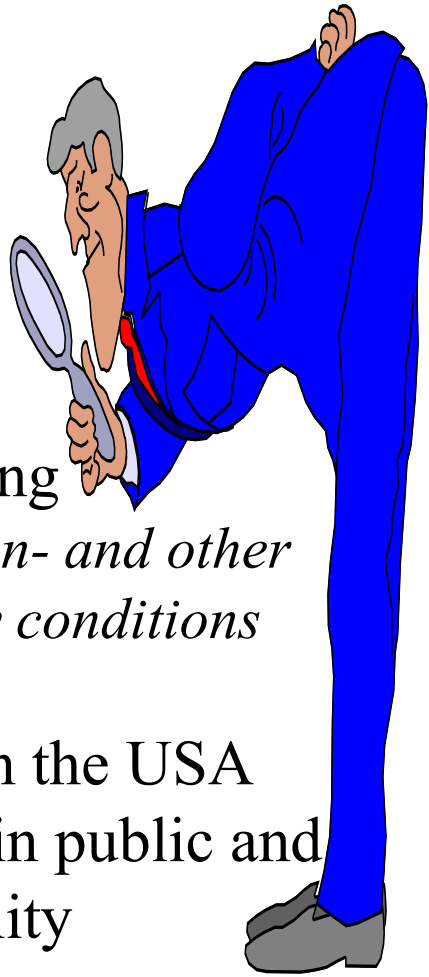
   A. Whose "consent" is required
   B. What constitutes "consent"



Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Comments

3. Based on our >100 years of joint relevant experiences in the USA and abroad, we



   A. Designed ***a linked set of facility-dependent "measurable" supplementary criteria*** defining
      - ***i. Whose consent*** would be required *if radiation- and other health-risk were the two governing boundary conditions*
      - ***ii. "Majority-consent"***
   B. Identified ***a selective set of incentives*** used in the USA and abroad to achieve, enhance, and/or sustain public and political acceptance of hosting a nuclear facility

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Measurable Supplementary Siting Criteria

1. Geographically-based distinctions between areas/people
   A. Subjected to projected radiation and other health risks* from or residing within a given distance* from the proposed facility (= ***facility stakeholders***)
   B. Subjected to projected radiation and other health risks* from or residing within a given distance* from the proposed waste-transportation routes (= ***transportation stakeholders***)
   C. Not subjected to either 1.A. or 1.B. (= ***interested parties***)

* Values to be determined based on facility- and waste-route-specific characteristics, and then be periodically re-evaluated and, if necessary, updated

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Measurable Supplementary Siting Criteria
  - Criterion 1.A. applied to the Yucca Mountain site

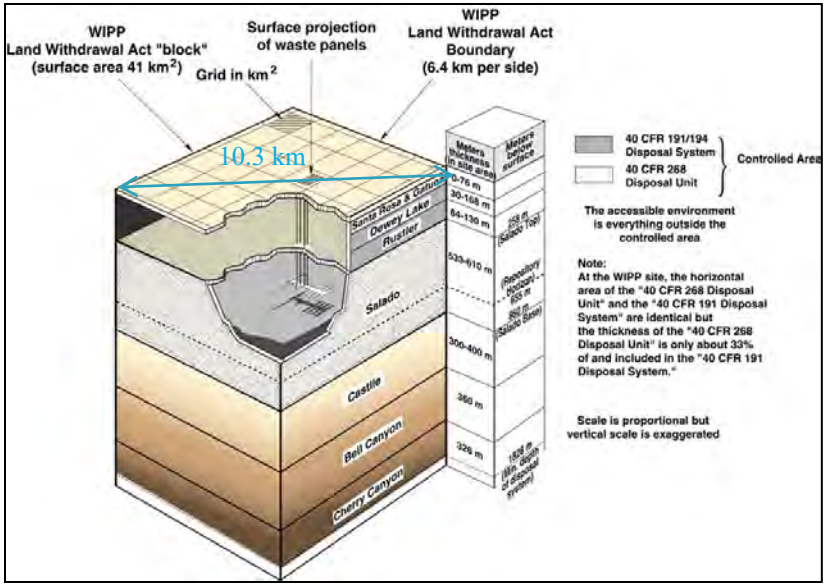
A 25-km diameter (= 490-km^2) "***facility stakeholder area***" criterion would identify the following

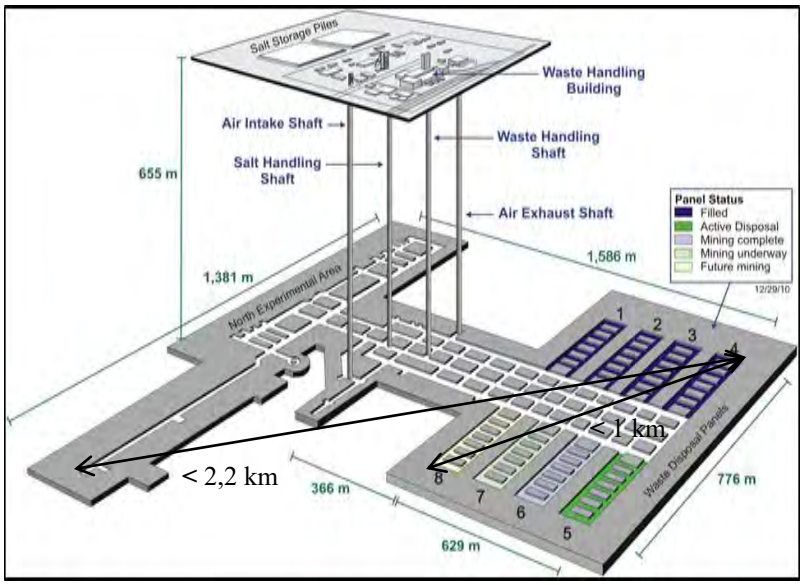
A. ***"Facility hosts", e.g.,***
- i. Nye County
- ii. The US Government
- iii. The State of Nevada

B. ***"Interested parties", e.g.,***
- i. Lincoln County
- ii. Clark County
- iii. City of Las Vegas
- iv. The State of California

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Measurable Supplementary Siting Criteria
  - The Waste Isolation Pilot Plant (WIPP) Repository





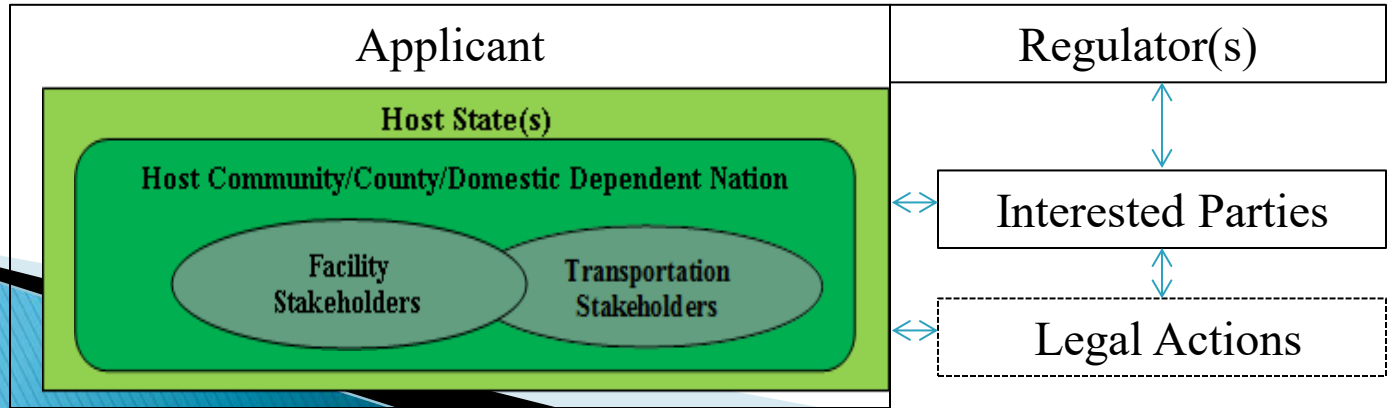
Status on 4 February 2013

- Had operated safely since March 1999 (= ~14 years)
- Had received 85,498 m^3 of TRUW (certified for 175,584 m^3)
- This TRUW had been safely transported 21,414,066 km on "pre-approved" public roads

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Measurable Supplementary Siting Criteria

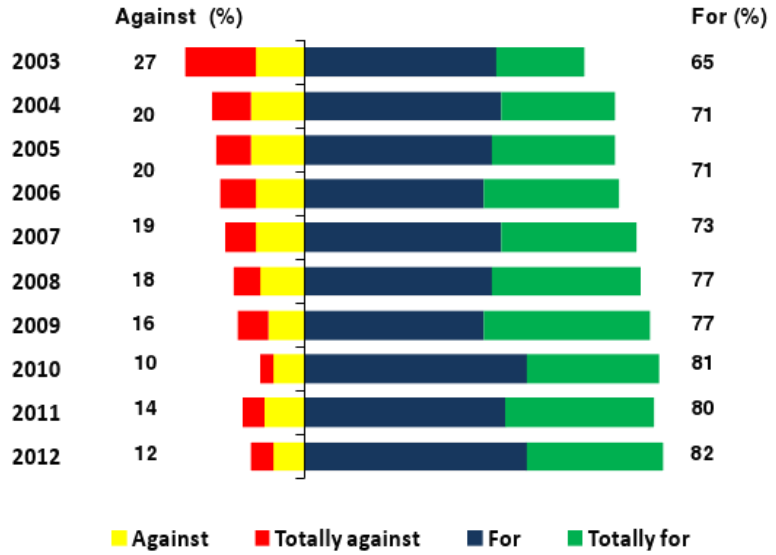
2. "***Majority consent***" is presented as a guiding principle with these parameters
   A. Only required of the "***affected parties***" (= Criteria 1.A. and 1.B. ***stakeholders***) shown in different green colors below
   B. Defined as at least 60% in each of the ***stakeholder groups*** and applied to both votes "in favor" and "against"



Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Measurable Supplementary Siting Criteria
  - Public-Acceptance Data* from Sweden (courtesy of SKB, Sweden)

Steady increase in favour of a repository at Forsmark



* The 2012 data are based on telephone interviews with 800 of the ~21,300 residents in the Municipality of Östhammar, which was selected in June 2010 to host Sweden's first SNF repository

Poll taken in March 2012

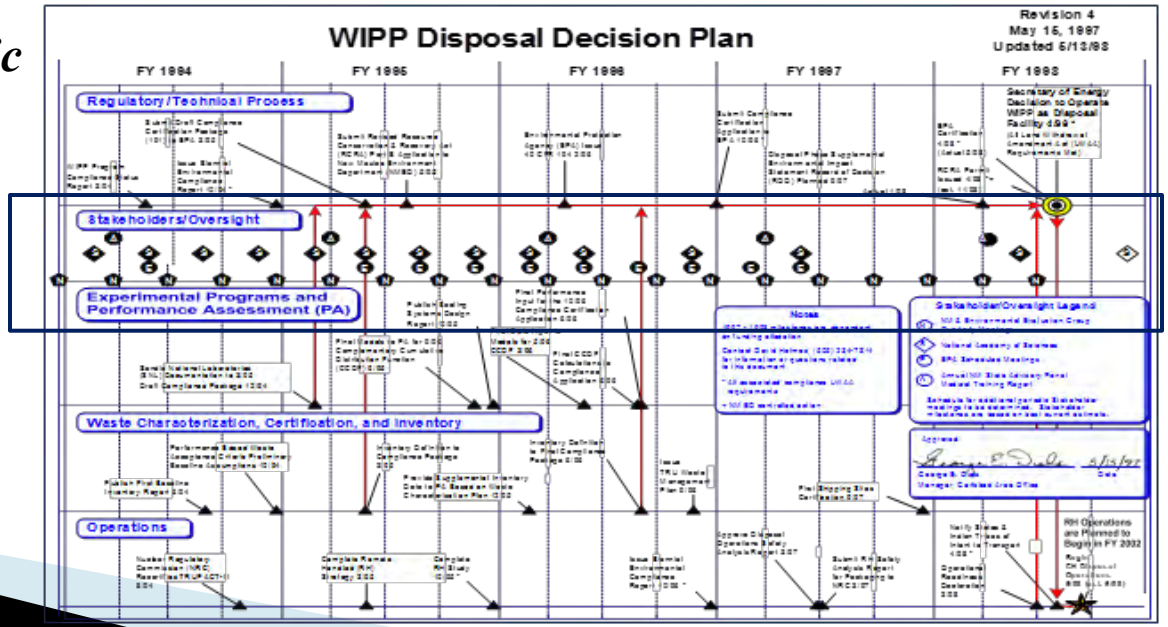
Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Facility Acceptance Enhancing Incentives
  - ✓ Veto right by **stakeholder hosts** up until a certain point in the licensing process (e.g., in Sweden, UK, and USA)
  - ✓ "Independent" **facility-host** subject-matter expert-groups (e.g., in New Mexico, USA, and Oskarshamn, Sweden)
  - ✓ A multi-state organization made up by the Governors in states with waste-transportation routes (e.g., the Western Governors Association for WIPP in the USA)
  - ✓ A comprehensive, forward-looking, fully-integrated, periodically-updated Facility Siting and Development Plan

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Facility Acceptance Enhancing Incentives
  - ✓ Public meetings in which all **stakeholder groups** and all **interested parties** have the opportunity to learn about the status of the program and to interact in real time with the implementing organization, key participating scientists, and the regulator(s)

47 ***pre-scheduled public meetings*** were held during the 4 1/2 years preceding the first certification of the Waste Isolation Pilot Plant TRU-waste repository in May 1998



Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Facility Acceptance Enhancing Incentives
  - ✓ A standing "independent" national advisory board made up of representatives from academic disciplines that could contribute to the formation of a set of moral, ethical and scientific guidelines by which the problem of nuclear waste disposition is to be addressed and resolved

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Main Conclusions

1. History shows that consent-based siting of nuclear facilities has been very successful *under the right conditions/criteria*. Indeed, it has been a pre-requisite for both initial local acceptance and sustained support both in the USA and abroad, as have been the related trust in both the messenger and the message.
2. The criteria described today and elaborated upon in WM2013 paper 13015 provide a "generic" framework for a measurable, radiation- and other-health- risk-based, siting approach for nuclear facilities.

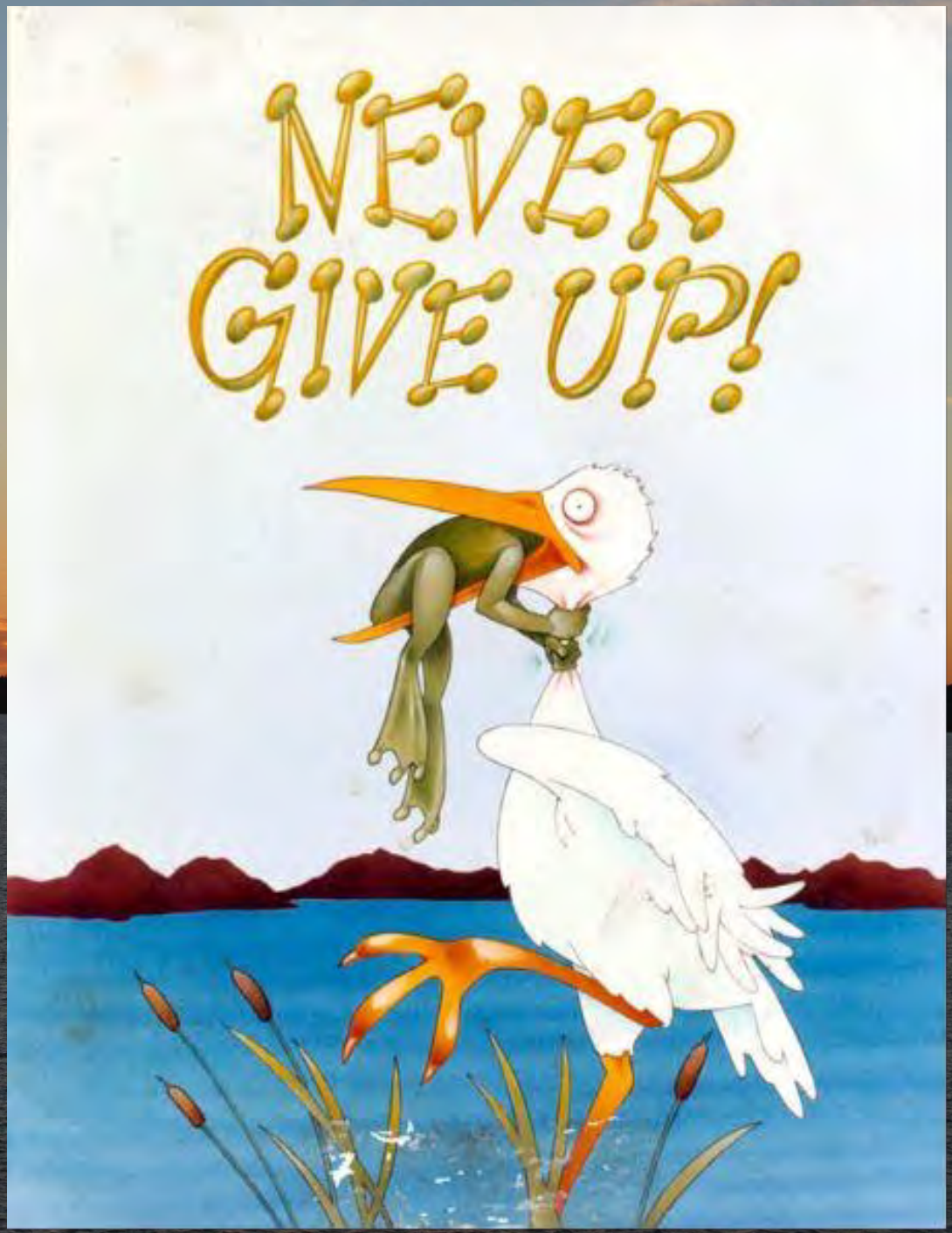
Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Main Conclusions

3. History also shows that regardless of the inherent merits of or the acute need for a given nuclear facility, politics will govern its viability, schedule and cost.
4. Against the 2013 backdrops of the Secretary's "Strategy" and the President's "State of the Union" address, several Key Elements outlined in the 2012 BRC report and their related supplementary criteria and incentives presented today and elaborated upon in WM2013 paper 13015 may not see the light of day by this generation, if at all.

Thank you for your attention

Leif G. Eriksson
25 February 2013, Phoenix, Arizona, USA
(E-mail: nukewastedisp@gmail.com)



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BACK UP SLIDES

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Due to the spatial and temporal scales, and the state-of-art-art scientific and engineering concepts involved in safe disposition of SNF and HLW, most people (>99%) face one or more of the following five options

1. To ***reject*** the proposed solution ***because it is not understood*** and thus scares them
2. To ***reject*** the proposed solution ***due to ideological beliefs***
3. To ***reject*** the proposed solution ***because it lacks personal, political, and/or financial benefits***

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Due to the spatial and temporal scales, and the state-of-art-art scientific and engineering concepts involved in safe disposition of SNF and HLW, most people (>99%) face one or more of the following five options

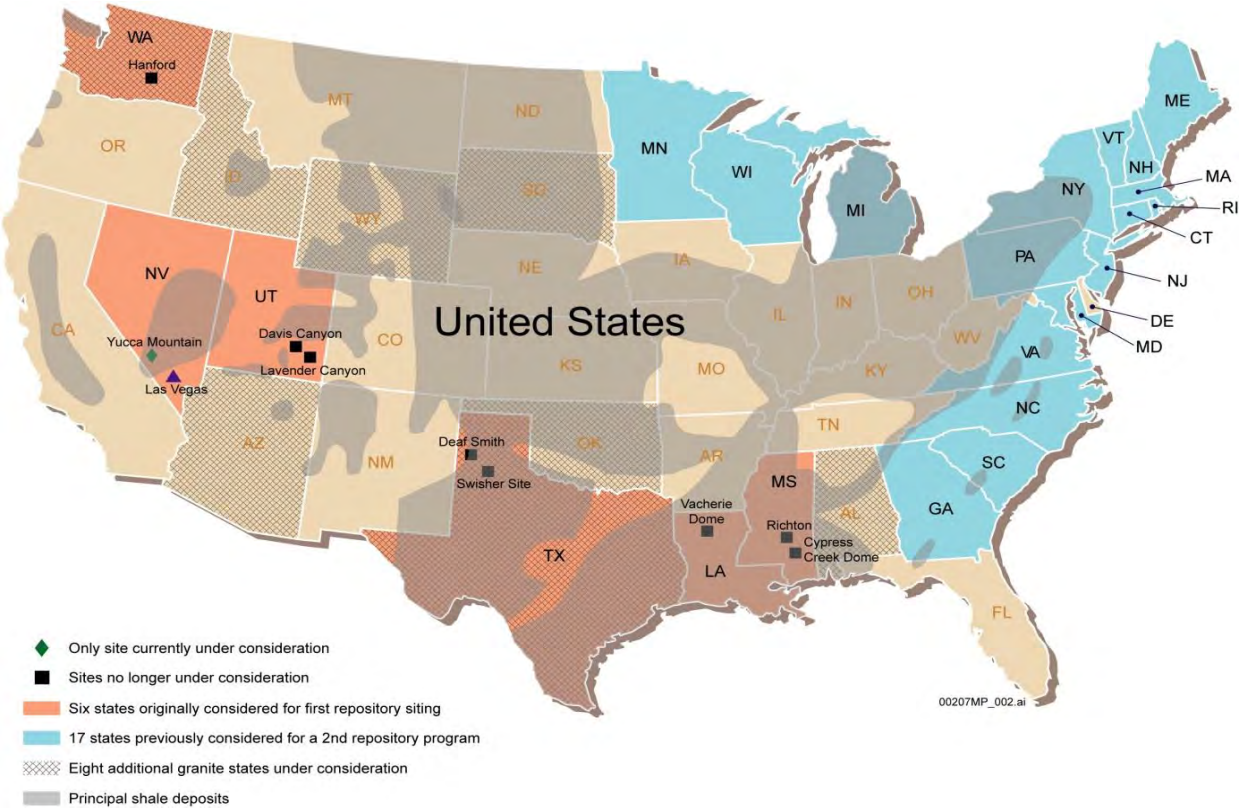
4. To ***accept*** the proposed solution ***because it has personal, political, and/or financial benefits***
5. To ***accept*** the proposed solution ***because the individual believes the applicable laws and regulations provide adequate safety and trusts that the "messenger", i.e., the individual and/or "organization" proposing the solution has the requisite objectivity, experience, expertise, and credibility***

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

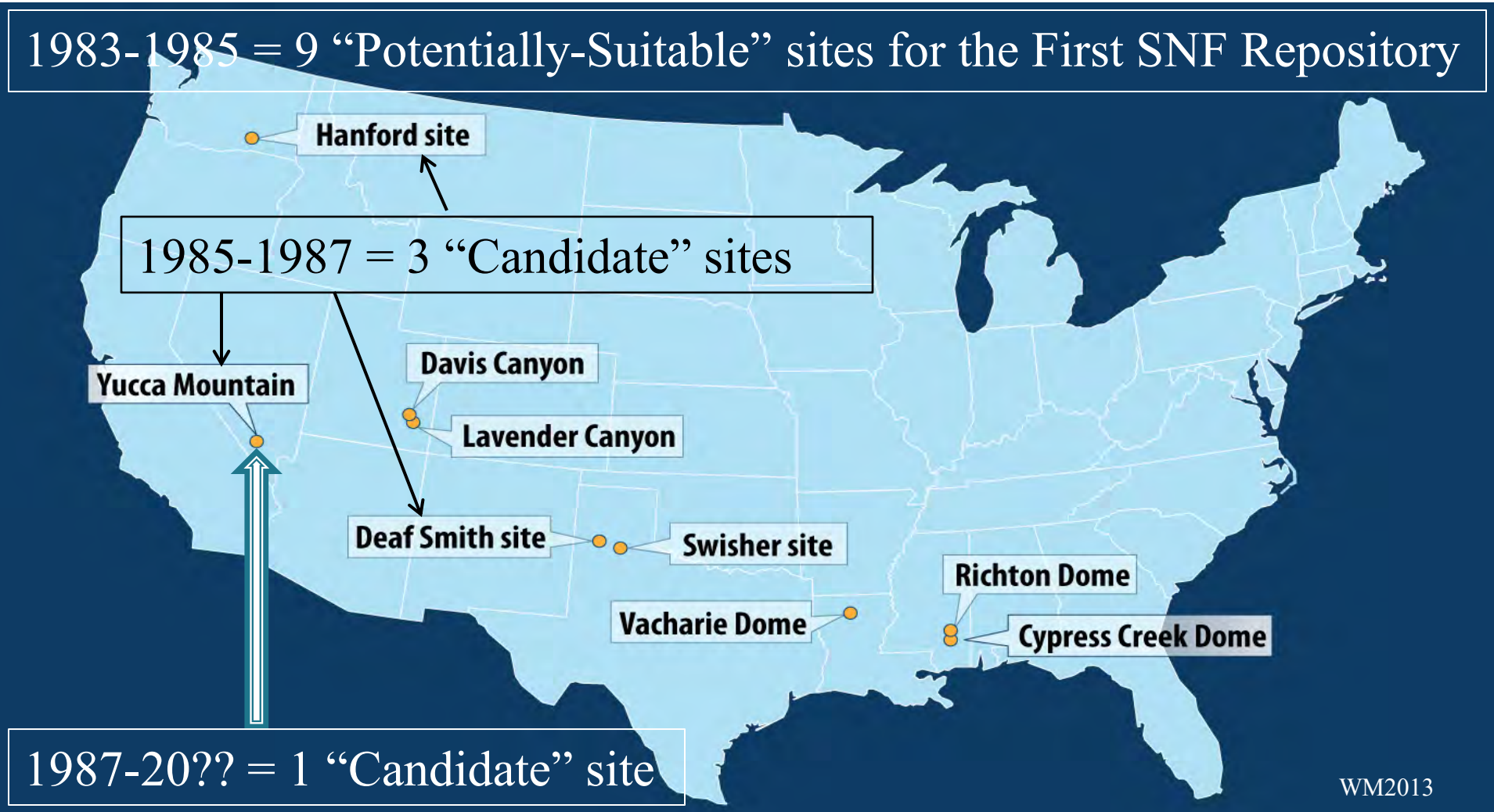
Repository Regions, Areas, and Locations Considered to Date for Deep Geological Disposal of SNF and HLW

Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Repository Regions, Areas, and Locations Considered to Date for Deep Geological Disposal of Long-Lived Radioactive Materials (LLRMS)

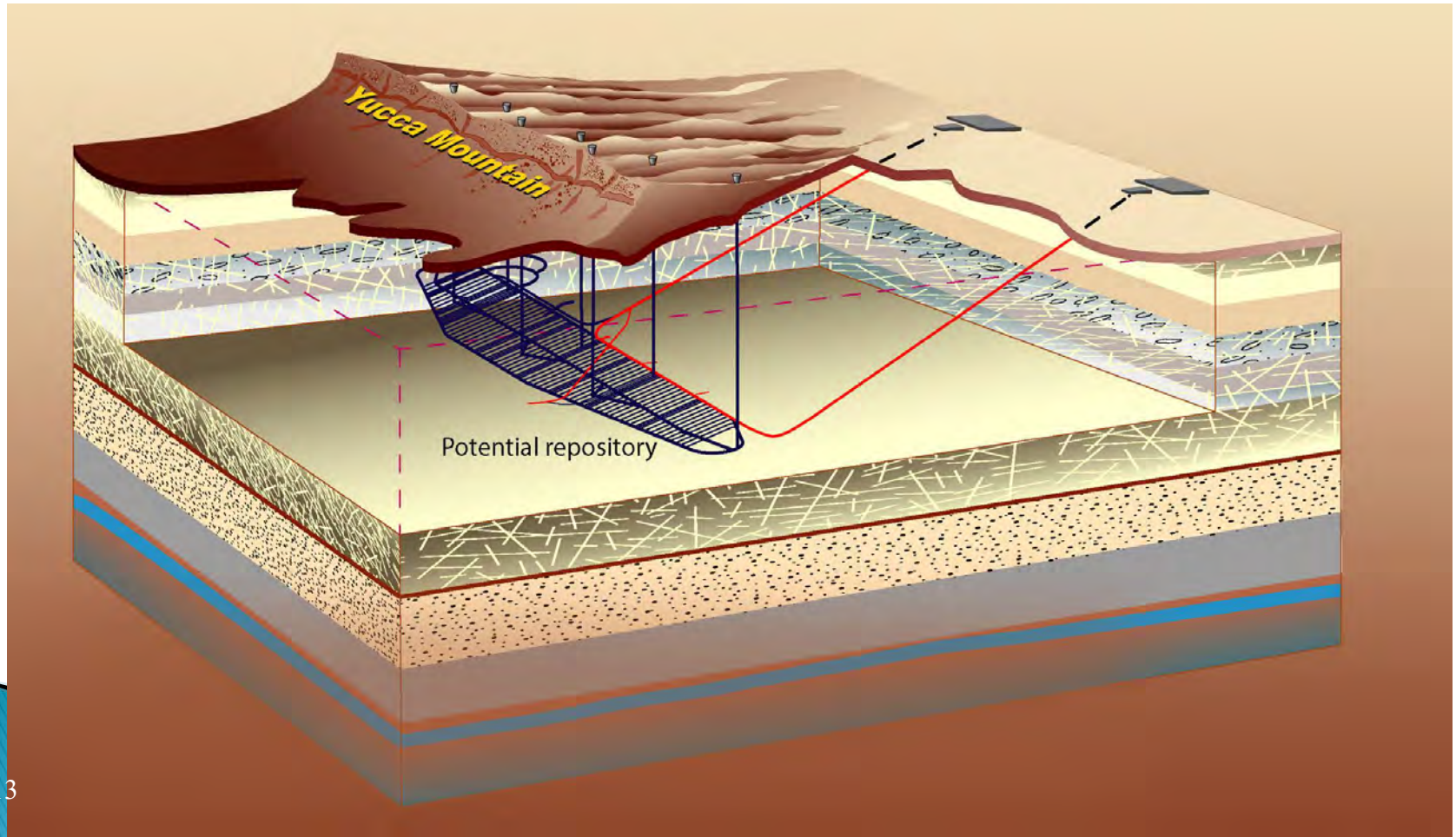


Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report



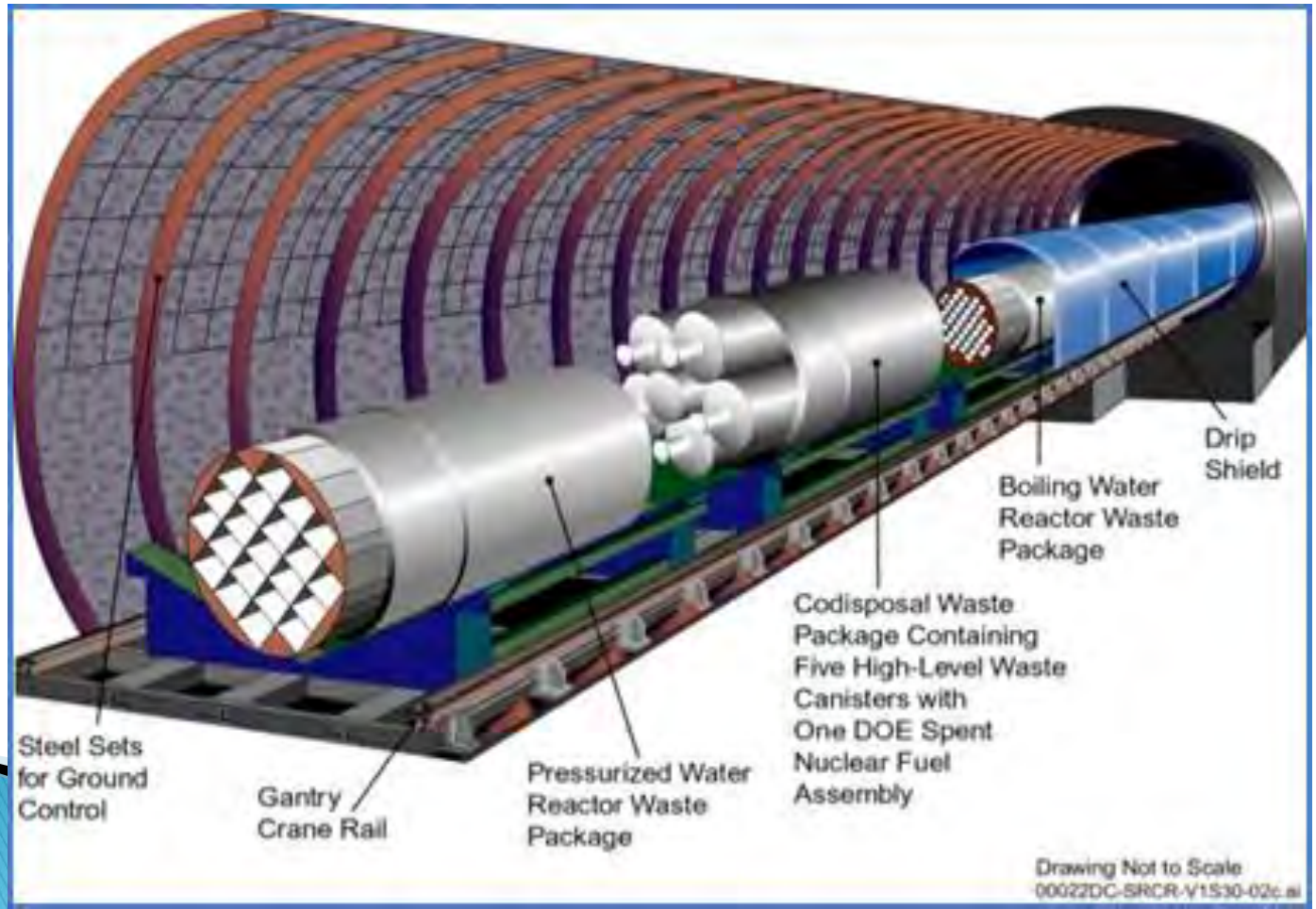
Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- The Yucca Mountain Site Repository Layout



Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- The Yucca Mountain Disposal Room Concept



Criteria and Incentives Supporting Five Key Elements in the 2012 BRC Report

- Select Yucca Mountain site milestones

2013 - The U.S. Court of Appeals for the District of Columbia has not ruled on related law suits

2010 - The Secretary stopped all work, transferred virtually all personnel and funding, and motioned to the NRC for withdrawal of the CLA, ***which the NRC rejected***

2008 - The Secretary submitted the construction license application (CLA) for the Yucca Mountain SNF/HLW repository to the NRC/ASLC

1987 - The site was selected for the nation's only candidate first SNF (~90%) and HLW (10%) repository

Status of HLW Disposal in the USA and Rational, Progressive, Paths Forward Based Upon Lessons Learned in the USA and Abroad Since 1973

Paper 15103

Authored by George E Dials and Leif G Eriksson
Presented by George E Dials on 16 March 2015

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Main talking points

1. Current status of HLW-disposal* in the USA and abroad, including background information on past repository-siting efforts in the USA.
2. Historical public-acceptance challenges.
3. Paths forward considered by the U.S. Congress.
4. Overview of the eight Key Elements recommended in the Blue Ribbon Commission on America's Nuclear Future (BRC) January 2012 Report.
5. Paths forward recommended by the authors.

* *Includes used and spent nuclear fuel*.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

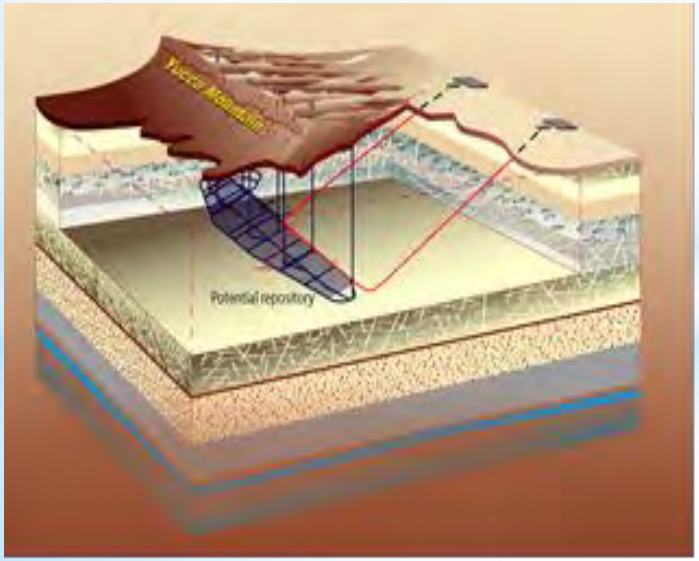
- Current status in the USA

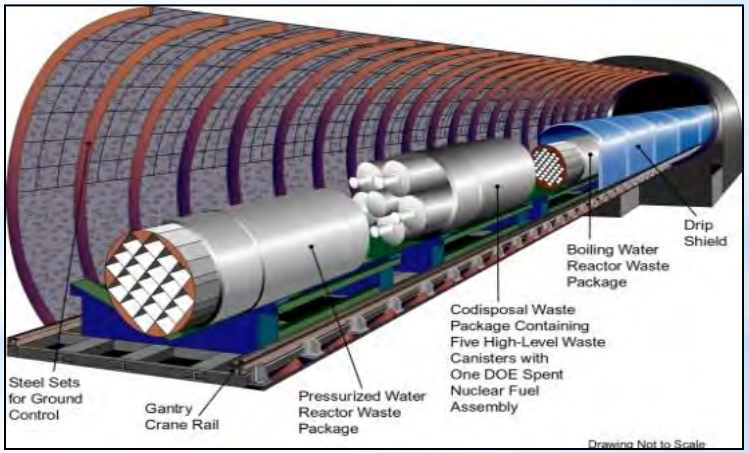
1. The USA's only candidate HLW-repository since 1987 has been opposed and stalled by the Obama administration since 2009 and its legally-mandated opening is already >17 years overdue.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Current status in the USA

2. The US NRC is reviewing the US DOE's June 2008 license application to construct a 70,000 MT HLW repository at the Yucca Mountain (YM) site, but it does not have sufficient funds to complete the review.





WM Symposia 2015

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

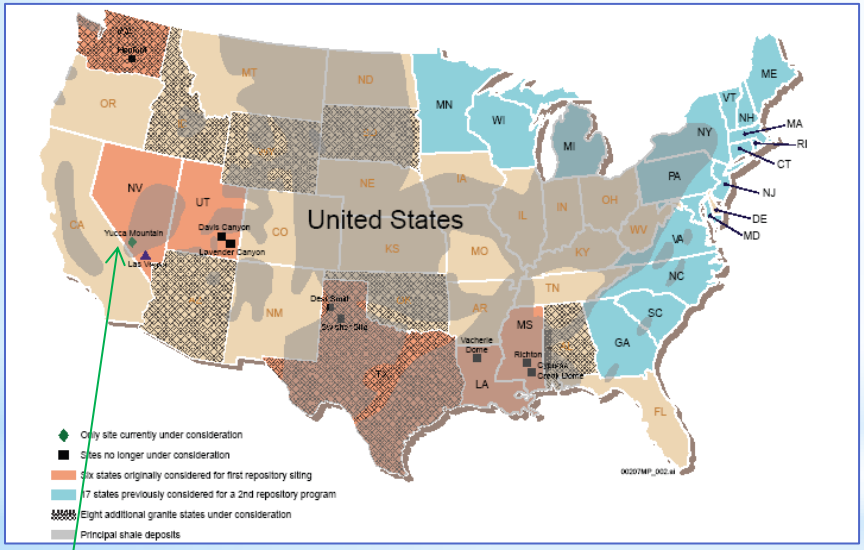
- Current status in the USA

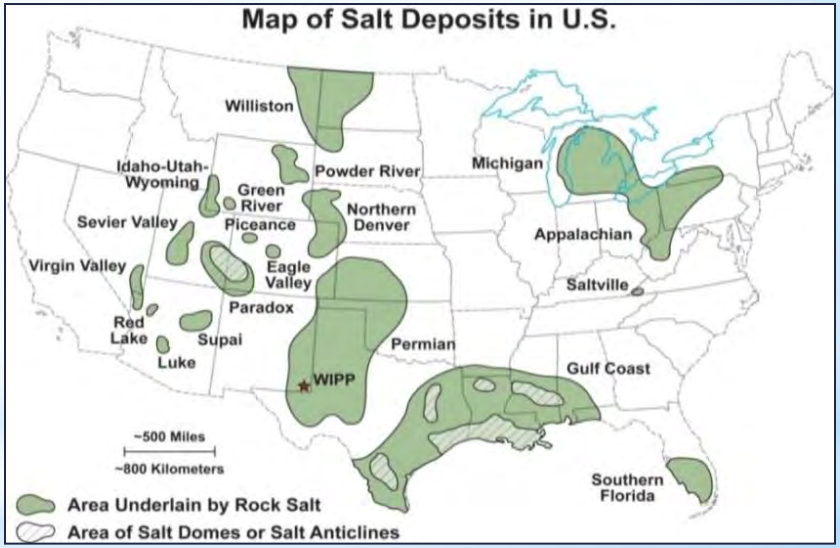
3. More than 76,000 metric tons (MT) of commercially (CHLW) and defense (DHLW) generated HLW is stored at >130 sites in >40 states.
4. In November 2013, the nuclear utilities were relieved of paying ~$750 million per year into the Nuclear Waste Fund (NWF) until the US DOE had a HLW-disposal plan or solution that was not "… truly, pie-in-the-sky".
5. Payments and settlements to the nuclear utilities for the US DOE's failure to take title to CHLW by 1 February 1998 exceeded $2.6 billion (B) and were estimated to exceed $20 B if it does not "take title to" CHLW by 2020.

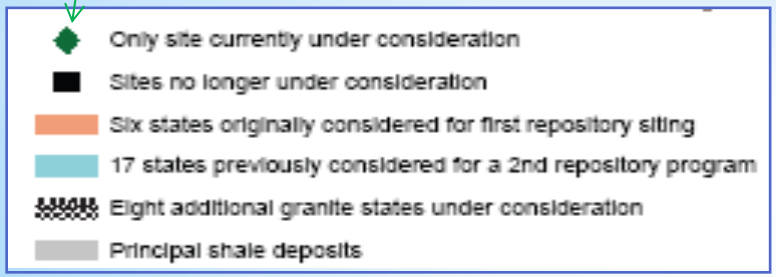
Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Past repository-siting efforts in the USA

Sites, states and rock types evaluated in the past; one in basalt (Hanford - aborted 1987), one in tuff (Yucca Mountain - still alive), and seven in salt (aborted 1987).







Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Past repository-siting efforts in the USA

  Sites and rock types evaluated since 1982 (does not show the Waste Isolation Pilot Plant salt site in New Mexico).

Basalt (1)

Tuff (1)

Salt (7)

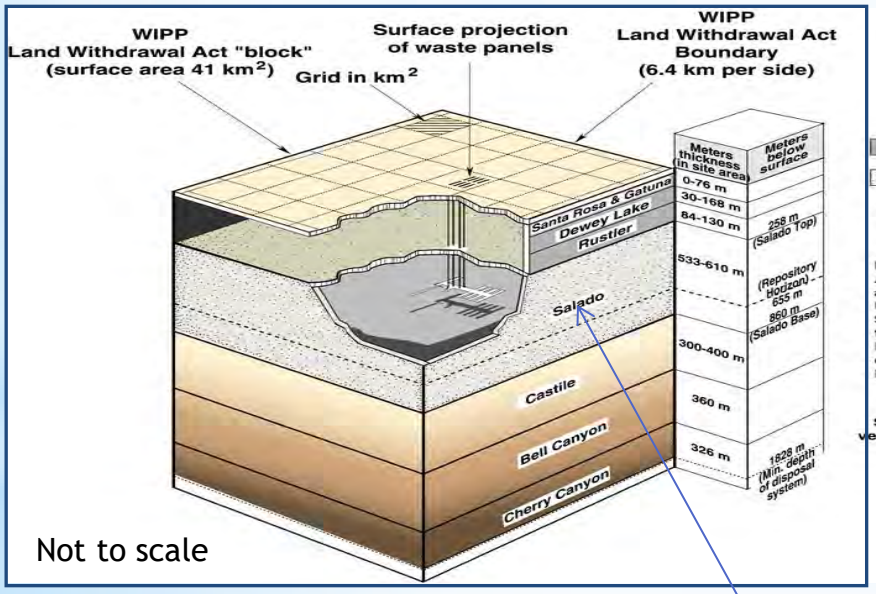
Still "alive"
Aborted 1987
Aborted 1985

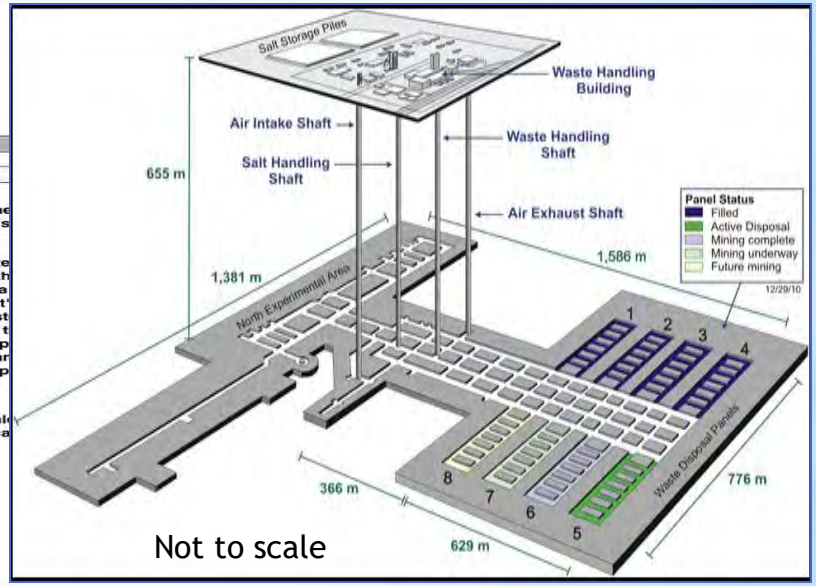
WM Symposia 2015

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Past repository-siting efforts in the USA

  Schematic illustrations of the stratigraphy at the Waste Isolation Pilot Plant (WIPP) site and the repository layout





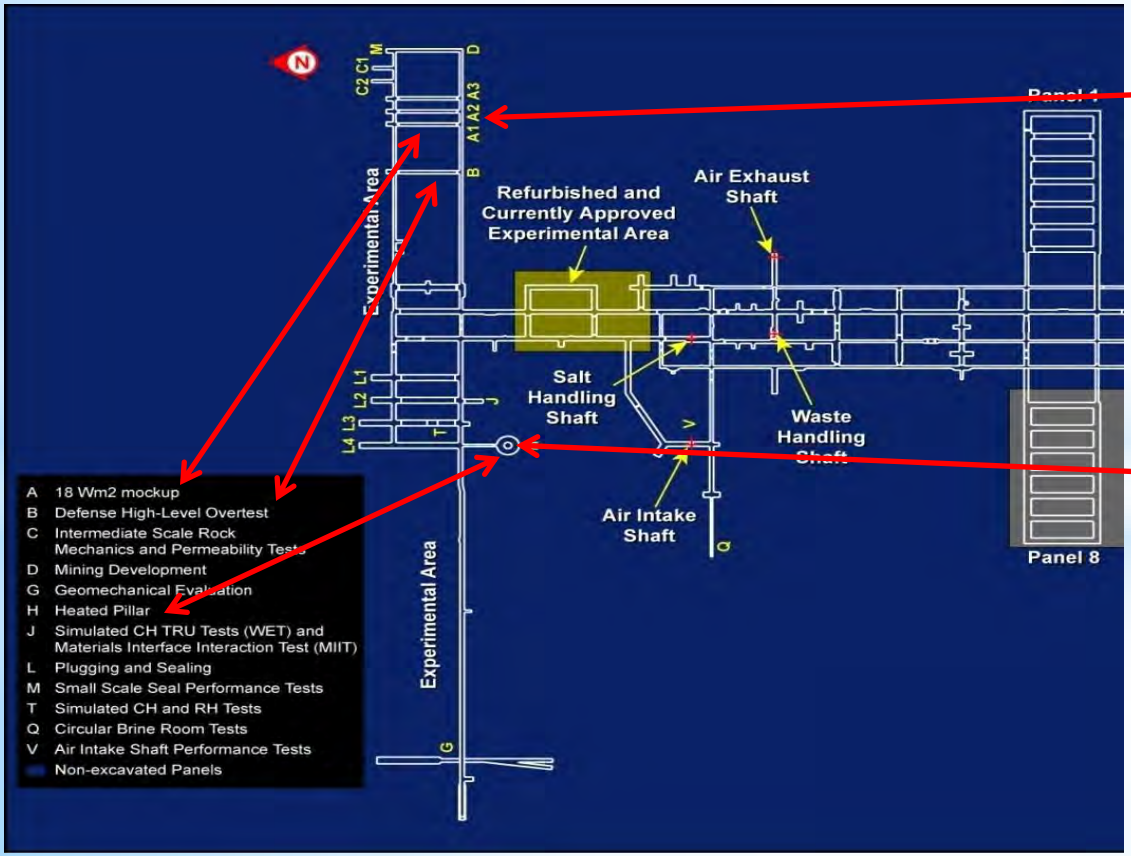
> 200-million-year-old bedded salt

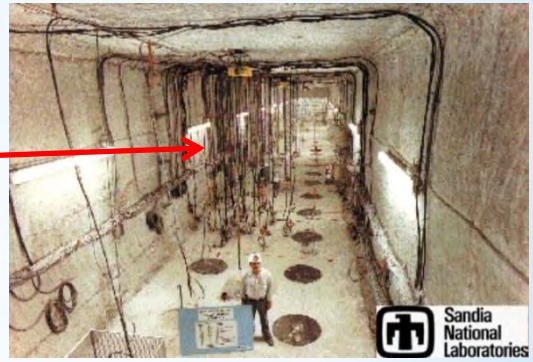
WM Symposia 2015

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Past repository-siting efforts in the USA

  HLW-related tests conducted in the WIPP URL





Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Current status in other countries

A. The world's three most-mature/advanced HLW-repository programs, their respective host rock, and recently-projected opening years are:
   1. Finland - igneous rocks - 2023.
   2. France - sedimentary rocks - 2025.
   3. Sweden - igneous rocks - 2027.

B. Other nations with long-standing (> 20 years) progressive HLW-disposal programs include:
   4. Belgium - over-consolidated, plastic, clay (= soil)
   5. Canada - igneous rocks*.
   6. China - igneous rocks.
   7. Germany - salt rocks.
   8. Japan - clay and sedimentary and igneous rocks.
   9. Switzerland - sedimentary and igneous rocks.
   10. The United Kingdom (UK) - igneous rocks.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Historical public-acceptance challenges*

1. Very few members of the public and their elected representatives fully comprehend the potential radiation risks imposed by a large, deep-underground, HLW-disposal system.
2. Ideological and other interests obscure and/or skew the concerns and opinions expressed by the directly affected (= host) parties (DAPs).
3. The DAPs had virtually no say in the decision-making process.

** Focus of paper 15104 presented in Session 118.*

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- BRC Key Elements 1-4

1. A new, consent-based approach to siting future nuclear facilities.
2. A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.
3. Access to the funds nuclear ratepayers are providing for the purpose of nuclear waste management.
4. ***Prompt efforts to develop one or more geologic disposal facilities.***

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- BRC Key Elements 5-8

5. ***Prompt efforts to develop one or more consolidated storage facilities.***
6. Prompt efforts to prepare for the eventual large-scale transport of spent nuclear fuel and high-level waste to consolidated storage and disposal facilities when such facilities become available.
7. Support for continued US innovation in nuclear energy technology and for workforce development.
8. ***Active US leadership in international efforts to address safety, waste management, non-proliferation, and security concerns.***

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Paths forward considered by Congress

1. Enabling legislation for one or both of:
   A. The partially-constructed, candidate HLW-repository located at the YM site in Nevada.
   B. The ***consent-based*** HLW-disposition (storage and disposal) strategy proposed by the Obama administration >26 months ago.*

* In June 2013, a Bill (S.1240-IS), referred to as "the Nuclear Waste Administration Act of 2013", was introduced in the U.S. Senate. It outlined a new organizational and procedural framework for ***"consensual" siting*** of new HLW-storage and -disposal facilities. This Bill remains to be approved by the U.S. Senate, reconciled with the U.S. House of Representatives, approved by the U.S. Congress, and then signed by the U.S. President.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Paths forward considered by Congress
  - Optimistically assuming the enabling legislation and a functional HLW-disposition organization would be in place by the end of 2016, based on the most-recent-related projections:
    A. The YM HLW repository would open no earlier than in 2026 (2017+9*), but more likely in 2029 (2020+9*).
    B. A new HLW repository would open by 2052 (2048+4*).
  - Conservatively assuming the current HLW stockpile would continue to grow ~2,000 MT per year:
    1. By 2026, it would exceed 100,000 MT**.
    2. By 2029, it would exceed 105,000 MT**.
    3. By 2052, it would exceed 150,000 MT**.

* *Obama-administration-imposed delay to date.*

** *The current legislatively-imposed maximum disposal capacity of the YM repository is 70,000 MT of HLW.*

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Author-recommended paths forward

1. Take advantage of existing repository knowledge and focus on mature HLW-disposal concepts already accepted elsewhere, i.e. already extensively-evaluated geological media/structures and engineered/design concepts.
2. Explain the proposed HLW-disposal concept and its related system-performance- and radiation/health-risk- assessment results in terms and by examples readily understood by laypeople.
3. Use spokes-people, “explainers/messengers”, that have earned public trust.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Author-recommended paths forward

4. The following rock types offer the USA's most advanced HLW-repository-sciences-and-engineering expertise, experience, databases, and modeling capabilities:

   A. Welded tuff above the regional groundwater table.
   B. Salt below the regional ground water table.
   C. Basalt below the regional groundwater table.

   In our opinion, salt is by far the most promising host rock for future HLW repositories.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Author-recommended paths forward

5. Pursue more than one HLW-repository site. Based upon the historical record, pursuing at least two large HLW disposal solutions is deemed to be of critical importance to:
   A. Timely progress;
   B. The future of nuclear energy;
   C. Homeland security;
   D. The amount of penalties due to the nuclear utilities;
   E. Public confidence in HLW disposal; and
   F. The USA's credibility and standing in the international radioactive waste management community.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

- Author-recommended paths forward

6. Separate disposal of CHLW and DHLW and dispose of the DHLW:
   A. At or adjacent to the WIPP site.
   B. At or adjacent to the YM site.
   C. At Government-owned and -operated sites with suitable geological conditions.
   D. In deep boreholes.

Status and Rational, Progressive, Paths Forward for HLW-disposal in the USA

Thank you for your attention

QUESTIONS?

U.S. Senate Bill S.854-IS - A Maladjusted Politicized Maze for Consent-Based Siting of New HLW-Repositories

Presented by Leif G. Eriksson on 7 March 2016

At the WM2016 Conference
Held in Phoenix, Arizona, USA
On 6-10 March 2016

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Talking Points

1. Summary of main HLW-disposal prospects and their respective status at the end of 2015.*
2. Main yardsticks used to evaluate the organizational structure and "consensual" siting and development (S&D) process proposed for new HLW-disposition (storage and disposal) facilities in the March 2015 U.S. Senate Bill S.854-IS.*
3. Main related findings of concern.*
4. Main conclusions.*
5. Main recommendations.*

* *Please see WM2016 papers 16019 and 16010 for additional information*.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

DISCLAMER

Findings, concerns, comments, conclusions, and recommendations presented today are:

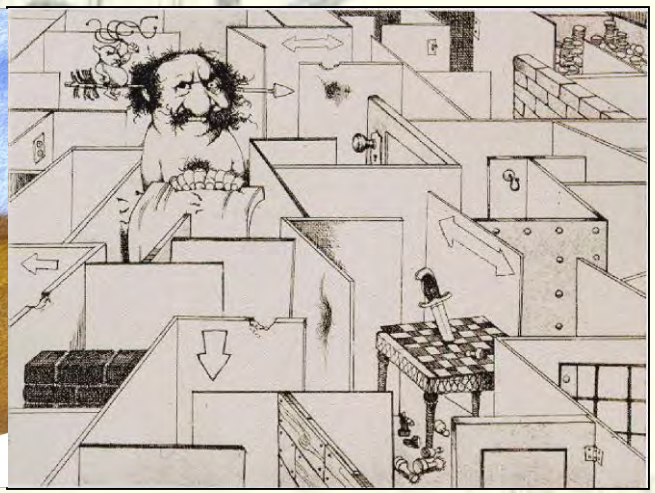
- *Only attributable to the presenter;*
- *Based upon his understanding of S.854-IS and related global historical imperatives for making progress on the S&D of HLW-disposition solutions;*
- *Often generalized and simplified; and*
- *Virtually certain to change with time.*

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

The Presenter's Pictorial Understanding of the Statuses of the USA's two Mined HLW-disposal Prospects at the End of 2015

The YM HLW Repository

The proposed U.S. Senate Bill S.854-IS



S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Proposed Purpose of S.854-IS

"A Bill to establish ***a new organization to manage nuclear waste, provide a consensual process for siting nuclear waste facilities****, ensure adequate funding for managing nuclear waste, and for other purposes."*

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Proposed Organizational Structure, Positions, and Term Limits

Executive Branch Entities	Positions	Selected and Appointed By	Term Limit
An independent "agency": The Nuclear Waste Administration (NWA)	Administrator	U.S. President and U.S. Senate	6 years [a]
	Deputy Administrator		6 years [a]
	Inspector General		No Limit
	General Counsel	The Administrator	No Limit
	Financial Officer	The Administrator	No Limit
	Up to 3 Assistant Administrators	The Administrator	No Limit
	(No Clerical staff ?)	(TBD ?)	(TBD ?)
An independent "establishment": The Nuclear Waste Oversight Board [b] (NWOB)	Member #1 [c]	U.S. President and U.S. Senate	1 year [d]
	Member #2 [c]		2 years [d]
	Member #3 [c]		3 years [d]
	Member #4 [c]		4 years [d]
	Member #5 [c]		5 years [d]
	Executive Secretary	The Oversight Board	No Limit
	Up to 10 Clerical staff	The Oversight Board	No Limit

Excerpts from S.854-IS

[a] *May serve more than 1 term.*

[b] *The U.S. President designates the Chair of the NWOB. (May also "… remove any member for "inefficiency, neglect of duty, or malfeasance in office".)*

[c] *Not more than 3 members of the NWOB may be members of the same political party. ("3 members of the NWOB shall constitute a quorum for the purpose of doing business.")*

[d] *A member of the NWOB may be reappointed for an additional term by the President, by and with the advice and consent of the Senate.*

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Pursuant to Sec. 201 of S.854-IS

"… the purposes of the Nuclear Waste Administration are:

(1) to discharge the responsibility of the Federal Government to provide for the permanent disposal of nuclear waste;

(2) to protect the public health and safety and the environment in discharging the responsibility under paragraph (1); and

(3) to ensure that the costs of activities under paragraph (1) are born by the persons responsible for generating the nuclear waste."

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- Main Yardsticks Used to Evaluate the Proposed Organizational Structure

  A. Did it have the in-house subject-matter scientific and technical (e.g., health-physics, nuclear safety, and repository-sciences and -engineering) expertise historically required for earning and maintaining broad public, nuclear-industry, and local and national political credibility, trust, and support?

  B. Did it have "*…**sufficient independent authority** — subject to appropriate financial, technical, and regulatory oversight — to provide **institutional and programmatic stability over time**?" (From a 2011 BRC-subcommittee report).*

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Yardsticks (lessons learned) Used to Evaluate the "Consensual" S&D Process

C. Were the "consensual" parties defined?
D. Was the term "consensual" defined so it could be objectively measured?
E. Was the candidate facility-hosts given:
   1) Timely financial resources to retain subject-matter experts; and
   2) Timely and definitive say in the S&D process?
F. Was the S&D process:
   1) Transparent from the outset; and
   2) Included advance periodic publications and periodic public meetings on what, how, and when?

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern

  1. The proposed model/process for attracting, retaining, appointing and maintaining key NWA and NWOB staff is not conducive to result in organizational entities that will be deemed competent, interest-group-independent, and trustworthy by the directly affected parties (DAPs) or other parties familiar with the S&D of HLW-disposition facilities.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern
  2. None of the NWA "administrators" or the NWOB "members" is required to possess any relevant health-physics, nuclear-safety, or repository-sciences or -engineering education or experience.

"We are neither hunters nor gatherers. We are Bean Counters."

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern

  3. The **term limits** in the proposed model/process for attracting, retaining, appointing and maintaining key staff may:
     a. Limit the number of qualified nominees due to e.g., relocation issues;
     b. Be shorter than the time historically-required for the U.S. President and the U.S. Senate to agree on a nomination; and/or
     c. Pre-maturely deplete the resident institutional memory.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern

  4. There is no rationale for why two new Executive Branch entities were deemed more qualified and promising "custodians" for the timely and cost-effective design and implementation of a new "consent-based" national program for the S&D of HLW-storage and -disposal facilities than an existing federal office with resident HLW-management experience such as, e.g.,:

     a. The only statutory, but currently unstaffed and unfunded, federal "custodian" for HLW disposal in the USA, i.e., the DOE Office of Civilian Radioactive Waste Management (OCRWM); or

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern

  4. There is no rationale for … rather than an existing federal office with resident HLW-management experience such as, e.g.,:

     b. The current federal "custodian" of an operating repository for long-lived transuranic radioactive waste and several operating HLW-storage facilities, i.e., the DOE Office of Environmental Management (DOE-EM); or

     c. The current federal "custodian" of most, still-working, former DOE-OCRWM staff, the DBD program, and the 23 December 2015 Federal Register invitation for public comments on the design of the consent-based S&D process (addressed in WM2016 session 107B on Thursday a.m.), i.e., the DOE-NE.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern

5. S.854-IS would leave several unresolved issues in a pending divorce from the 1983 law (NWPA), as amended in 1987 (NWPAA), and their related 2012 and 2013 (2) rulings by the U.S. Court of Appeals for the District of Columbia Circuit. For example, it does not address:

   a. Who the "guardian" for the YM HLW repository would be;
   b. Who the responsible party(ies?) for the "breech of contract" penalties - ~$500 M/a - would be; or
   c. The different and conflicting definitions of the key term "the Administrator".

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern

6. The "consensual" S&D process:

   a. Appears to be designed to ensure the "Administrator" solely controls the planning and implementation of the S&D process.
   b. Does not include the CHLW generators, who have long-standing experiences on safe and secure storage of CHLW, and already use CHLW-storage containers imposing constraints on transportation and disposal.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern

  6. The "**consensual**" S&D process:

     c. "Consensual" and its derivatives are qualitative terms susceptible to a wide range of biased interpretations fueling self-serving contentions and lawsuits that, in turn, will delay the S&D of related HLW-disposition solutions.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Finding of Concern
  7. S.854-IS does not address the legal status of the YM HLW repository, or its related schedule and cost impacts, on the need, size or schedule for a new HLW repository.
  8. S.854-IS does not include lessons learned in the USA and abroad the past 30+ years shown imperative to earning the local acceptance and sustained support required for timely and cost-effective progress on the S&D of HLW-disposal facilities.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Conclusion

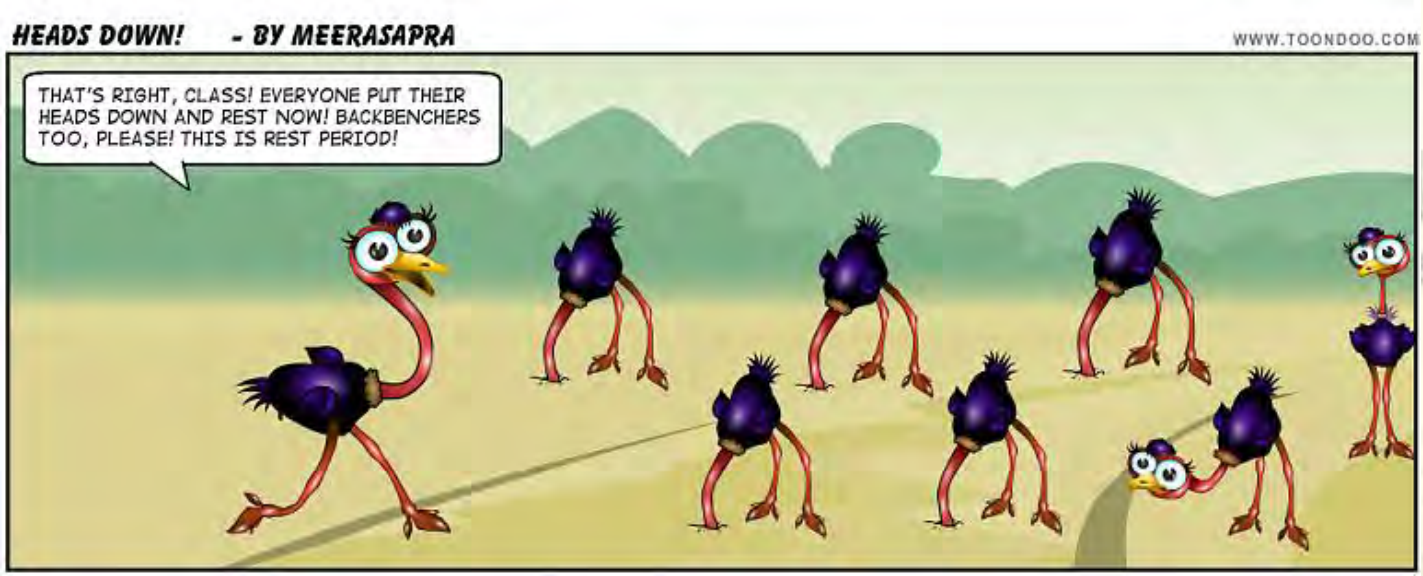
1. The organizational structure, appointment process, and term limits proposed in S.854-IS are more susceptible/conducive to political nepotism and quid-pro-quo reciprocity for services rendered than the related legislation for the YM HLW repository program that has been in a political "chokehold" since 2010.

A law based upon S.854-IS could therefore be "dead upon arrival".

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Conclusion

  2. The November 2016 national elections will delay the enabling and enactment of a new law based on S.854-IS, as well as the enabling of the YM HLW repository, until ***at least*** late 2017.



S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Conclusion

  3. Optimistically assuming the respective (or joint) enabling legislation is in place by the end of 2017 and the implementing organization is in place by the end of 2018:

     A. Based on the Secretary of Energy's December 2008 projection, ***the YM HLW repository would open between 2027 and 2030***.
     B. Based upon the then Secretary of Energy's January 2013 projection, ***a new, consent-based, HLW repository would open by 2054***.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Main Conclusion

  4. Federal-tax payers had paid "breach of contract" penalty fees to the nuclear utilities since February 1998 on behalf of the federal government, and will continue to pay these penalty fees - estimated to exceed a cumulative total of $30 Billion (B) in 2028 - *until the government begins taking title to commercially- generated HLW (CHLW),* which it still can do under existing laws by providing one or more "centralized" 300-1,900 MT HLW-storage facilities on government sites.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

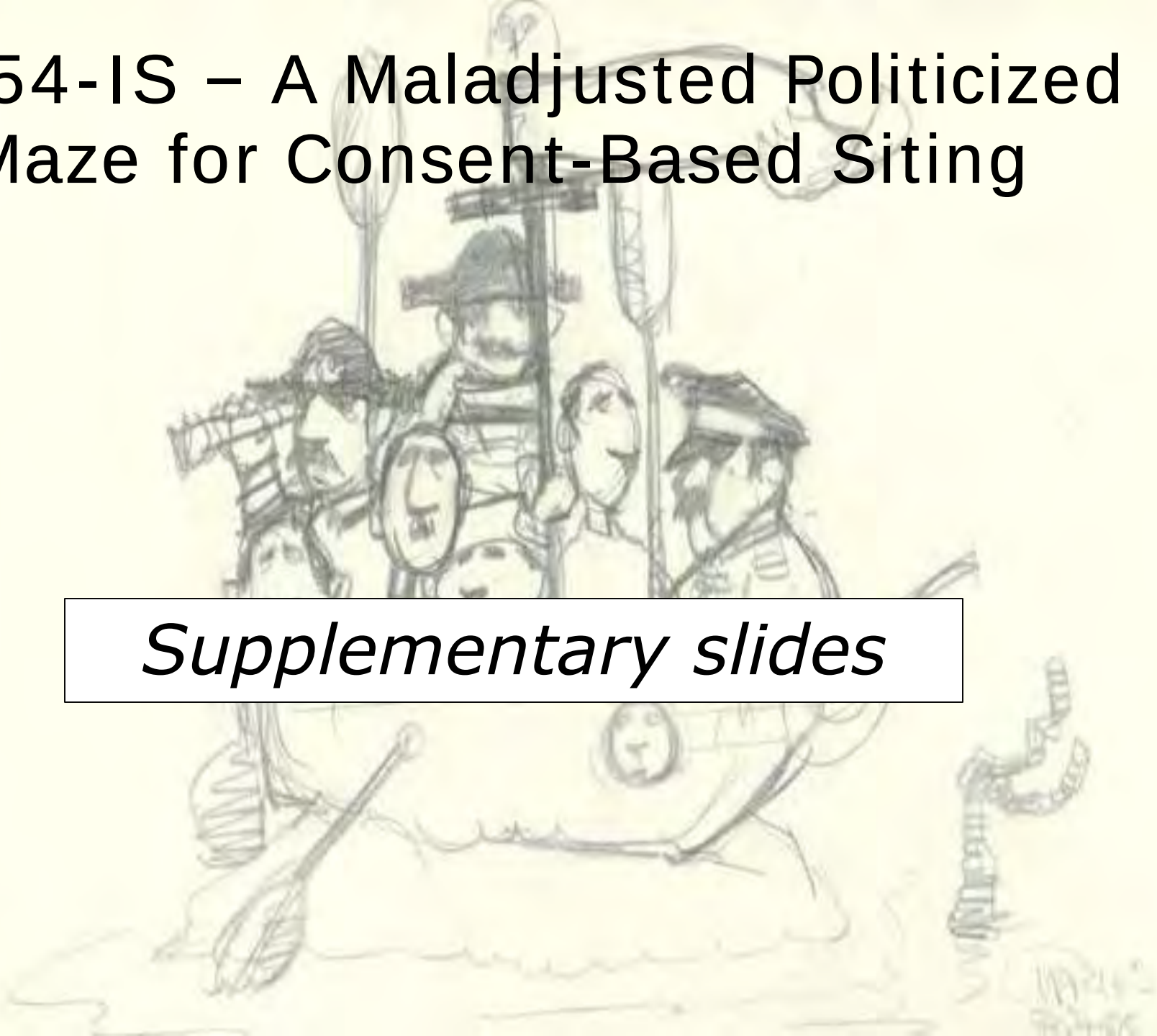
- Main Recommendations

1. Update (or replace) S.854-IS based on lessons learned on S&D and licensing of facilities for safe storage and disposal of long-lived radioactive waste in the USA and abroad the past 30+ years.
2. Define "consent-based" quantitatively before enacting a law for S&D of new HLW repositories that also addresses the status and impacts of the YM HLW repository, if still a legal option.
3. Promptly site, develop, license and open at least one "centralized" CHLW-storage facility allowing the government to begin taking title to CHLW.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Tank you for your attendance and attention.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting



Supplementary slides

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Organizational Structure, Positions, and Term Limits Proposed in S.854-IS.

Executive Branch Entities	Positions	Selected and Appointed By	Term Limit
An independent "agency": The Nuclear Waste Administration (NWA)	Administrator	U.S. President and U.S. Senate	6 years [a]
	Deputy Administrator		6 years [a]
	Inspector General		No Limit
	General Counsel	The Administrator	No Limit
	Financial Officer	The Administrator	No Limit
	Up to 3 Assistant Administrators	The Administrator	No Limit
	(No Clerical staff ?)	(TBD ?)	(TBD ?)
An independent "establishment": The Nuclear Waste Oversight Board [b] (NWOB)	Member #1 [c]	U.S. President and U.S. Senate	1 year [d]
	Member #2 [c]		2 years [d]
	Member #3 [c]		3 years [d]
	Member #4 [c]		4 years [d]
	Member #5 [c]		5 years [d]
	Executive Secretary	The Oversight Board	No Limit
	Up to 10 Clerical staff	The Oversight Board	No Limit

Excerpts from S.854-IS

[a] *May serve more than 1 term.*

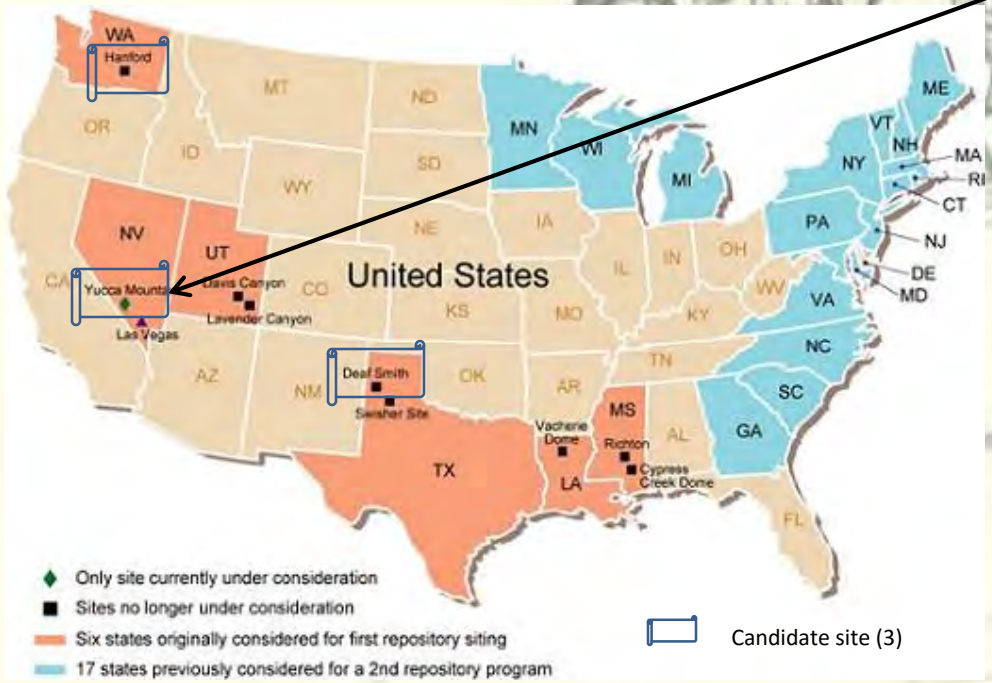
[b] *The U.S. President designates the Chair of the NWOB. (May also "… remove any member for "inefficiency, neglect of duty, or malfeasance in office".)*

[c] *Not more than 3 members of the NWOB may be members of the same political party. ("3 members of the NWOB shall constitute a quorum for the purpose of doing business.")*

[d] *A member of the NWOB may be reappointed for an additional term by the President, by and with the advice and consent of the Senate.*

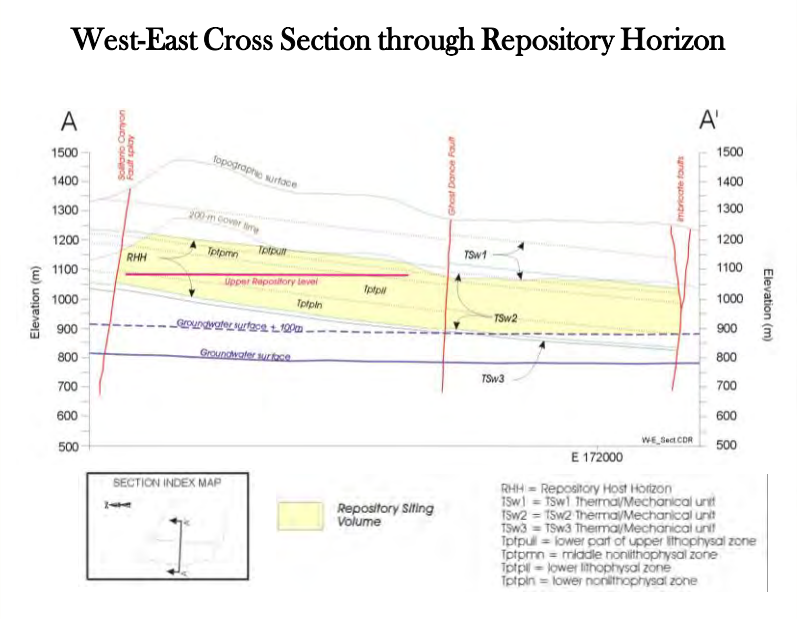
S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

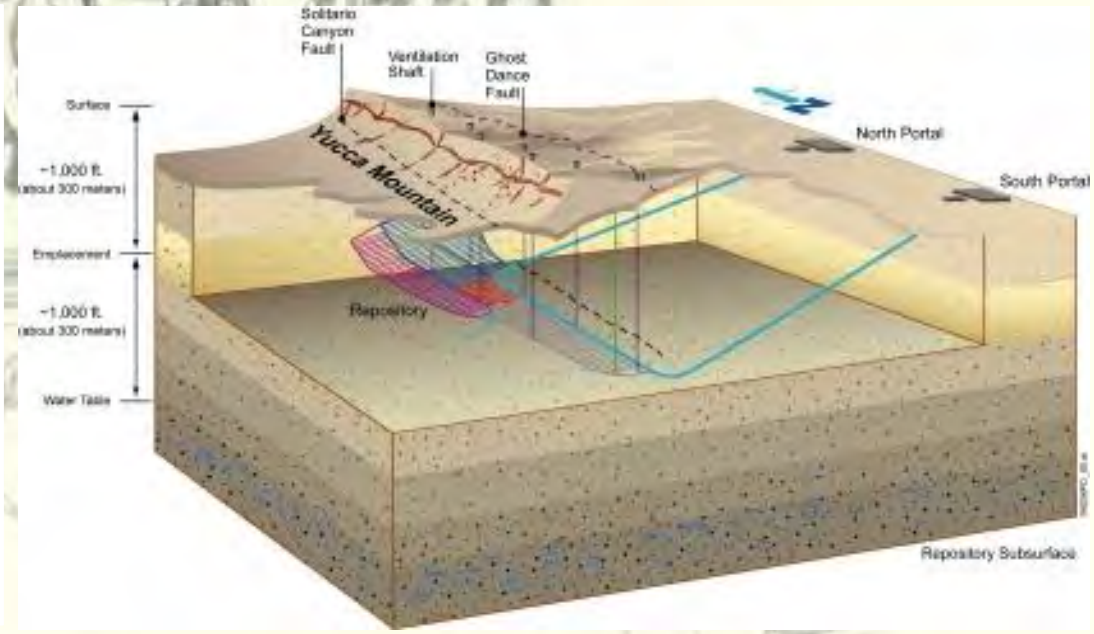
Location of the YM site



S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

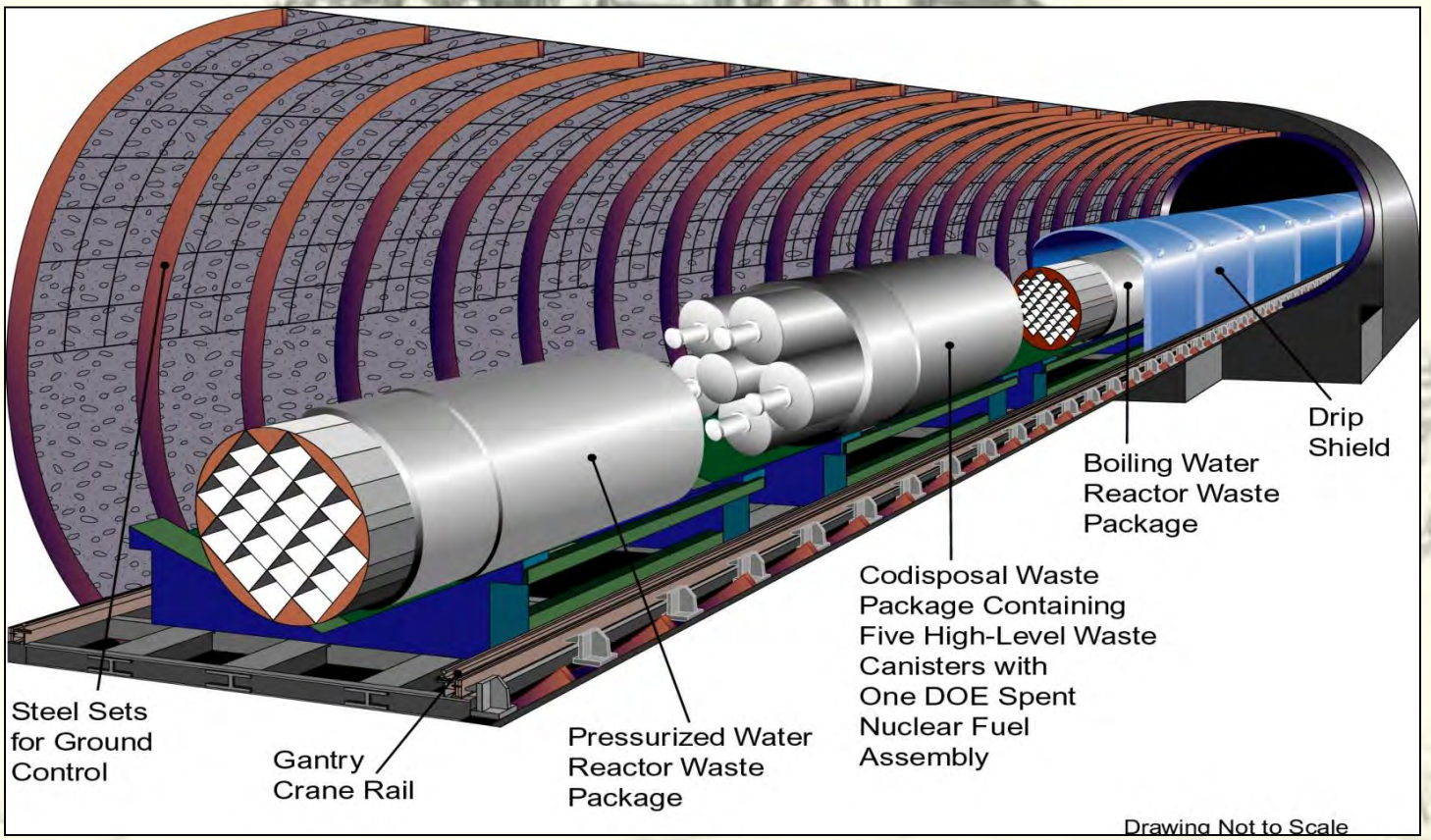
Schematic illustrations of the geologic setting for and the layout of the YM HLW repository





S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Disposal-room concept for the YM HLW repository

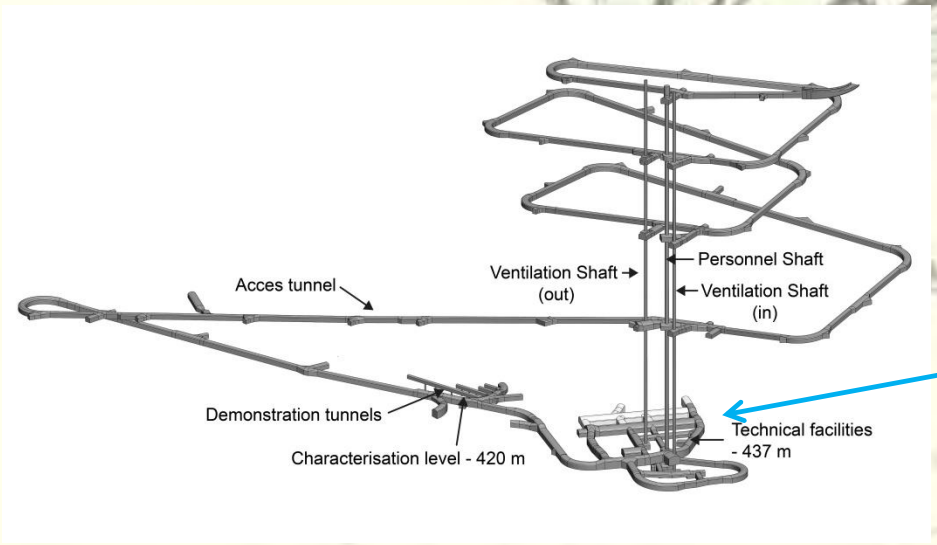


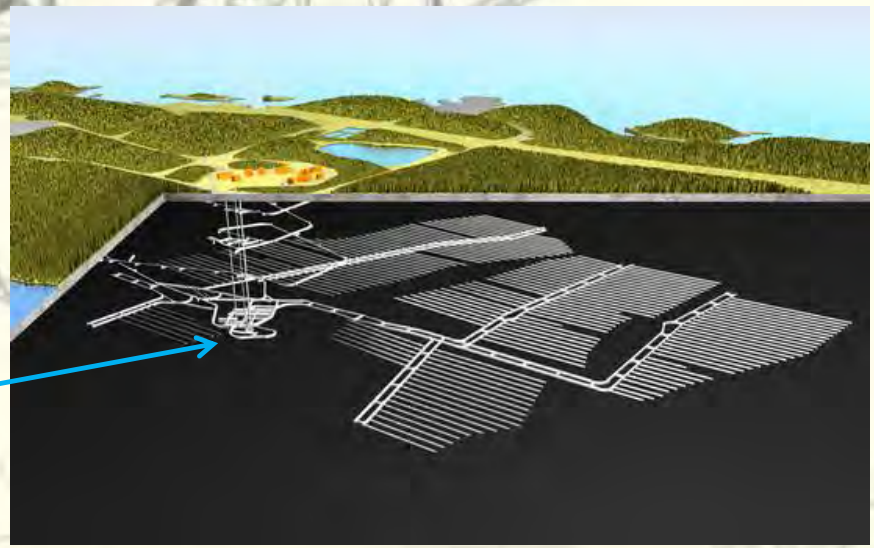
S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- End of 2015 Status in Finland (described further in paper 16507 in Session 121)
  1. In November 2015, the Finnish Parliament ratified Posiva's 2012 construction license application (CLA) for a deep geological repository in "granite" for 6,500 metric ton (MT)/~ 3,000 canisters of SNF and an adjacent encapsulation plant at the Olkiluoto site in the Eurajoki municipality (http://www.posiva.fi).
  2. *Both facilities are projected to open as the first of their respective kind in the world in* ***2024.***

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

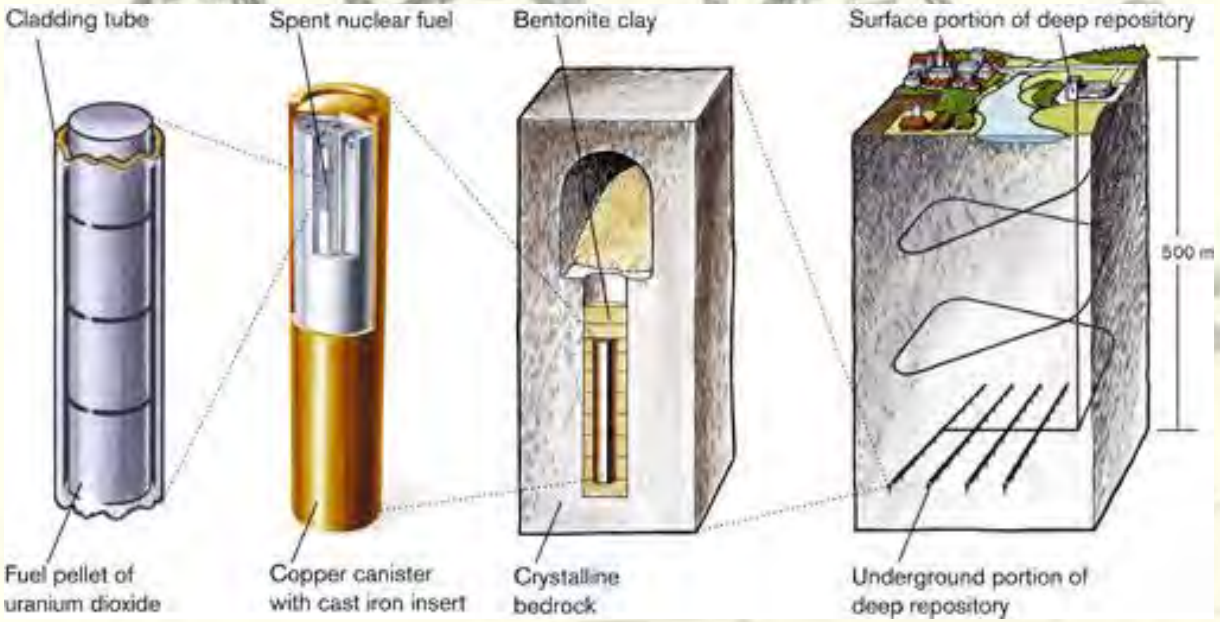
Schematic illustrations of the operating underground research facility (URL), ONKALO, and the layout of the planned SNF repository at the Olkiluoto site in Finland



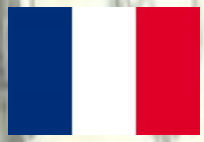


S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Schematic illustration of the KBS-3V disposal concept pursued in Finland and Sweden



S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

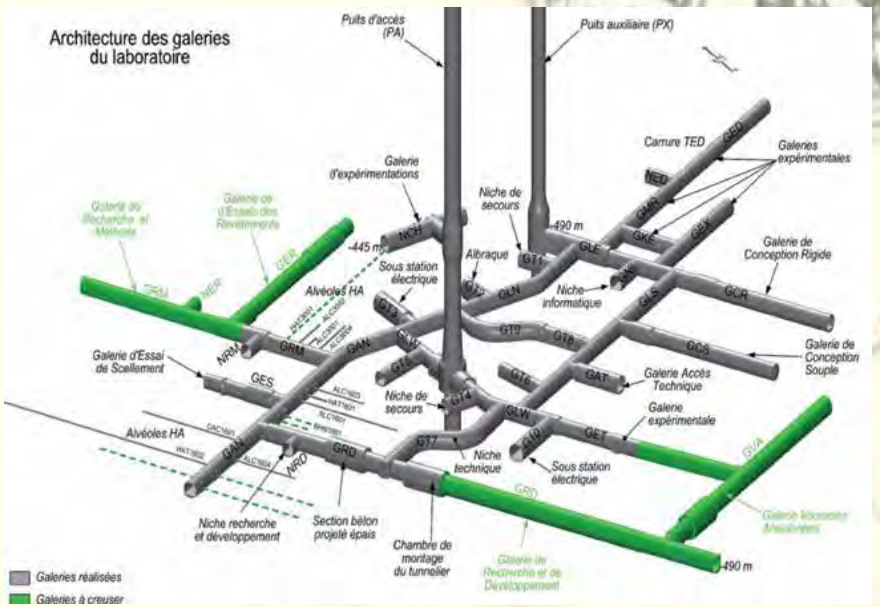


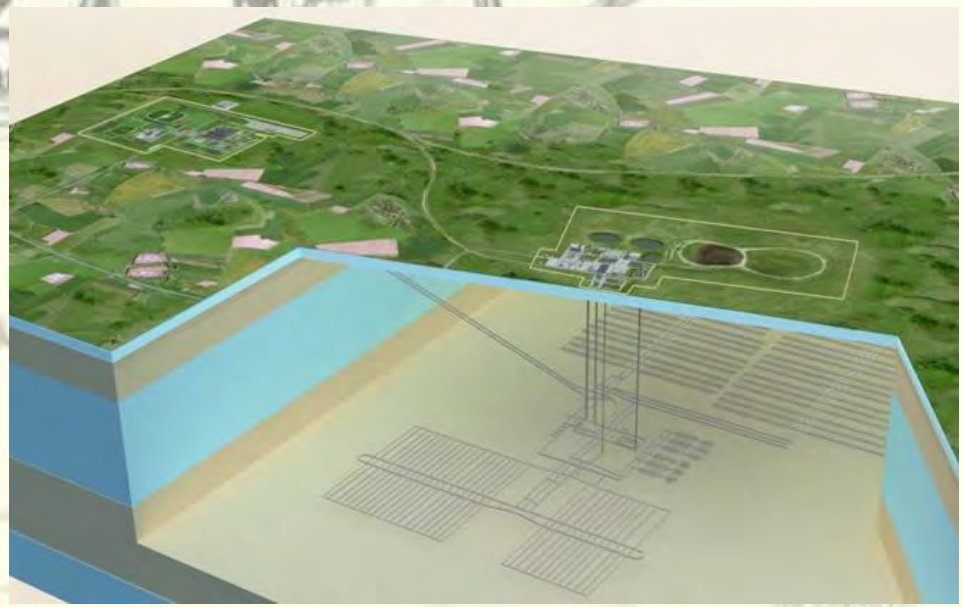
- End of 2015 Status in France (described further in several other WM2016 papers)

  1. The French nuclear waste management organization Andra operates a URL in sedimentary rocks at the Bure site in the Meuse/Haute Marne region since 2000 and will operate a near-by repository, *the Cigéo,* for disposal of 10,000 m^3/ 60,000 LL-ILW containers and 73,500 m^3/180,000 HLW containers (http://www.andra.fr).
  2. *Cigéo is projected to open in* ***2025.***

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Schematic illustrations of the operating URL at the Bure site and the near-by LL-ILW and HLW repository, Cigéo.





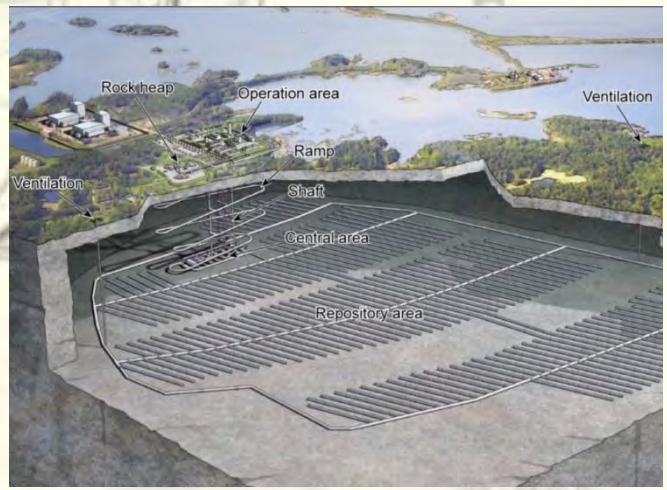
S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- End of 2015 Status in Sweden

1. Preceded by a favorable review by the regulator, SSM, in December 2015, the Swedish Land and Environmental Court announced the SKB's 2010 CLA for a deep geological repository in "granite" for 12,000 MT/~6,000 canisters of SNF at the Forsmark site in the Östhammar municipality and an SNF-encapsulation plant in the Oskarshamn municipality was complete and released it for public comments (http://www.skb.se).
2. *Both facilities are projected to open in early **2030**.*

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Schematic illustrations of the operating URL at the Äspö site and the integrated, centralized, SNF-storage and encapsulation facilities located in the Oskarshamn municipality, and the planned SNF repository located at the Forsmark site in the Östhammar municipality.



S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

Schematic illustration of the Swedish HLW-repository "Licensing" Process

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- End of 2015 Prospects and Statuses
  - HLW destined for deep geologic disposal was stored at 130+ sites in 39 states and exceeded the current legal 70,000 metric ton (MT) HLW-disposal capacity of the YM repository by >6,000 MT; *projected to increase by 2,000-2,300 MT per year (MT/a) until the government (= the Secretary of Energy/DOE in current laws) begins taking title to HLW*.

S.854-IS – A Maladjusted Politicized Maze for Consent-Based Siting

- Lessons Learned
  - Three common root cause HLW-disposal solutions are opposed or **rejected** are that a very small portion (< 1% ?) of the population in any given country fully understands:
    a) The inherent unprecedented spatial (> 50 km^3) and long temporal (10,000 - 1,000,000 years) scales;
    b) The inherent state-of-art-art scientific and engineering concepts; and
    c) The inherent analyses, units, and "jargon" governing the siting, design, and performance/safety/risk assessments for a deep geological HLW-disposal system.

Consent-Based Siting

From: Lake Barrett [mailto:lake@lbarrett.com]
Sent: Wednesday, July 27, 2016 2:03 AM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Sustainable Fuel Task Force Science Panel IPC Comments

Dear Sir:

On behalf of the Science Panel of the Sustainable Fuel Cycle Task Force, I am pleased to submit our response to your IPC. This was also submitted to the Federal Register Web Site, so please do not double count it.

If there are any questions, please feel free to contact me. Thank you.

Lake Barrett

Lake@Lbarrett.com
1278 Tuscany Blvd
Venice, FL 34292
941-445-4873

Sustainable Fuel Cycle
TASK FORCE

Sustainable Fuel Cycle Task Force Science Panel

July 28, 2016

U.S. Department of Energy, Office of Nuclear Energy
Response to IPC
1000 Independence Ave SW
Washington, DC 20585

The Science Panel of the Sustainable Fuel Cycle Task Force is pleased to provide its response to the U.S. Department of Energy's *Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities*.

As scientists who have independently worked for many decades to support a sound approach for safely managing and disposing of our nation's used nuclear fuel and high level radioactive wastes, it is our view that the decades of extensive international scientific analyses support moving forward promptly to establish an operable geologic disposal repository. In theory, we support the proposed concepts expressed, however this should not be used as an excuse to not finish the nearly complete licensing process for the Yucca Mountain site. Thus we strongly recommend that these concepts be added as a supplement to the continuation of the Yucca Mountain licensing process rather than to replace it.

It is the collective view of our Panel that the need for progress to promptly develop a geologic repository is more critical now than ever. Used nuclear fuel accumulations at both shutdown and operating reactors continues to grow imposing significant societal burdens; disposal of defense high level radioactive waste needs are not being met; and important legal contractual obligations and state agreements are not being achieved. In addition to restarting Yucca Mountain licensing, we note the need for urgent action expressed by the Blue Ribbon Commission (BRC). The BRC did not preclude continuing Yucca Mountain licensing and we believe continuing the Yucca Mountain licensing review is the most reasonable and prudent means to address this issue with a sense of urgency. We strongly believe that the legally mandated Yucca Mountain licensing process should continue now and that the addition of proposed consent based concepts can help with Yucca Mountain and with the establishment of other future waste management facilities such as supplemental Interim Storage facilities and a potential second geologic repository as stated in the Nuclear Waste Policy Act. We urge the NRC and DOE to now be proactive and move forward with both Yucca Mountain licensing and development of consensus concepts rather than accept the unrealistic unscientific politically motivated inaction excuses of the past few years.

Detailed responses to the requested questions are attached.

Yours sincerely for the Science Panel

Charles Fairhurst, Ph.D. D. Warner North Ph.D. Ruth Weiner, Ph.D.

Isaac Winograd, Ph.D. Wendell Weart, Ph.D.

Sustainable Fuel Cycle
TASK FORCE

Attachment
U.S. Department of Energy, Office of Nuclear Energy,
Response to IPC

Sustainable Fuel Cycle Task Force Science Panel, Response to Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities

How can the Department ensure that the process for selecting a site is fair?

A definition of "fair" is difficult because it is a value judgement that means different things to different people. To us a "fair" process is one that is open, transparent, and defined and once established should not be altered by any party, including the federal legislative and executive branches.

What models and experience should the Department use in designing the process?

The business community affords examples with siting of industrial facilities. Agreements are made with local and state governments and confirmed by contracts.

The experience of the WIPP is relevant, as is that of other countries such as Sweden, Finland, UK, Canada, Switzerland, and Spain. All societal experiences are different and there has been considerable difficulties in successfully implementing a theoretically desirable consensus process in the real world where there are strong emotional, but often un-scientifically based fears.

Who should be involved in the process for selecting a site, and what should be their role?

Any person or group that wishes to be involved can provide their views, however the host landowner/applicant, local government, and state governments are the primary entities that should formally be consulted with. Consensus does not mean that everyone agrees because there will always likely be some group of people that will oppose any solution anywhere. All are listened to, but only the actual applicant and local and state governments are the parties that should have to agree to provide a consensus agreement.

What information and resources do you think necessary to facilitate your participation?

All information should be available to everyone. For example, the NWPA Licensing Support Network (LSN) established by NRC and populated by NRC, DOE and Sate of Nevada, is an example of providing all information to members of the public. DOE could establish such an LSN concept from the very beginning of site selection all the way to site closure. Hopefully a future LSN type system would be more user friendly from a computer software aspect, for simpler access by the general public. But the principles of information availability and transparency are the same.

Local governments should be provided educational grants to study options and participate. No other funds need to be paid to special interest groups.

What else should be considered?

Safety and environmental protection is provided by NRC and EPA regulations, so nothing else is needed other than a willing applicant and a working arrangement that the applicant has made with the willing local and state hosts.

Questions for Input

(1) How can the Department of Energy ensure that the process for selecting a site is fair?

Fairness is a difficult definition because siting involves tradeoffs between various aspects of an integrated waste management system. Positive aspects in one part may not be positive in another, especially when it includes emotional aspects such as "my back yard" versus "your back yard'. So whatever process DOE selects should be adhered to over time so that everyone knows the rules and the process at all times.

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(2) What models and experience should the Department of Energy use in designing the process?

The creation of and implementation of the Nuclear Waste Policy Act provides considerable positive and negative experience.

Currently the main obstruction to a consensus on the Yucca Mountain repository is from the State of Nevada. The NWPA addressed the right of the host state to "disapprove" the site and that the site was terminated unless it was over-turned by positive votes by the House and Senate and President.

The Concept of Consultation and Cooperation: section 117(b) of the Act includes provisions for a Consultation and Cooperation agreement: "…. the Secretary shall consult and cooperate with the Governor and legislature of such State and the governing body of any affected Indian tribe in an effort to resolve the concerns of such State and any affected Indian tribe regarding the public health and safety, environmental, and economic impacts of any such repository." And section 117 (c) "…. the Secretary shall seek to enter into a binding written agreement."

Thus the NWPA already has elements of a consensus program within it and it started out fairly well, however the truncation of sites being evaluated in 1987 made the Federal-Nevada relationship very difficult in the end. This truncation was an example of changing the process for site selection after the process had begun that undermined the federal-affected units of local government relationships.

At some point, however, a national decision has to be made and implemented and a societal decision has to be made. In our view, if the site has been found by an independent regulator, such as the NRC, to technically meet all protective safety and environmental requirements in a publicly open and transparent process, and the sponsor of the site, such as the federal government or commercial sponsor, has made a good faith effort to establish a consensus relationship with the Local and State hosts, then a State or Local government should not have an absolute veto over the facility without a reason other than "we don't want it here".

(3) Who should be involved in the process for selecting a site, and what is their role?

The Federal government and host land owner/applicant, local government,
and state government. There is no need for others.

(4) What information and resources do you think would facilitate your participation?

Just a publicly open and transparent process is all that we would need.

(5) What else should be considered?

Implicit in the answer to each of the above questions is the assumption that the proposed disposal site is undergoing (or has undergone) a reconnaissance study and potentially meets accepted technical criteria for spent fuel disposal. That is, a fair selection process is a necessary but not a sufficient criterion for site selection.

Additionally, whatever repository is to be considered, there should be applicable EPA and NRC protection standards established well in advance so that potential hosts understand what the levels of risk are and what they are potentially agreeing to. Such scientific and legal standards already exist for Yucca Mountain, but do not exist for other potential geologic repository settings. Thus if there is to be a meaningful consideration of other geologic settings, the EPA and NRC should establish regulatory standards very early in the process because creation of such standards takes many years.

Consent-Based Siting

From: joanie fauci [mailto:joanie4c@yahoo.com]
Sent: Tuesday, July 19, 2016 3:22 PM
To: Consent Based Siting
Subject: Response to IPC - Joanie Fauci

Dear Sirs,

Please accept these comments to the DOE's nuclear waste program at INL.

I am firmly OPPOSED to ANY additional nuclear waste coming into Idaho. Even if some say this would be good for Idaho, INL, and surrounding communities, overall nuclear waste is BAD. It is BAD everywhere. No new technology exists to make it better. Even the newer technologies end up with nuclear waste. There is no good solution for long term storage. I do not approve of Idaho storing, or processing, any more nuclear waste than we already have. This is a beautiful state. It is growing and thriving. We do not need the economic boost of nuclear waste. We especially do not need nuclear waster from other countries. Other countries should store their own waste.

Please, please, please do NOT bring any more nuclear waste to Idaho. And please say No to accepting any other country's nuclear waste. Do you really want your legacy to be that you turned our state and/or country into a nuclear waste pit?

No means NO!

Regards,
Joanie Fauci
2944 Hillway Dr
Boise ID 83702
joanie4c@yahoo.com
208-631-4748

Consent-Based Siting

From: Laura Feldman [mailto:lfeldman32101@yahoo.com]
Sent: Saturday, July 30, 2016 6:30 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Comment Opposing DOE's Consent-Based Siting Process for Nuclear Waste

Dear Secretary Moniz,

We, in Oregon, have already seen how vulnerable and mismanaged the rail system is in terms of transporting oil. I simply can't consent to your trucking and training radioactive waste around the country--it's insane. Better the U.S. and nuclear industry spend its time and money figuring out once and for all what to do with the waste, how to transform it, rather than creating more of it to bury somewhere like a pathetic dog with a bone.

Please wake up!!!!!!
We, out here are awake!!!!

Respectfully,

Laura Feldman

Laura Feldman
9481 N. Tioga Ave.
Portland, OR 97203

From: Fettus, Geoffrey [mailto:gfettus@nrdc.org]
Sent: Friday, July 29, 2016 3:48 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: NRDC's Response to the IPC

Dear Sir/Madam:

Please find attached NRDC's timely response to the U.S Department of Energy's (DOE) efforts to implement a "consent-based siting process to establish an integrated waste management system to transport, store, and dispose of commercial spent nuclear fuel and high level defense radioactive waste." *See*, *Invitation for Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities*, 80 Fed. Reg. 79872-79874 (Dec. 23, 2015) (hereinafter "Consent Based IPC"); comment period extended to July 31, 2016, 81 Fed Reg. 15295-6 (Mar. 22, 2016).

Please don't hesitate to contact me if you have any problems downloading the attached document.

Regards,

Geoff Fettus

GEOFFREY H. FETTUS
Senior Attorney

NATURAL RESOURCES
DEFENSE COUNCIL

1152 15TH STREET NW, SUITE 300
WASHINGTON, DC 20005
T 202.289.2371

GFETTUS@NRDC.ORG
NRDC.ORG

Natural Resources Defense Council, Inc.,

Response to DOE's Invitation for Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities

July 29, 2016

Geoffrey H. Fettus, Senior Attorney
Matthew McKinzie, Ph.D., Director, Nuclear Program
Jungmin Kang, Ph.D., Visiting Fellow, Nuclear Program
Natural Resources Defense Council, Inc.
1152 15th St. NW, Suite 300
Washington, D.C. 20005
Tele: 202-289-6868
gfettus@nrdc.org; mmckinzie@nrdc.org; jkang@nrdc.org

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July 29, 2016

Via Electronic Mail

U.S. Department of Energy
Office of Nuclear Energy
1000 Independence Ave S.W.
Washington, DC 20585
consentbasedsiting@hq.doe.gov

RE: **NRDC Response to Invitation for Public Comment to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities**

Dear Sir/Madam:

The Natural Resources Defense Council (NRDC) appreciates this opportunity to submit comments on the U.S Department of Energy's (DOE) efforts to implement a "consent-based siting process to establish an integrated waste management system to transport, store, and dispose of commercial spent nuclear fuel and high level defense radioactive waste." *See*, *Invitation for Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities*, 80 Fed. Reg. 79872-79874 (Dec. 23, 2015) (hereinafter "Consent Based IPC"); comment period extended to July 31, 2016, 81 Fed Reg. 15295-6 (Mar. 22, 2016).

I. NRDC Statement of Interest

NRDC is a national non-profit membership environmental organization with offices in Washington, D.C., New York City, San Francisco, Chicago, Los Angeles, Missoula and Beijing. NRDC has a nationwide membership of over one million combined members and activists. NRDC's activities include maintaining and enhancing environmental quality and monitoring federal agency actions to ensure that federal statutes enacted to protect human health and the environment are fully and properly implemented. Since its inception in 1970, NRDC has sought to improve the environmental, health, and safety conditions at the nuclear facilities operated by Department of Energy (DOE) and the civil nuclear facilities licensed by the Nuclear Regulatory Commission (NRC) and their predecessor agencies, and we will continue to do so.

II. Summary of Comments

After nearly 60 years of effort, the federal nuclear waste program in this country has failed to deliver a final resting place for highly toxic, radioactive waste that will be dangerous for millennia. Over the years, there have been numerous efforts to attribute the failure of the repository program in singular fashion to the Atomic Energy Commission (AEC), to the DOE, to certain Senators, to Nevada Governors of both parties, to several states that refused to entertain

even hosting sites, to the NRC Commissioners, and even to the public for failure to accept its part in disposing of nuclear waste.

All of this is wrong. Failure cannot be laid at the feet of any one person or entity or the public. Rather, the reasons are multiple and some are detailed in the Final Report of President Obama's Blue Ribbon Commission for America's Nuclear Future (BRC).[1] In brief, several agencies (including the U.S. Environmental Protection Agency (EPA), the DOE, the NRC, and the U.S. Department of Justice (DOJ)) and Congress repeatedly pushed aside thorough, careful science, abused the fundamental framework of how significant decisions with environmental impacts are made in this country, and distorted the process for developing licensing criteria for a proposed repository. In each instance such action was done so as to push an expedient solution forward, to weaken environmental standards rather than strengthen them, and always to ensure the site would be licensed, no matter the end result.

All of this was done in a context that should be starkly contrasted with the Consent Based IPC under discussion today – to wit, this history, and what currently exists in law is the precise opposite of a consent based process for nuclear waste. Pointedly, current law requires that commercial spent nuclear fuel and defense high-level radioactive waste be disposed of in one, pre-selected location, in Yucca Mountain, Nevada. This history is detailed in Section III of our comments. The section concludes with a brief notice of what the BRC presented on nuclear waste disposal efforts in other countries, and additional detail from the ongoing efforts in South Korea. We also touch on the current state of legislation, consolidated storage and efforts to develop borehole disposal technology.

Rather than learn from this past and ongoing efforts, we fear a new Administration and a new Congress could plow ahead with revanchist attempts that will waste tens of millions of dollars in efforts to reopen the now-defunct Yucca project, or create a controversial, stop-gap interim spent nuclear fuel storage facility that solves none of the long-term challenges. These are policies that are likely to ensure continued failure of the repository program. As the very existence of this Consent Based IPC recognizes, President Obama's 2012 BRC recommendations, though only partially adequate to the task, point a way forward with adherence to: the need for geologic repositories; a science driven process for setting standards; and, most importantly, a focus on consent-based agreements between federal and state partners. In NRDC's view, it is the partnership between federal and state partners that is key to arriving at state consent to host any amount of permanent nuclear waste disposal and we plan to explore how that partnership must happen in extensive detail. Our path forward is presented in Section IV of these comments.

We appreciate that the Department concurs with the BRC's recommendation that a phased, adaptive, consent-based siting process is the best approach to gain the public trust and confidence needed to site nuclear waste facilities. To that end, our comments throughout precisely address DOE's questions of (1) equity and fairness in selecting a site; (2) what models and experience are relevant; (3) who should be involved and what are their respective roles: and (4) essential information.

[1] President Obama's "*Blue Ribbon Commission on America's Nuclear Future - Report to the Secretary of Energy, January 31, 2012*" (hereafter "*BRC*" or "*Final Report*").

III. How Did We Get Here?

A. Both Sound Science & Equitable Politics Will Be Crucial to Solving Nuclear Waste

The history of the nuclear waste repository program is replete with failures of science, of federal state and local agencies, of political, industry, and even public interest actors. And if considered carefully, the failures associated with nuclear waste suggest a single, clear conclusion that we'll turn to in a moment. But just because that conclusion is clear does not mean that the failures necessarily fit into simple categories and explanations as to why our repeated national efforts to dispose of nuclear waste have cratered so dismally.

Let's dismiss simple categories and clichéd explanations as to why sixty years of national effort to solve our nuclear waste problem has failed. Platitudes such as "it is imperative to keep politics out of the process" and "science and science alone must drive the process" (imagine the raised voice and clenched fist) are, after 60 years, reductive to the point of absurdity.

As an initial matter, *of course* science must drive the process. Any discussion of attempts to isolate toxic, dangerous radioactive waste for a length of time that dramatically exceeds human history is obviously an extraordinary technical and engineering challenge. But the mere existence of this painfully clear scientific challenge does not, and nor should it, do away with the spectacularly difficult institutional hurdles that are also presented by *how* society should decide to manage and dispose of its nuclear waste. Who gets to decide such matters and how do they carry out such a grave responsibility? To suggest one should keep "politics of the process" ignores the history of human decision making and functionally dismisses the only way we have to make collective, societal decisions without violence. Or, more dismally, to suggest we keep politics out of the process via Congressional fiat[2] conjures a dystopian view of a subjugated and unwilling population that will and must, ultimately, accede to whatever the current power structure wants.

Politics is, in significant measure, a method of how we apportion power in society. And the exercise of power when dealing with a subject as fraught and confounding as nuclear waste disposal is a profound challenge that defies easy, reductive answers such as "keep politics out of it." Just as with science, *of course* politics will be part of the discussion. Indeed, with nuclear waste we are all asked to trust that the decisions we make today will, in a time perhaps far distant, somehow work without a dreadful disaster. Clear, unflinching and honest assessments of the science and small "p" politics – that is, how power is apportioned, how are decisions made and by whom – must both be at the heart of how we collectively decide to finally move forward on providing agency and legislative direction for the disposal of nuclear waste. And such an effort will take a firm understanding of the past and strict adherence to George Santayana's wise maxim: "those who do not understand history are doomed to repeat it."

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[2] *See NRDC Testifies in the House of Representatives on Nuclear Waste,* May 15, 2015, Matthew McKinzie writes of a member of the House Majority making it perfectly clear to the State of Nevada with respect to the abandoned Yucca Mountain project, "just saying no is not an option," https://www.nrdc.org/experts/matthew-mckinzie/nrdc-testifies-house-representatives-nuclear-waste (accessed July 22, 2016).

In coming to grips with that history, a central piece is appreciating the metamorphosis of Congressman Mo Udall's (AZ-D) Nuclear Waste Policy Act (NWPA). Indeed, NRDC views the original incarnation of the NWPA as a remarkable, nearly visionary piece of legislation that contained one tragic, fatal flaw – which was, a deep misunderstanding of federalism and the necessary role of states. And that flaw is the central reason we are here today commenting on DOE's Consent Based IPC and it is the single "clear conclusion," noted at the outset, that we have drawn from the history of failures associated with nuclear waste.

As DOE is well aware, the enacted 1982 law set forth obligations and duties for EPA, DOE and NRC, with Congressional oversight and checkpoints along the way. Fundamentally, the law attempted to place science in the forefront and also balance power in a way that might allow this fraught, difficult process of finding disposal sites for nuclear waste come to an end. But, importantly, the NWPA never challenged or altered in any way the Atomic Energy Act of 1954's (AEA) provision for exclusive federal jurisdiction over radioactive waste. Despite this baked in oversight, the attempt at the legal balancing act was unprecedented at the time and that observation remains true today. And as we all know, the balancing act was disrupted as the law was repeatedly altered and the process was finally abandoned by the current administration in 2009.

But why the repeated derailments? A myriad of answers have been offered, generally suggesting that "not in my backyard" (NIMBY) sensibilities and associated politics are responsible for the failure to license and open Yucca Mountain. But as noted at the outset – this is wrong. The deep misunderstanding of federalism and the necessary role of states at the heart of the NWPA just kept getting lost over the years and the federal exclusivity over nuclear waste regulation was simply presumed *a priori*, without consideration as to whether that might be at the root of the problem.

So how is the misunderstanding of federalism at the root of the problem? The relationship of the federal government to the governments of the fifty states that comprise our republic is the fundamental fact of American politics. Our political system has never easily digested or durably solved profound national problems like voting rights, health care, gun control, carbon restrictions, or the disposal of nuclear waste, by either federal fiat or, conversely, by turning matters over to the states entirely (again, please see *e.g.*, voting rights).[3] And in every instance of national decision making on these and other complex issues, heavily compromised laws or regulations have taken into account the needs and perspectives of states.

Bedrock environmental laws reflect this fact. With the notable exceptions of the Atomic Energy Act (the organic act for nuclear power) and its progeny, the NWPA, there is federalist intention at the heart of environmental statutes and a role expressly reserved for the states. As examples, the Clean Water Act, Clean Air Act, and Resource Conservation & Recovery Act (RCRA) allow states authority to implement those air, water, and waste programs, respectively, in lieu of a

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[3] For perspective on the continuing interplay of the constitutional principles of federalism and equal sovereignty of the states and the extraordinary controversies that still attend such matters, see the relatively recent landmark (5 votes to 4 votes) Voting Rights decision and its vigorous dissent, *Shelby County, Ala. v. Holder*, 133 S. Ct. 2612 (2013).

federal program. States that obtain "delegated" authority from the federal government must meet minimum federal standards (and the federal government retains independent oversight and enforcement authority). And generally, depending on state law, those delegated states can impose stricter requirements or different regulatory mandates. Nuclear waste should be no different, but under the AEA and the NWPA, it is.

So, where do these observations leave us? First, any suggestion that the failed Yucca Mountain project can be quickly and easily restarted and brought to a successful conclusion should be dispensed with as folly. Nevada has deeply rooted bipartisan objections to the failed project and it falls precisely into the netherworld of abused, expedient efforts to site the facility over both scientific and political objections. As we describe in some detail (*infra* at 7-10, 13-14), continuing down that road, whether in good faith or on some revanchist journey, is likely a doomed effort, sure to derail the solution for nuclear waste for at least another generation.

Second, just having a united Congress, industry representatives and Administration will not "solve" the problem of nuclear waste and put Yucca back on track or even necessarily create the new, consent based process many hope for. Trusting in small "p" power politics and a new Senate without Nevada's Senior Senator Harry Reid in 2017 as a pathway to opening Yucca Mountain over Nevada's objections is misplaced and, frankly, missing the point of this introduction. Indeed, we've had portions of this power politics equation at various times over the years (see the late 1980s, most of the 90s, and the Bush Administration and Republican controlled House and Senate from 2002 to 2006) and we are still languishing without a meaningful nuclear waste solution.

Rather, it is our firm conclusion a new process must be created – and yes, it must be consent based and take into account the needs of the industry and their federal champions. But this time it must also take into account the need for public and state acceptance. State consent and public acceptance of a nuclear waste solution will never be willingly granted unless and until power to make such a decision as to how, when and where such waste is disposed of is shared and not decided by federal fiat. There is only one way that can happen consistent with the protective, cooperative federalism at the heart of environmental law. Specifically, Congress must finally end the Atomic Energy Act's exemptions from environmental law. Our hazardous waste and clean water laws must have full authority over radioactivity and nuclear waste facilities so that EPA and – most importantly – the states can assert direct regulatory authority. This will necessarily alter the federalism oversight that has been central to the failure of the NWPA. *See*, *infra* 19-22.

It is our contention today and has been since 2009 that the NWPA's (and AEA's) misunderstanding of the importance of federalism is at the heart of the repository program's failure. If we don't find a way to give EPA and the States regulatory power over nuclear waste – and that is accomplished only by doing away with the environmental exemptions in the AEA – we will not solve this dilemma. Lack of consent from an unwilling host state selected in an expedient demonstration of legislative and administrative power over the (statutorily defined) powerless is a recipe for disaster in this country, whether the issue is nuclear waste or any other great public concern.

In Section IV we discuss our prescription for how to apportion this power to decide how and where we will dispose of nuclear waste for the millennia to come. But for now, we'll start at the beginning.

B. The Need to Isolate Nuclear Waste

Since the first days of the atomic age, America has used nuclear fission to generate electricity. As of this day, nineteen percent of the nation's electricity is generated by nuclear reactors.[4] The United States government, via the action of the NRC, licenses nuclear power plants and regulates their impacts on public safety and the natural environment.

The nuclear fuel cycle and the decision to license power reactors have significant environmental and public safety impacts. As an example, nuclear plants pose a continuing risk of nuclear accidents, including a small, clear probability of a high-consequence event such as the Fukushima disaster in Japan. Further, environmental harms and risks from the nuclear fuel cycle include radionuclide and heavy metals contamination from uranium mining and processing activities, massive freshwater withdrawals and evaporative losses for reactor cooling, excessive thermal discharges to aquatic environments, massive entrainment and destruction of young fish stocks by reactor condenser cooling systems, and the leakage of radionuclides from storage and processing of spent nuclear fuels. Nuclear plants bear potentially catastrophic vulnerability to earthquakes, requiring seismic limitations on siting and co-locating nuclear plants and/or increased costs for improved seismic resistance.

But chief among nuclear power's environmental impacts is nuclear waste – specifically, the production of spent nuclear fuel. Although nuclear power emits substantially less harmful greenhouse gases than fossil fuels, the nuclear fuel cycle produces a deadly and long-lasting byproduct: highly radioactive spent nuclear fuel. At high doses, radiation exposure will cause death.[5] At lower doses, radiation still has serious health effects, including increased cancer risks and serious birth defects such as mental retardation, eye malformations, and small brain or head size.[6]

Along with serious health consequences, spent nuclear fuel remains dangerous for millennia. The United States Court of Appeals for the D.C. Circuit described it thus: "radioactive waste and its harmful consequences persist for time spans seemingly beyond human comprehension. For example, iodine-129, one of the radionuclides expected to be buried at Yucca Mountain, has a half-life of seventeen million years." *Nuclear Energy Institute, Inc. et al., v. Environmental Protection Agency*, 373 F.3d 1251, 1258 (D.C.Cir. 2004), *citing*, Comm. on Technical Bases for

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[4] World Nuclear Ass'n, World Nuclear Power Reactors & Uranium Requirements, http://www.world-nuclear.org/info/reactors.html. (Last visited July 27, 2016).

[5] National Institutes of Health, Fact Sheet: http://www.nlm.nih.gov/medlineplus/radiationexposure.html (accessed online July 29, 2016).

[6] *See* Environmental Radiation Protection Standards for Yucca Mountain, Nevada, 64 Fed. Reg. 46,976, 46,978 (Aug. 27, 1999).

Yucca Mountain Standards, Nat'l Research Council, *Technical Bases for Yucca Mountain Standards*, 18-19 (1995).

Because of the lasting dangers associated with nuclear waste, the federal government more than 60 years ago assumed the burden of disposal of the nuclear industry's waste. High level nuclear wastes remain dangerous to humans for long periods of time. The D.C. Circuit observed: "[h]aving the capacity to outlast human civilization as we know it and the potential to devastate public health and the environment, nuclear waste has vexed scientists, Congress, and regulatory agencies for the last half-century." *NEI et al.* at 1257. Because of this danger, since the National Academy of Science's original recommendations in 1957,[7] it has been a nearly consensus view among government, industry and environmental stakeholders that the waste from the nation's nuclear weapons program and its commercial nuclear power plants must be buried in technically sound deep geologic repositories, permanently isolated from the human and natural environments. This principle was first codified as national policy nearly 40 years ago in the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10131(b)(1) and most recently reiterated in President Obama's BRC.

C. The Failure of the Repository Program

1. The first failed efforts.

In 1957-1958, the U.S. Atomic Energy Commission (AEC) conducted the first site specific study of the disposal of high-level radioactive waste in geologic salt formations at Hutchinson, Kansas. Between 1961 and 1963, the AEC conducted experiments at the Carey salt mine at Lyons, Kansas. In 1970 the AEC, along with the Kansas governor, announced tentative selection of the Carey salt mine for a demonstration high-level waste repository. Opposition, primarily by the Kansas Geological Survey, concerns over conditions in the mine, the presence of numerous oil and gas wells in the vicinity, and the fact that there was solution mining at an operating adjacent salt mine operated by American Salt Company forced the AEC to abandoned the site by 1972.

Following the demise of the Lyons repository effort, the AEC announced in 1972 that it intended to develop a 100-year Retrievable Surface Storage Facility (RSSF). This proposal was opposed by the EPA and others because in their view it would divert attention and resources from efforts to find a permanent means of geologic disposal. As a consequence of this opposition, the Energy Research and Development Agency (ERDA) gave up its plans for a RSSF in 1975. Between 1975 and 1982, ERDA and the DOE continued to search for potential repository sites in various rock types in the states of Michigan, Ohio, New York, Utah, Texas, Louisiana, Mississippi, Washington, and Nevada. Various degrees of resistance from state and local representatives, combined with geological and technical problems, stalled these efforts to find a repository site. In 1976 President Gerald Ford halted the reprocessing of commercial nuclear fuel. In the following year President Jimmy Carter reinforced the government's ban on commercial reprocessing, and tried to halt the development of commercial breeder reactor development. These actions reinforced the need for prompt development of a geologic repository. While in

[7] National Academy of Sciences, *The Disposal of Radioactive Waste on Land, Report of the Committee on Waste Disposal of the Division of Earth Sciences* (Washington. D.C. 1957).

1977 ERDA also announced that it would accept custody of commercial spent fuel and store it at Away From Reactor (AFR) storage facilities, this never happened.

2. The IRG Process

By the mid-1970s it had become clear that commercial spent fuel reprocessing was uneconomical, environmentally unsound, and represented a serious proliferation risk. President Gerald Ford refused to subsidize the completion of the Barnwell reprocessing plant, and then President Jimmy Carter pulled the plug on reprocessing. These actions by Presidents Ford and Carter gave a new urgency to finding a site suitable for geologic disposal of both spent fuel and high-level radioactive waste. In the late 1970s President Carter initiated an Interagency Review Group (IRG) process to try to solve once and for all the nuclear waste problem in the United States. The IRG process involved numerous scientists, extensive public involvement, and a consultation and concurrence role for the states. The outcome of the IRG effort was a two-track program. The DOE was tasked with the responsibility for identifying the best repository sites in the country, and the EPA and the NRC were tasked with developing nuclear waste disposal criteria against which the selection and development of the final repository sites would be judged.

3. The Nuclear Waste Policy Act (NWPA)

In 1982, Congress enacted the NWPA, which embodied in law the principal recommendations that grew out of the IRG process, including a commitment to geologic disposal, two repositories, and characterization of three sites before final selection of the first repository. The NWPA established a comprehensive program for the disposal of spent nuclear fuel and high-level radioactive waste (HLW) from the nation's commercial reactors and nuclear weapons complex. At the time the NWPA was passed nearly 25 years ago, the site selection and development process proposed by the IRG enjoyed fairly widespread support from within the Congress, the environmental community and state governments. By contrast, at this time the U.S. Government has little, if any, support from the State of Nevada, and virtually no public support from the environment and public health community for the now abandoned Yucca Mountain project.

4. What else went wrong?

Over the last twenty years, a substantial segment of the environmental community has arrived at the judgment that the process of developing, licensing, and setting environmental and oversight standards for the proposed repository has been, and continues to be, rigged or dramatically weakened to ensure that the site can be licensed, rather than provide for safety over the length of time that the waste remains dangerous to public health and the environment. How the Yucca Mountain site was selected and how the environmental standards were set are examples that illustrate this perspective.

a. Site Selection

First, DOE and then the Congress corrupted the site selection process within the NWPA. The original strategy contemplated DOE choosing the best four or five geologic media, then selecting a best candidate site in each media alternative, then narrowing the choices to the best three

alternatives, and finally picking a preferred site for the first of two repositories. However site selection guidelines were strongly criticized as DOE was accused of selecting sites that they had previously planned to pick. In May of 1986 DOE announced that it was abandoning a search for a second repository, and it had narrowed the candidate sites from nine to three, leaving in the mix the Hanford Reservation in Washington (in basalt), Deaf Smith Co., Texas (in bedded salt), and Yucca Mountain in Nevada (in unsaturated volcanic tuff). All equity in the site selection process was lost in 1987, when the Congress, confronted with a potentially huge cost of characterizing three sites, amended the NWPA of 1982, directing DOE to abandon the two-repository strategy and to develop only the Yucca Mountain site. At the time, Yucca Mountain was DOE's preferred site. The abandonment of the NWPA site selection process led directly to the loss of support from the State of Nevada, diminished Congressional support (except to ensure that the proposed Yucca site remains the sole site), and less meaningful public support for the Yucca Mountain project. The situation with respect to Yucca Mountain has only deteriorated since that time.

b. Radiation Standards

Radiation standards, the second track of the NWPA process has, if possible, fared worse. Section 121 of the NWPA of 1982 directs EPA to establish generally applicable standards to protect the general environment from offsite releases from radioactive materials in repositories, and directs the NRC to issue technical requirements and criteria. Unfortunately, it has been clear for years that the projected failures of the geologic isolation at Yucca Mountain are the determining factor in EPA's standards. EPA repeatedly issued standards that are concerned more with licensing the site than establishing protective standards. EPA's original 1985 standards were vacated in part because the EPA had failed to fulfill its separate duty under the Safe Drinking Water Act, 42 U.S.C. §300h, to assure that underground sources of water will not be "endangered" by any underground injection. *Natural Resources Defense Council v. Environmental Protection Agency* (NRDC v. EPA), 824 F.2d 1258 (1st Cir. 1987).

EPA's second attempt to at setting standards that allow for a projected failure of geological isolation was again vacated, this time by the United States Court of Appeals for the D.C. Circuit. The D.C. Circuit found that EPA's Yucca Mountain rule (and the corresponding NRC standard), which ended its period required compliance with the terms of those rules at 10,000 years was not "based upon or consistent with" the recommendations of the National Academy of Sciences ("NAS") as required by the 1992 Energy Policy Act and therefore must be vacated. *Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251 (2004). Giving significant deference to the agency, the D.C. Circuit did not vacate EPA's strangely configured compliance boundary for the Yucca Mountain site. See this map of EPA's compliance boundary, NRDC Attachment A, at the end of the document.

Inside the oddly drawn line, the repository need not protect water quality and radiation can leak in any amount). The dramatically irregular line that represents the point of compliance has little precedent in the realm of environmental protection, and its shape is perhaps more reminiscent of gerrymandered political districts. Rather than promulgate protective groundwater standards, EPA pieced together a "controlled area" that both anticipates and allows for a plume of radioactive contamination that will spread several miles from the repository toward existing farming

communities that depend solely on groundwater and perhaps through future communities closer to the site.

EPA's next proposed and revised rule, issued in 2005, retained the 15 millirem/year and groundwater standards for the first 10,000 years, but then establishes a 350 millirem/year standard for the period after 10,000 years and does away with the groundwater standard entirely. This two-tiered standard failed to comply with the law and fails to protect public health, especially if the repository's engineered barriers were compromised earlier than DOE predicts. On October 15, 2008, EPA published the final version of its revised Yucca Mountain rule in the Federal Register ("2008 Yucca Mountain rule," 73 Fed. Reg. 61255-61289). The 2008 Yucca Mountain rule's two-tiered individual protection annual dose standard establishes an initial 15 millirem first-tier limit, but weakens that limit to 100 millirem in the period after 10,000 years, when EPA projects peak dose to occur. Again, peak dose could occur significantly earlier if engineered barriers fail earlier than DOE and EPA have projected.

In any event, the final status of EPA's most recent two-tiered rule remains fundamentally uncertain. In an action pending in the District of Columbia Circuit (*State of Nevada v. Environmental Protection Agency*, No. 08-1327, consolidated with No. 08-1345), Nevada has challenged EPA's 2008 Yucca Mountain rule as once again failing to honor EPA's statutory duty to protect public health and safety, and to proceed consistently with the National Academy of Science's recommendations.

5. Finding the Yucca Site Unworkable & President Obama's Blue Ribbon Commission

The rest of the history is well understood and many of the essential facts can be found in DOE's *Integrated Waste Management Consent Based Siting Handbook*, 2016. There, DOE succinctly describes the "controversy, cost escalation, and legal challenges, formal DOE recommendation of the Yucca Mountain site to the President" and the "President's recommendation of Yucca Mountain to Congress, and subsequent congressional approval of the site were delayed until 2002, four years past the date on which DOE was supposed to begin accepting waste." *Siting Handbook* at 6. Without elaboration, the Siting Handbook notes that in 2008 DOE submitted a license application to the NRC to construct a repository at Yucca Mountain and that the State of Nevada "strongly opposed each of these steps and the selection of the Yucca Mountain site itself remained highly controversial, with numerous legal and technical objections throughout the site evaluation and license application process. Similarly, efforts to site and develop federally managed interim storage facilities pending the availability of a disposal repository also encountered opposition at the state level and all were unsuccessful." *Id*.

Finally, in 2009, the Obama Administration made the decision that faced with intractable opposition, decades of litigation with the Nevada, that the Yucca Mountain project was unworkable. And as we noted at the outset, in 2010 DOE established the BRC which reaffirmed the need for a geologic repository and made several key recommendations, including "establishing a new entity to manage the U.S. nuclear waste program and using a consent based process to site future storage and disposal facilities." *Id*. at 7.

6. International Efforts

As of the date of these comments, there is no single operating geologic repository for nuclear waste anywhere in the world. The only existing and previously operating repository is the Waste Isolation Pilot Plant – a DOE developed and operated repository for defense generated transuranic waste – is currently closed after a fire and explosion in 2014. Countries around the world have made varying progress on repository development, with some nearing significant milestones, other President Obama's BRC examined several foreign efforts at siting nuclear waste repositories and even went so far as to send delegations to Finland, France, Japan, Russia, Sweden and the United Kingdom to learn about these countries' waste management programs. BRC Report 49-52 (*see also*, Chapter 6 and Appendix C). In 2012 the BRC wrote:

> All of the countries the Commission studied provided useful insights for the U.S. program going forward. Sweden and Finland are furthest along in selecting and developing a repository site, while other countries—like France and Canada—have also made substantial progress (of these countries, Canada provides perhaps the closest analogue to the United States in terms of political structure). In addition, Spain recently selected a site for a consolidated storage facility. Overall, the experience of these countries provides strong support for the Commission's conclusion that a transparent, consent-based approach built on a solid understanding of societal values has the best odds of achieving success in siting, constructing, and operating key waste management facilities. *Id*. (citations omitted).

Another source of more up to date information on the progress of other countries in their respective efforts to site and develop nuclear waste repositories can be found online as part of Stanford University's *Reset of U.S. Nuclear Waste Management Strategy and Policy Series*. *See* http://cisac.fsi.stanford.edu/research/nuclear-waste-reset-initiative. A wide range of materials both domestic focused and internationally focused can be found online, shared by the Project at https://drive.google.com/folderview?id=0B4IudW22FyDIa0g5c2t1NVBpdGc&usp=drive_web.

One significant nuclear country that did not receive significant attention during the BRC process was South Korea. South Korea, like every other nation, has not sited, developed, or commenced operation of a geologic repository, but there are useful observations for these comments.

First, South Korea's first power reactor at Kori started generating electricity in 1978. As of July 2016, there were in operation 25 power reactors with a total capacity of 24.5 GWe, 7.0 GWe under construction, and additional capacity planned that would bring South Korea's total nuclear generating capacity up to 42.7 GWe by 2035. All of these reactors are pressurized water reactors except for four CANDU heavy water reactors with a combined capacity of 2.8 GWe at the Wolsong nuclear power plant.

Just as the rest of the world, South Korea has a history of failure in siting a central interim spent fuel storage facility and a repository. This failure commenced in 1986, when the Atomic Energy Act was revised and the Ministry of Science and Technology (then known as MOST) and KAERI were assigned responsibility for radioactive waste management. Between 1986 and 1996, they made five attempts to acquire a single site for hosting both low- and intermediate-

level waste disposal and central interim spent fuel storage facilities. All attempts failed, however, due to strong local resistance. In 1996, this series of failures resulted in MOST and KAERI ceding the responsibility for radioactive waste management to what is now known as the Ministry of Knowledge and Economy (MKE) and the Korea Electric Power Corporation (KEPCO). In September 1998, the Atomic Energy Commission (AEC), South Korea's highest policy-making body for nuclear power, announced a "Radioactive Waste Management Plan" in which a waste disposal facility would be built by 2008 and a nearby central interim spent fuel storage facility would be built by 2016. The plan required that spent fuel be stored on the reactor sites until 2016.

There were four additional failures. In June 2000, the central government increased the financial incentive to 300 billion Won ($270 million) and invited bids from local communities to host a low or intermediate level waste disposal site. Seven regions along the east and west coasts indicated interest, but following internal debates over the costs and benefits, none of them applied. In August 2001, the central government returned to its original approach: selection first and discussion later. In December 2002, the AEC announced four candidate sites, including Ulchin, Yonggwang, Kochang and Youngduk along the east and west coasts. The announcement was greeted by simultaneous protest demonstrations in all four regions. In April 2003, the government increased the incentive by offering a research center with a proton accelerator and offering to move the headquarters of KHNP to the host community. Eighty percent of the population of Pooan on the west coast signed a petition in favor of hosting the site but large-scale opposition developed. A joint conference was held in November 2003 to resolve the issue but collapsed in dissension. And finally, in April 2004, the government attempted for the first time to launch a public discussion of the costs and benefits of a national radioactive waste site but the subject was poorly defined and public acceptance was not increased. In March 2005, the central government promised that the local government that hosted the waste disposal facility would not be asked to also host a central interim spent fuel storage facility.

Indeed, it's apparent to NRDC that just as it is around the world, choosing a South Korean site for storage (and ultimate disposal) of the high-level radioactive waste produced by nuclear power plants will depend in some significant part on winning over the communities that live near that site (as noted above, it's not clear to us whether South Korea has the same regional challenges the United States faces as a federal polity). Obtaining such agreement would be difficult in any circumstance; because, just as here in the United States, there are complex webs of conflicting interests among concerned parties in politicized spent fuel public process. Consequently, and just as it is elsewhere, creating a public consensus on storage siting is difficult. Indeed, NRDC has been struck by the similarities in some of the flaws that have disrupted both the technical process and efforts at gaining public acceptance. For example, our own Dr. Kang has related stories of educational information ostensibly provided to local communities by experts associated with the government that were, to put it mildly, less than accurate. Just as we've found domestically, truly independent experts can be an effective way to impart meaningful understanding of the spent fuel storage situation. Such independent experts would not address the relative sources of power and decision-making NRDC believes necessary to reach a true, consent based process that gains full public acceptance, but it's a critical and foundational step.

More specifically, a main reason for the past siting failures in South Korea, according to Dr. Kang, was the government's secret selection process in which it selected sites based on its own technological assessments. The process inevitably floundered in the face of local, strong opposition. Dr. Kang describes this familiar history as the "Decide, Announce, Defend, and Abandon" (DADA) process that has played out in other countries, including the United Kingdom and the United States. The ongoing consultative process with local governments that includes a local veto, independent experts, and joint fact finding that is currently underway in Sweden and Finland is instructive and, while not necessarily an analogue to the federal system of states in America, gives credence to the idea that a consent based process is the only viable way to site a nuclear waste repository.

D. The Current Status of Nuclear Waste Management & Disposal

The current status of the repository can best be described as a stalemate. The Obama Administration long ago decided that the project is unworkable and implemented the BRC process to start the way down another – consent based – road. Such a path will, however, take legislation and altering the existing NWPA. Further, it's unclear how the impending Presidential election in November 2016 will, or will not, alter that decision. Whatever the course taken by a new Administration, the current Senate & House Majority have made their intentions clear – that they intend to pursue the Yucca Mountain project.[8] And the industry has also made its intentions clear with respect to the abandoned Yucca Project – that no matter Nevada's clear position of non-consent to the project in any form or fashion, the licensing of the site must proceed.[9]

Just as pertinent to these stated positions, over the past two years the NRC has issued two new volumes of its Safety Evaluation Report (SER) and its favorable conclusion that the Yucca Mountain repository could proceed to a licensing hearing. And again, as DOE described in its Siting Handbook, "[w]hile the review concluded that DOE had successfully demonstrated the proposed repository would meet all applicable technical performance requirements, staff did not recommend issuance of a construction authorization because of outstanding issues related to land withdrawal and water rights. Specifically, congressional action would be needed to give DOE the requisite ownership and control of land needed for the repository. In addition, DOE would need water rights from the State of Nevada." *Siting Handbook* at 7. We agree with DOE's conclusion that the "challenges posed by Nevada's opposition to the selection of the Yucca Mountain site remain, underscoring the need for an initiative that relies on a consent-based process to gain acceptance for a repository site at local, state, and tribal levels." *Id*.

And thus, all parties and the process for managing and disposing of nuclear waste are at an impasse. We noted at the outset that restarting the Yucca Mountain process would be at best

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[8] *See, e.g.*, Statement of Representative Shimkus (R-IL), Chairman John Shimkus' Opening Statement Subcommittee on Environment and the Economy, "Federal, State, and Local Agreements and Economic Benefits for Spent Nuclear Fuel Disposal," 10:00 a.m., July 7, 2016; found online at http://docs.house.gov/meetings/IF/IF18/20160707/105164/HHRG-114-IF18-MState-S000364-20160707.pdf

[9] *See e.g.*, Nuclear Energy Institutes *Issues & Policy, Nuclear Waste Management*, "The industry supports the completion of the Nuclear Regulatory Commission's review of the DOE license application to build a repository at Yucca Mountain, Nevada; found online at http://www.nei.org/Issues-Policy/Nuclear-Waste-Management.

problematic and likely waylay the process of developing a repository for years, if not forever. We'll now take the opportunity to briefly elaborate why this is the case. First, without remotely straying into hyperbole, there are *dozens* of issues likely to be litigated at enormous length. One in particular is premised entirely on DOE's design for titanium drip shields that are supposed to sit over each of the thousands of waste canisters in Yucca Mountain's underground tunnels to keep out corroding water. Although DOE included the drip shields as part of the repository design, and NRC has accepted them for license-review purposes, there is no plan to design, license, pay for, and much less install the shields until at least 100 years after the waste goes in. This unacceptable state of affairs is detailed by former NRC Commissioner Victor Gilinsky.[10] Quite simply, Yucca's likely repository configuration doesn't come close to meeting NRC requirements.

This and other issues are anticipated to be vigorously litigated by the State of Nevada, which has filed more than 300 contentions challenging DOE's license application for Yucca Mountain. To put such a hearing process in perspective, NRDC recently concluded five years of a NRC licensing proceeding where not one party – not industry seeking the license, not NRC Staff, nor the environmental intervenors –had any interest or took any steps to functionally prolong or delay the proceeding beyond the rare extension of a short period of time for filing a pleading (something all parties found appropriate and necessary at various points).[11] And in the more than five years of this proceeding, *only three contentions* were fully litigated on their merits, not the more than 300 likely to be litigated for the Yucca license if the process were commenced. Any suggestion the Yucca licensing proceeding could easily restart and quickly move to a successful conclusion for permanent disposal is simply a fallacy. And when that inevitable litigation rightly waylays yet another effort at nuclear waste disposal, the damage to the nation's prospects to ever developing a repository may be permanent.

E. Status of the BRC Recommendations – the Trajectory of Senate Nuclear Waste Legislation

The BRC was issued in January, 2012 and Congress began work on responding to the document that Spring. Two Senate committees lay claim to jurisdiction over the topics and the Senate Environment & Public Works Committee held the first hearing on the BRC Recommendations in June of 2012.[12]

Senate Energy & Natural Resources Committee Chairman Bingaman (D-NM) was the first to put pen to paper and drafted the S. 3469, the first legislative presentation of the BRC

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[10] *See Yucca Mountain Redux*, Victor Gilinsky, Bulletin of the Atomic Scientist, November 5, 2014 (accessed July 29, 2016) http://thebulletin.org/yucca-mountain-redux7800.

[11] *In the Matter of Strata Energy, Inc*., (Ross In Situ Recovery Uranium Project), Docket No. 40-9091-MLA, ASLBP No. 12-915-01-MLA.

[12] *See* NRDC's June 7, 2012, statement before the Committee on Environment and Public Works, Subcommittee on Clean Air and Nuclear Safety, United States Senate, http://www.epw.senate.gov/public/_cache/files/d1af1f37-aa54-4266-80ae-d7997614792b/6712hearingwitnesstestimonyfettus.pdf.

recommendations. On September 12, 2012, NRDC testified before the Senate Energy & Natural Resources Committee on S. 3469, the template for S. 1240, and its current iteration, S. 854.[13] In 2012 we commended S. 3469's adherence to three principles that, in our view, must be complied with if America is ever to develop an adequate, safe solution for nuclear waste – (1) radioactive waste from the nation's commercial nuclear power plants and nuclear weapons program must be buried in technically sound deep geologic repositories, in which the waste will be permanently isolated from the human and natural environments; (2) governing legislation must contain a strong link between developing waste storage facilities and establishing final deep geologic repositories that ensures no "temporary" storage facility becomes a permanent one; and (3) nuclear waste legislation must embody the fundamental concept that the polluter pays the bill for the contamination that the polluter creates.

Unfortunately, the trajectory of legislation in the Senate has been negative, and we opposed 2013's S. 1240 (and thus, the more recent S. 854) because the bill: 1) severs the crucial link between storage and disposal; 2) places highest priority on establishing a Federal interim storage facility at the expense of getting the geologic repository program back on track; 3) fails to ensure that adequate geologic repository standards will be in place before the search for candidate geologic repositories sites commences; 4) fails to provide states with adequate regulatory authority over radiation-related health and safety issues associated with nuclear waste facilities in their respective states; and 5) fails to prohibit the Administrator (or Board) of a new federal entity overseeing nuclear waste management from using funds to engage in, or support spent fuel reprocessing (chemical or metallurgical).

In short, and regrettably, it appears that the authors of S. 1240/S. 854 have rejected several key recommendations of the BRC. The bill wrongly prioritizes the narrow aim of getting a government-run interim spent fuel storage facility up and running as soon as possible – a priority with potential financial benefits for business interests. However, as NRDC noted to the Senate in our testimony in 2013, we do believe a legislative process on nuclear waste management is salvageable with the prescriptions we outline in Section IV, and we look forward to engaging in constructive efforts.

F. Consolidated Storage & Other Efforts

Also ahead is the looming debate over consolidated storage. Just to focus on one of the potential sites, the Waste Control Specialists (WCS) corporation is seeking to establish "interim" storage site for the nation's commercial spent nuclear fuel at its existing "low-level" radioactive and hazardous waste site in Andrews County, Texas, just across the border from New Mexico's defense waste transuranic repository, the Waste Isolation Pilot Plant (WIPP) and even closer to Urenco's uranium enrichment plant, officially in Eunice, NM. WCS submitted a license application to the NRC in April 2016, and it is currently under NRC review. In essence, the WCS proposal is to site a dry storage facility containing transport casks containing high-level radioactive waste from reactors across the country. WCS suggests this "interim" site would exist

[13] NRDC's testimonies, delivered in 2012 and 2013 to the Senate E&NR Committee, can be found online at http://www.energy.senate.gov/public/index.cfm/hearings-and-business-meetings?Id=228fe2e8-8c9e-4440-b266-1d3885c3fa93&Statement_id=68e04fd7-ad48-4d91-b67f-e3e7c789471b; and http://www.nrdc.org/nuclear/gfettus-13073001.asp.

for 60 years, after which the waste could then be moved again to some permanent repository that not only doesn't yet exist, but there isn't even a plan to get there.

There are several problems with this proposal. First, and most obviously from NRDC's perspective, immediately going forward with a consolidated storage proposal before working out the details of a comprehensive legislative path for nuclear waste storage and disposal (and connecting the licensing of storage to the licensing of a permanent repository) entirely severs the link between storage and disposal, and creates an overwhelming risk that a storage site will function as de facto final resting place for nuclear waste. Or, in the alternative and also just as damning, it sets up yet another attempt to ship the waste to Yucca Mountain or even open up New Mexico's WIPP facility for spent nuclear fuel disposal– a site designed and intended for nuclear waste with trace levels of plutonium, not spent fuel (that has already blown plutonium throughout the underground and into the environment, contaminating 22 workers, and is functionally inoperable for years).[14] All of this runs precisely counter to the BRC's admonition that "consent" come first – a potentially ironic turn after decades of promises were delivered to New Mexico that it would never be asked to turn WIPP into a commercial nuclear waste repository.

And that's the beginning of the problems of moving forward with consolidated storage before Congress sets out a comprehensive plan. Others are more practical in nature. In contrast to the defunct Private Fuel Storage (PFS) site proposed in Utah, which actually obtained a NRC license even though nearly every single major Republican office-holder in the state objected to it, the WCS proposal isn't designed as a private site where WCS would negotiate with each nuclear utility to accept its waste. The PFS scheme failed in part because such a private site transfers no liability for the nuclear waste, thus no utility was interested in the retention of the liability– especially as the waste would have to be transported hundreds or thousands of miles. In this instance, as we understand it, WCS will be requesting DOE accept title to the waste and all liability and costs for transportation to Andrews County, Texas. And while WCS states that Andrews County supports the idea, it's not at all clear over the long term whether consensus will include more than the statement of a local governing body. Indeed, Texas and New Mexico will both need to be involved and already there are high-ranking objections from New Mexico. http://www.tomudall.senate.gov/?p=press_release&id=1947.

Objections have also been heard in both of the Dakotas regarding DOE's recent efforts to develop the science on a borehole disposal approach to some forms of nuclear waste. DOE's stated objectives include providing the technical basis for "fielding a demonstration project, defining the scientific research activities associated with site characterization and postclosure safety, as well as defining the engineering demonstration activities associated with deep borehole

[14] On February 5, 2014 there was an underground fire at the WIPP facility, precipitating the evacuation of 86 workers underground at the time of the fire, with 13 workers treated for smoke inhalation (seven at the WIPP site and six at the Carlsbad Medical Center). Next, on the night of Friday, February 14, 2014 there was a significant release of radiation to the environment from the facility that has substantially contaminated the underground and affected the health of a number of WIPP employees. *See*, February 5, 2014, Fire - http://www.wipp.energy.gov/Special/AIB%20Report.pdf; *see also*, February 14, 2014 Radiological Release (Phase 1), -http://www.wipp.energy.gov/Special/AIB_Final_WIPP_Rad_Release_Phase1_04_22_2014.pdf.

drilling, completion, and surrogate waste canister emplacement."[15] DOE's failure in these recent efforts could not have provided a better illustration for the need to achieve public acceptance before proceeding. Efforts at an initial site in North Dakota have already been abandoned after several communication failures and deep community mistrust.[16] And in South Dakota a former Governor put it concisely: "North Dakota sent them on their way; we'd be happy to do the same thing …I told them that if they want to divide communities and divide families and divide churches, keep it up, this will do it. We've had pig feedlot issues here that divided people so much they won't sit in the same pew in church anymore."[17]

In contrast to this history and the impasse that is the present, NRDC suggests a better way forward that could (1) restart the repository program after addressing the federalism flaw inherent in the NWPA and (2) commence a pilot program for consolidated storage that does not sever the link between storage and disposal.

IV. NRDC's Prescriptions for Restarting and Forward Progress Towards Achieving Science-Based, Consent-Based Nuclear Waste Disposal Program

The BRC recognized that the 1987 amendments to the NWPA were "highly prescriptive" and "widely viewed as being driven too heavily by political consideration." As detailed earlier, we believe that those observations by the BRC are insufficiently critical assessments, however they make a sound point that goes directly to the fundamental flaw in the NWPA and the current stalemate – at no point has Nevada consented to accept a potentially endless supply of nuclear waste and indeed, after the past two decades there is a vanishing likelihood the State, no matter the party in power, would ever would consent under any circumstances. So what to do?

NRDC recommends to DOE that it consider five straightforward steps to re-launch the U.S. nuclear waste disposal program in a manner that finally, once and for all, puts the country on a path to solve the extraordinary challenge of waste that is toxic and radioactive for millennia.

A. Five Recommendations to Get the Nuclear Waste Program Back on Track

NRDC urges both the Administration and Congress to – (1) recognize that repositories must remain the focus of any legislative effort; (2) create a coherent legal framework before commencing any geologic repository or interim storage site development process; (3) arrive at a consent-based approach for nuclear waste storage and disposal via a fundamental change in law; (4) address storage in a phased approach consistent with the careful architecture of former Senator Bingaman's S. 3469 (introduced in 2012); and (5) exclude delaying, proliferation-

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[15] *See,* Energy Department's *Research, Development, And Demonstration Roadmap For Deep Borehole Disposal*, found online at http://www.energy.gov/ne/downloads/research-development-and-demonstration-roadmap-deep-borehole-disposal.

[16] *See*, *DOE Axes North Dakota Borehole Project*, Karl Herchenroeder, Exchange Monitor, March 4, 2016, accessed online July 29, 2016, http://www.exchangemonitor.com/publication/exchange-monitor/doe-axes-north-dakota-borehole-project-2/

[17] *See*, *Borehole project surfaces in South Dakota*, Lauren Donovan, Bismarck Tribune, May 9, 2016, accessed online July 29, 2016, http://bismarcktribune.com/news/state-and-regional/borehole-project-surfaces-in-south-dakota/article_4927d4ed-1d29-5ff2-858e-6e44f754318c.html.

driving and polarizing closed fuel cycle and reprocessing options from this effort to implement the interim storage and ultimate disposal missions.

Importantly, our view on each area is premised on a single overarching caution: in order to avoid repeating the mistakes of the last three decades, Congress, as this must be legislated, must create a transparent, equitable process incorporating strong public health and environmental standards insulated from gerrymandering or other distortions in order to ensure, at the conclusion of the process, the licensing of a suitable site (or sites).

1. Recommendation 1 - Deep Geologic Repositories Are The Solution For Nuclear Waste And Must Remain the Focus

NRDC concurs with the recognition that our generation has ethical obligation to future generations regarding nuclear waste disposal. Adherence to the principle of deep geologic disposal as the solution to nuclear waste is consistent with more than 60 years of scientific consensus and the views of the BRC. No other solutions are technically, economically or morally viable over the long term, and NRDC strongly supports development of a science-based repository program that acknowledges the significant institutional challenges facing nuclear waste storage and disposal. Thus, in whatever consent based program DOE (or any other entity) commences in the new administration, we urge explicit adherence to the first purpose of the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10131(b)(1), since the decision to isolate nuclear waste from the biosphere implicates critical issues of security, including: financial security, environmental protection, and public health.

2. Recommendation 2 – Create A Coherent Legal Framework That Ensures The "Polluter Pays" Before Commencing Any Repository Or Interim Storage Site Development.

To avoid repeating failures of past decades and consistent with BRC recommendations, both the standards for site screening and development criteria must be in final form before any sites are considered. Generic radiation and environmental protection standards must also be established prior to consideration of sites. To give this recommendation explicit and simple context, Senator Bingaman's 2012 legislative effort (S.3469, specifically in Sections 304, 305 and 306) set in place some of the necessary structures that could avoid repeating the failure of the Yucca Mountain process. Specifically, the bill would have directed EPA to adopt, by rule, broadly applicable standards for the protection of the general environment from offsite releases from radioactive material in geologic repositories. The bill also directed NRC to then amend its regulations governing the licensing of geological repositories to be consistent with any relevant standard adopted by EPA. Further, embedded in Senator Bingaman's bill was the requirement that the polluters pay the bill for the contamination created. This bipartisan concept has long history as bedrock American law and must remain in full force in any legislation.

These requirements and this phasing of agency actions in Senator Bingaman's bill were appropriate (*i.e.*, first EPA sets the standards and then NRC ensures its licensing process meets those standards) – and in the next recommendation we'll expand on how this coherent legal framework must be improved. But for the instant point, it's key that a coherent legal framework be in place before siting decisions get made. Unfortunately, the subsequent iterations of nuclear

waste legislation have ignored this wise sequencing, thus ignoring BRC's recommendation that new, applicable rules be in *final* form before site selection.

It should also be clear to DOE that standards should be based on careful characterization of the radiation sources and resulting doses. The chief sources of radiation in high-level nuclear waste forms are the beta-decay of fission products like Cs-137 and Sr-90 and the alpha-decay of actinide elements like Uranium, Neptunium and Americium. Beta-decay is the primary source of radiation during the first 500 year of storage, as it originates from the shorter-lived fission products. The alpha-decay becomes dominant as a source after approximately 1000 years.

3. Recommendation 3 – Develop A Consent-Based Approach For Nuclear Waste Disposal Through A Fundamental Change In Law.

(a). Consent, Federalism, and a Fundamental Change In Law

(i) The Consent Based Statements of the BRC Are Inadequate To the Task.

For all its laudable qualities, we believe the 2012 BRC's report does not accurately portray, and certainly not set the path forward, the fundamental problem facing how to finally solve our nuclear waste disposal challenges. The BRC should have explicitly stated – and we do so here today – that Congress, with its firm understanding of federalism, should legislate a role for EPA and the states in nuclear waste disposal by amending the Atomic Energy Act (AEA) to remove its express exemptions of radioactive material from environmental laws.

Bluntly, the reasons we expounded upon at length in the pages above make it excruciatingly clear that state, local and tribal governments must be central in any prescription for a successful repository and waste storage program. Regrettably, current law has treated them as dispensable afterthoughts, preempted from any meaningful power and authority over radioactive waste disposal sites. And the current effort at draft legislation suffers the same malady.

Rather than address this problem head on, the BRC chose to carefully skirt the matter in its report, while still noting that federal and state tensions are often central in nuclear waste disputes. The BRC's Final Report states in pertinent part:

> We recognize that defining a meaningful and appropriate role for states, tribes, and local governments under current law is far from straightforward, given that the Atomic Energy Act of 1954 provides for exclusive federal jurisdiction over many radioactive waste management issues. Nevertheless, we believe it will be essential to affirm a role for states, tribes, and local governments that is at once positive, proactive, and substantively meaningful and thereby reduces rather than increases the potential for conflict, confusion, and delay.

BRC Final Report at 56 (citation omitted).

The first (very long) sentence both makes an observation and states a fact. The observation is that defining a meaningful and appropriate role for states, tribes, and local governments under

current law is far from straightforward. The fact is that the Atomic Energy Act of 1954 provides for exclusive federal jurisdiction over many radioactive waste management issues. According to the BRC, the difficulty of defining a meaningful and appropriate role for states is a "given" because of the fact of exclusive federal jurisdiction.

So what does the BRC suggest relevant decision makers such as the Administration or Congress do about this? Do away with the explicit federal jurisdiction? Increase the exclusivity of the federal jurisdiction? Somehow argue that the problems can be addressed without altering the exclusive federal jurisdiction in some fashion? There is nothing so clear or direct in the text. Rather, the BRC's very next sentence is simply an aspiration, without any explicit recommendation addressing the "given" (*i.e.*, exclusive federal jurisdiction) that makes the process so difficult. The BRC simply noted that it is "essential to affirm a role for states, tribes, and local governments that is at once positive, proactive, and substantively meaningful." NRDC agrees with the aspiration, thinks it's a nice thing to write, but plainly the BRC missed an important opportunity to address the fundamental roadblock to solving our nuclear waste problem.

Without fundamental changes in our current, non-consent based law that explicitly address what the BRC termed, "federal, state and tribal tensions," we will never approach closure and consent on transparent, phased, and adaptive decisions for nuclear waste siting. We now explore in more detail this decades-overdue change in the law.

(ii) NRDC's Prescription for Ensuring States' Authority – Remove the AEA's Exemptions from Environmental Law

As we stated at the outset (*supra* at 4-5), a meaningful and appropriate role for states in nuclear waste storage and disposal siting can be accomplished in a straightforward manner by amending the AEA to remove its express exemptions of radioactive material from environmental laws. The exemptions of radioactivity make it, in effect, a privileged pollutant. Exemptions from the Clean Water Act and the Resource Conservation and Recovery Act (RCRA) are at the foundation of state and, we submit, even fellow federal agency distrust of both commercial and government-run nuclear complexes. Such an act would make the treatment of radioactive waste consistent with every other bedrock environmental law.[18]

As DOE is aware, most federal environmental laws expressly exclude "source, special nuclear and byproduct material" from the scope of health, safety and environmental regulation by EPA or the states, leaving the field to DOE and NRC. In the absence of clear language in those

[18] We initially described the federalist intention at the heart of environmental statutes and reiterate it here. Nearly every environmental law provides for state assumption of its authorities, and certainly the central protections for land, water and air (Clean Water Act, Clean Air Act, and Resource Conservation & Recovery Act (RCRA)) do so. Once that authority is assumed, those states must meet minimum federal standards and the federal government retains independent oversight and enforcement authority. And generally, depending on state law, those delegated states can impose stricter requirements or different regulatory mandates. We suggest no departure from these norms. Nuclear waste should be no different under environmental law, but under the AEA and the NWPA, it is.

statutes authorizing EPA (or states where appropriate) to regulate the environmental and public health impacts of radioactive waste, DOE retains broad authority over its vast amounts of radioactive waste, with EPA and state regulators then only able to push for stringent cleanups on the margins of the process. Indeed, the BRC Report discusses the State of New Mexico's efforts to regulate aspects of the Waste Isolation Pilot Plant under RCRA as critical positive element in the development of the currently active site (BRC Final Report at 21). The NRC also retains far reaching safety and environmental regulatory authority over commercial nuclear facilities, with agreement states able to assume NRC authority, but only on the federal agency's terms.

States are welcome to consult with NRC and DOE, but the agencies can, and will, assert preemptive authority where they see fit.[19] This has happened time and again at both commercial and DOE nuclear facilities. This outdated regulatory scheme is the focal point of the distrust that has poisoned federal and state relationships involved in managing and disposing of HLW and spent nuclear fuel, with resulting significant impacts on public health and the environment.

If EPA and the states had full legal authority and could treat radionuclides as they do other pollutants under environmental law, clear cleanup standards could be promulgated, and the Nation could be much farther along in remediating the toxic legacy of the Cold War. Further, we could likely avoid some of the ongoing legal and regulatory disputes over operations at commercial nuclear facilities. *See, e.g.,* Att. B. Any regulatory change of this magnitude would have to be harmonized with appropriate NRC licensing jurisdiction over facilities and waste and harmonized with EPA's existing jurisdiction with respect to radiation standards: but such a process is certainly within the capacity of the current federal agencies and engaged stakeholders. Some states would assume regulatory jurisdiction over radioactive material as delegated programs under the Clean Water Act or RCRA, others might not. But in any event, substantially improved clarity in the regulatory structure and a meaningful state oversight role would allow, for the first time in this country, consent-based and transparent decisions to take place on the matter of developing storage sites and geologic repositories.

We close this recommendation with a brief discussion of Section 306 of the 2013 nuclear waste bill, which suggested a consent agreement with terms and conditions including "regulatory oversight authority," focused on a singular host state that intended to grant consent. As we observed then, the attempt to remedy regulatory deficiencies could be more simply and effectively handled by ending exemptions under the AEA. Providing some statutory cover for regulatory oversight authority and even removing the ability of the United States to unilaterally break the terms of the consent agreement could potentially give a state some measure of comfort that the agreement it had painstakingly negotiated over "undue burdens" or conflicting compliance agreements will hold fast. But there would be nothing stopping Congress from revisiting this law, ratifying the consent agreement with conditions that functionally remove that oversight authority, and thereby removing whatever meaningful restraint a state might assert. Thus, ultimately what is offered as a thoughtful contract provision a state could negotiate, could

[19] *See* Att. B, the 2010 exchange of letters between NRDC, Greenpeace, Union of Concerned Scientists, Beyond Nuclear, Riverkeepers and Eastern Environmental Law Center and NRC regarding federal preemption and groundwater protection.

quickly and easily by any future Congress be rendered inoperable and thereby eviscerate a state's protection against altered, less favorable terms – and we'd be right back where we started.

In short, ending the anachronistic AEA exemptions solves the matter of opportunity for meaningful state oversight over nuclear waste and does not carry with it substantial likelihood of congressional terms and modifications exacted from states years into a good faith negotiation on a site. Indeed, while it would be theoretically possible for a future Congress to revisit the AEA and re-insert exemptions from environmental law, it would have to do so in a manner that would remove overdue jurisdictional authority from all states (or Congress would have to single out one state for special treatment). The difficulty of prevailing over the interest of all 50 states rather than simply amending legislation that affects the interests of just one state should be apparent. It is past time to normalize nuclear waste with the rest of environmental law and NRDC sees this as the key to developing a durable consent based approach.

4. Recommendation 4 – Address Storage In A Phased Approach Consistent With The Careful Architecture Of S. 3469.

Efforts to initiate a temporary storage facility – that are now, unfortunately, picking up speed – must be inextricably linked with development of a permanent solution. This linkage, which is a crucial guard against a "temporary" storage facility becoming a permanent one, should guide the legislative process. Consistent with the BRC's findings, a case can only be made for interim storage if it is an integral part of the repository program and not as an alternative to, or de facto substitute for, permanent disposal.

Rather than prematurely bypassing a careful process that can arrive at protective, environmentally sensible and scientifically defensible solutions, NRDC urges spent fuel storage efforts to focus on vigorous efforts by industry and by appropriate regulatory authorities to ensure that all near-term forms of storage meet high standards of safety and security for the decades-long time periods that interim storage sites will be in use. While NRDC can agree with the overall concept of consolidated interim storage for a measured amount of spent fuel that meets strong safety criteria (moving fuel from seismically active areas, for example) and removing the stranded fuel from decommissioned plants, we can only do so after the introduction of a phased approach, as the general architecture of Senator Bingaman's 2012 bill suggests, but is unfortunately dispensed with in current iterations before the Senate.

The only situation where NRDC sees merit in a pilot project(s) is to address the current total stranded spent fuel at the closed reactor sites, accommodated in a hardened building at one or more of the currently operating commercial reactor sites that follows the example of the Ahaus facility in Germany. These potential volunteer sites – operating commercial reactors – have already demonstrated "consent" by hosting spent nuclear fuel for years or decades. Far less of the massive funding that would be necessary in the way of new infrastructure would be required and the capacity for fuel management and transportation is already in place, along with consent necessary for hosting nuclear facilities in the first instance.

5. Recommendation 5 – Exclude Unsafe, Uneconomic Closed Fuel Cycle And Reprocessing Options From This Effort.

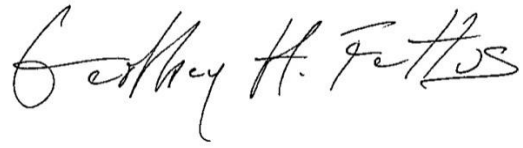
Both the BRC Recommendations and Senator Bingaman's 2012 bill and for the most part its progeny have wisely resisted inclusion of support for reprocessing, fast reactors, or other closed fuel cycle options. We see no reason to belabor the point and simply note that consistent with BRC Findings, there are "no currently available or reasonably foreseeable" alternatives to deep geologic disposal. As Senator Bingaman noted, "even if we were to reprocess spent fuel, with all of the costs and environmental issues it involves, we would still need to dispose of the radioactive waste streams that reprocessing itself produces and we would need to do so in a deep geologic repository." At no point should this evolving process include support for closed fuel cycle options.

V. Conclusion

The history of the federal nuclear waste program has been dismal. But decades from now others will face the precise predicament we find ourselves in today if Congress or a new Administration tries to ram through unworkable solutions contentiously opposed by States, lacking a sound legal and scientific foundation, and devoid of public acceptance and consent. Efforts to quickly restart the abandoned Yucca Mountain project or fast track an interim storage facility will either not work or lead to more contentious disputes and a derailing of the effort to find a final disposal site. Unless Congress fundamentally revamps how nuclear waste is regulated and allows for meaningful State oversight by amending the AEA to remove its express exemptions of radioactive material from environmental laws, we're doomed to repeat this dismal cycle until a future Congress and Administration get it right.

We appreciate the opportunity to comment. If you have any questions, please do not hesitate to contact us.

Sincerely,



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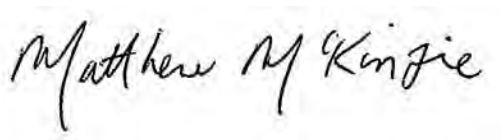

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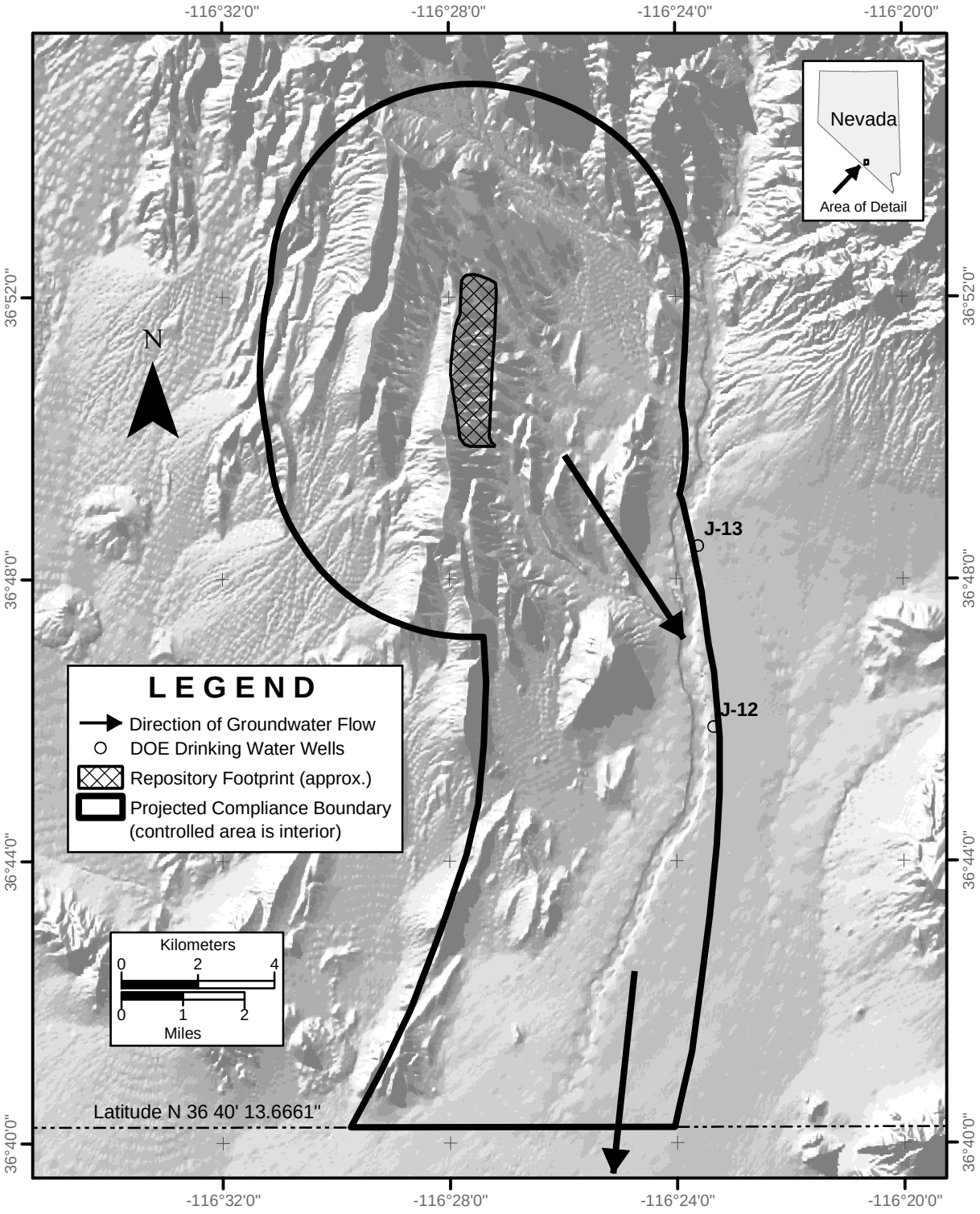
Projected Groundwater Standards Compliance Boundary for Spread of Radioactive Contamination at the Yucca Mountain Project

Measurement of Radioactive Contamination Takes Place Outside of Controlled Area



NRDC produced this visual representation from the following information:
"The controlled area may extend no more than 5 km in any direction from the repository footprint, except in the direction of groundwater flow. In the direction of groundwater flow, the controlled area may extend no farther south than latitude 36 40' 13.6661" North ... [T]he size of the controlled area may not exceed 300 square km." 66 Fed Reg. at 32117 (June 13, 2001). The direction of groundwater flow is from FEIS (February 2002) at 5-21, Figure 5-3. The repository footprint is from the Yucca Mountain Science and Engineering Report, DOE/RW-0539, at 1-17, Figure 1-3, and the area is approximately 4.27 square km. The area within the projected compliance boundary, as shown in this map, is about 230 square km. The relief image was created from a 1 arc-second Digital Elevation Model from the USGS National Elevation Dataset, April 2002. This map is based on a Nevada State Plane Central projection, North American Datum 1927.

May 25, 2010

Chairman Gregory B. Jaczko
Commissioner George Apostolakis
Commissioner William D. Magwood, IV
Commissioner William C. Ostendorff
Commissioner Kristine L. Svinicki

Dear Chairman Jaczko & Commissioners

On April 20th, the U.S. Nuclear Regulatory Commission (NRC) held a meeting seeking public input into the NRC's handling of groundwater contamination at nuclear reactor sites across the United States.

During the meeting, it was brought to our attention that on July 5, 2006, the NRC's Office of General Counsel (OGC) issued a letter to the Illinois Attorney General threatening to intervene in Illinois v Exelon Corp., No. 06 MR 248 (Will County Court) (Attached). The NRC's OGC wrote that, "if the lawsuit moves forward one option for us is to seek leave to participate in the lawsuit to raise the Commission's preemption concerns."

Today we seek further clarification regarding the NRC's intent with respect to similar situations. In situations where States find that their drinking water resources are being affected by inadvertent discharges from licensed nuclear facilities, we hope that the NRC already recognizes that States have an obligation to protect their citizens that is not preempted by the Atomic Energy Act. Although we are gratified that recent comments by the NRC in the press have recognized the "states have a role to play" in such situations, this is somewhat vague. Please confirm in writing that the NRC recognizes that it is both legal and appropriate for the States to take action against licensees when drinking water is under threat.

This recognition of State powers in this area would not deprive the NRC of the means to regulate such situations. Congress has made it clear that the specific language of the AEA expressly prohibits the NRC from licensing source, special nuclear, or byproduct materials if the operation **"**would be inimical to the common defense and security or the health and safety of the public." 42 USC § 2099; 42 USC § 2034; and 42 USC § 2077(c)(2). Put simply, the NRC may not allow a nuclear facility to operate in an unsafe manner. We presume the Commission would agree with such a characterization of its obligations and takes a broad view of those powers. We also presume the Commission is equally troubled that there have been dozens of instances in the recent past of contaminated groundwater at licensed NRC reactor facilities. If the Commission had been taking sufficient action pursuant to these powers, we believe States would not have felt an obligation to intervene. We believe that the recent trend of increasing State involvement with nuclear facilities can be traced to a lack of adequate action by the NRC.

Rather than enforcing regulations governing the unmonitored and uncontrolled release of radiation into groundwater, the NRC endorsed a voluntary industry initiative run by the industry's trade association, the Nuclear Energy Institute. We think it is time for the Commission to take a different path. At the very least, we urge that the NRC should not try to handcuff states performing the work that the agency should have been doing in the first instance. Indeed, we think it notable and deserving of Congressional attention if the NRC were to exercise its preemptive authority on behalf of the nuclear industry in order to block state regulators from holding nuclear corporations accountable for the contamination of drinking water resources. Indeed, the NRC's actions in the Illinois case referenced above clearly illustrate that clarification of the AEA's apportionment of regulatory authority to protect important economic and environmental resources – such as a State's vital interest in protecting its groundwater – is long overdue. We can assure you that any further attempts to handcuff state governments under the guise of federal preemption will precipitate greater controversy.

When drinking water is not under threat, the regulatory situation is less clear. The nuclear industry has already aggressively exploited this lack of regulatory clarity in what state regulators can and cannot do. And equally important, the industry finds comfort in the assurance that the NRC has, thus far, required little and even threatened to preempt those States that have the temerity to enforce requirements protective of public health and the environment.

This lack of regulatory clarity was illustrated at the April 20th meeting. Even the nuclear industry's advocates admitted "[t]he plants did not have legal authorization to release radioactive material to groundwater." But on the other hand, an industry advocate at the Morgan Lewis firm stated that while "(t)he Clean Water Act requires a permit to discharge any pollutant into a water of the United States," he/she points out that "groundwater is NOT a water of the United States." (Both presentations were provided to NRC by Greenpeace after the April

20th meeting but are still unavailable for public review in the NRC's publicly accessible ADAMS database.) Many states' laws prohibit unpermitted discharges of radioactive substances to groundwater, but the ability of the states to enforce these laws against licensed nuclear facilities has not been tested.

It is evident that the nuclear industry and its attorneys recognize that they lack the legal authority to release radiation or any pollutant into groundwater. We believe such action is clearly "inimical to the health and safety of the public." We are therefore dismayed that the NRC remains reluctant, at best, to act on such matters. Given the lack of NRC action in this area, the public is at a loss to understand why the NRC's OGC would countenance interference with State efforts to protect groundwater.

As a result of the groundwater contamination issues at dozens of operating nuclear reactor sites across the country, NRC's credibility as a regulator of the public heath and safety has been called into question. Since the NRC has chosen not to enforce its mandate to protect human health and safety with respect to the multiple groundwater contamination issues, we strongly urge the NRC to cease any attempts to preempt state governments from exercising their authority to protect important economic and environmental resources within their borders.

Sincerely,

Paul Gunter	Richard Webster
Beyond Nuclear	Eastern Environmental Law Center
Jim Riccio	Geoffrey H. Fettus
Greenpeace	Natural Resources Defense Council
Phillip Musegaas	Dave Lochbaum
Riverkeeper	Union of Concerned Scientists

CC: Senator Bernie Sanders, Senator Patrick Leahy, Senator Charles Schumer, Senator Kirsten Gillibrand, Senator Frank Lautenberg, Senator Robert Menendez, Congressman Edward J. Markey, Congressman John Adler, Congressman John Hall, Congressman Dennis Kucinich, Congressman Christopher H. Smith, Congressman Peter Welch

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

GENERAL COUNSEL

July 9, 2010

Jim Riccio
Nuclear Policy Analyst
Greenpeace
702 H Street NW, Suite 300
Washington, D.C. 20001

Dear Mr. Riccio:

I am responding to your letter to the Commission of May 25, 2010, which suggests that the Office of the General Counsel (OGC) has attempted, "under the guise of federal preemption", to "handcuff state governments" in their efforts to protect groundwater. You were prompted to write this letter because it came to your attention during a public meeting the U.S. Nuclear Regulatory Commission (NRC) held recently that OGC had written to the office of the Illinois Attorney General four years ago to express OGC's concerns about actions the State was taking onsite at the Braidwood plant to protect groundwater from unplanned releases of tritium. You ask the agency to "confirm in writing that the NRC recognizes that it is both legal and appropriate for the States to take action against licensees when drinking water is under threat."

The NRC has certainly never denied that States have some authority over groundwater. There is, for example, nothing in the 2006 letter that even suggests that Illinois had no authority to take some action against the Braidwood licensee. Indeed, some years ago, when the NRC was considering what form of regulation would be best for in situ leach mining facilities, the NRC initially sought to have the States regulate groundwater at such facilities. *See, e.g.,* Regulatory Issue Summary 2004-09, June 7, 2004. But NRC cannot set forth, in writing, just which actions the State could take, and under what circumstances there is no interference with our regulatory authority. As your letter observes, "the ability of the states to enforce these laws against licensed nuclear facilities has not been tested."

Over the years, the NRC has generally avoided making declarations about what States, or other Federal agencies, can and cannot do. For example, when the Nuclear Energy Institute in 2002 petitioned the agency to restate Federal preemption law, and to provide procedures whereby any person could request an NRC staff determination as to whether a particular State or local requirement was preempted by NRC's requirements, the NRC denied the petition, partly because any opinion the agency issued would be at best only guidance as to how a court might rule when faced with a preemption challenge to a State or local action. *See* 67 Fed. Reg. 66074, 66076 (Oct. 30, 2002). As far as I know, only once, when the City of New York was requiring Columbia University to get a radiological safety permit from the City, has the NRC appeared in court as a plaintiff seeking a ruling that the Atomic Energy Act preempted State or local action. *See U.S. v. City of New York*, 463 F.Supp. 604 (S.D.N.Y., 1978). Even when the controversy has been over releases of tritium from nuclear power plants, the agency has generally avoided statements about what a State can and cannot do.

The exceptions to the NRC's general policy of not making declarations in regard to preemption have arisen in situations that demanded some clarification of lines of authorities. For example, when, in the mid-1990s, the U.S. Environmental Protection Agency (EPA) rescinded its regulation of nuclear power plants under the Clean Air Act, the question arose whether States exercising authority under the same Act retained any authority over those same plants. Both the EPA and the NRC agreed that, yes, the States did retain such authority, even though EPA no longer exercised its own authority. Indeed, the EPA and the NRC said that the States could set more stringent standards for radionuclide air emissions from these plants than did the NRC. 60 Fed. Reg. 46206, 46210 (September 5, 1995). Another case in which lines of authorities demanded clarification was the case, already mentioned, in which New York City sought to require that Columbia have a radiological health and safety permit from the City. The Atomic Energy Act clearly reserves to the NRC the regulation of the radiological health and safety aspects of nuclear reactors. *See, e.g.,* section 274c.(1) of the Act, 42 U.S.C. 2021(c)(1).

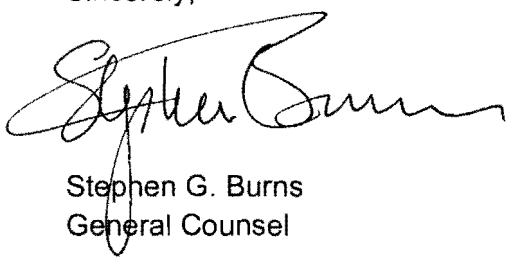
The letter OGC sent to Illinois is another such case. Each of the seven specific concerns that the letter raised had to do with actions the State sought to take onsite, for radiological health and safety reasons, sometimes in ways that had safety implications for plant operations. The Atomic Energy Act clearly reserves such actions to the NRC. True, the letter said that the NRC might "seek leave to participate in the [then already existing county] lawsuit to raise the Commission's preemption concerns." But a government agency must be free to request such participation if that agency determines that it needs to convey its views to a court. The alternative is a doctrine that an agency must always depend on private litigants or other governmental entities to seek to draw boundaries of its own authority. OGC's letter did not deny that the State had authority to take some action toward the licensee, and indeed the letter did not assert that the State was entirely without authority to take even action that could affect plant operations. The EPA, for example, has Clean Water Act authority over water intake structures at nuclear power plants, but, for nuclear safety reasons, the EPA exercises such authority only in consultation with the NRC. *See* 69 Fed. Reg. 41576, 41585 (July 9, 2004). The same is reasonably to be expected of States acting in similar circumstances. In the end, as a result of the consultations between OGC and the Illinois Attorney General's Office, the NRC did not intervene in the lawsuit, and Illinois proceeded with its action against the NRC licensee.

Preemption law is far too complex for easy generalization. The distribution of authorities among Federal and State governmental entities is one thing under the Clean Water Act, another under the Clean Air Act, another under the Atomic Energy Act, and yet another under the Coastal Zone Management Act. Consultations among governments on environmental matters are often essential, and States frequently initiate such consultations. You "think it notable and deserving of Congressional attention if the NRC were to exercise its preemptive authority on behalf of the nuclear industry in order to block State regulators from holding nuclear corporations accountable for the contamination of drinking water resources." However, the sentence misses the mark on several grounds -- for example, in its suggestion that the NRC would seek preemption in order to protect the industry, and the implication that the NRC has expansive preemptive authority that it can exercise unilaterally. But the sentence is especially troubling to the extent it suggests that Congress should prevent one government agency from expressing concerns about where the line is between its and another government agency's respective jurisdictions. Such consultations are a necessary part of the attentive implementation of complex statutes enacted in the public interest.

With respect to the general issue of groundwater, I am sure you are now aware that the report of the NRC's Groundwater Task Force has been issued and the Executive Director of Operations has formed a senior management review group to evaluate the report and make recommendations for Commission consideration later this year.

Please do not hesitate to contact me if you have questions about NRC's legal framework.

Sincerely,



Stephen G. Burns
General Counsel

Consent-Based Siting

From: sarah@uraniumwatch.org [mailto:sarah@uraniumwatch.org]
Sent: Sunday, July 31, 2016 7:51 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

U.S. Department of Energy
Office of Nuclear Energy
Response to IPC
1000 Independence Ave SW
Washington, D.C. 20585
consentbasedsiting@hq.doe.gov

RE: Response to IPC. Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities. 80 Fed. Reg. 79872 (December 23, 2015).

Dear Sir or Madam:

Below please find Comments regarding The Department of Energy (DOE) request for Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities. These comments are submitted by Uranium Watch and Living Rivers, Moab, Utah.

Please acknowledge the receipt of these comments.

Thank you,

Sarah Fields
Director
Uranium Watch
P.O. Box 344
Moab, Utah 84532

Uranium Watch

P.O. Box 344
Moab, Utah 84532
435-260-8384

July 31, 2016

via electronic mail

U.S. Department of Energy
Office of Nuclear Energy
Response to IPC
1000 Independence Ave SW
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RE: Response to IPC. Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities. 80 Fed. Reg. 79872 (December 23, 2015).

Dear Sir or Madam:

Below please find Comments regarding The Department of Energy (DOE) request for Public Comment To Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities.

These comments are submitted by Uranium Watch and Living Rivers, Moab, Utah. Moab has a DOE uranium mill tailings removal project that has involved individuals; organizations; local, state, and federal representatives; and local, state, and federal government agencies for over 30 years. Therefore, Commenters have had extensive experience with the DOE and its Legacy Management program.

Commenters incorporate by reference the comments submitted by Donna Gilmore, San Onofre Safety, San Clemente, California.

1. INTRODUCTION

1.1. According to the DOE public notice of December 23 Notice of Invitation for Public Comment (IPC):

> The U.S Department of Energy (DOE) is implementing a consent-based siting process to establish an integrated waste management system to transport, store, and dispose of commercial spent nuclear fuel and high level defense radioactive waste. In a consent-based siting approach, DOE will work with communities, tribal governments and states across the country that express interest in hosting any of the facilities identified as part of an integrated waste management system.

1.2. Uranium Watch supports No Consent for the establishment of consolidated interim storage sites. Consolidated storage will only increase the risks of nuclear waste and does nothing to advance credible solutions to the long-term management and isolation of highly radioactive materials. The Nuclear Regulatory Commission (NRC) has previously stated that the least risky option is to keep he waste securely stored at or close to the site of generation.

1.3. The DOE must consider the possibility that there never will be a deep geologic repository in the United States for Irradiated Nuclear Fuel ((INF) termed Spent Nuclear Fuel (SNF) by the DOE and other entities) that meets all siting, operational, environmental, and safety criteria AND receives the approval of the state and relevant communities and entities (including those on the transportation routes) as a result of any consent-based process.

The DOE must consider the possibility of a permanent above ground dry cask storage/ disposal site.

1.4. It is premature to request public comment on “consent” criteria and a consent-based process until urgent and significant legal and safety issues are resolved. The DOE must first address Issues regarding the transportation of unsafe canisters that cannot be monitored, inspected, maintained, and repaired, which do not meet the current Nuclear Waste Policy Act (NWPA) requirements. The DOE must first assure that a community will not be asked to consent to something that is inherently unsafe and that no sane community should consent to.

1.5. The DOE must clearly state the federal authority under which the DOE is authorized to pursue a siting process for interim consolidated storage of commercial nuclear waste.

1.6. Currently, the NWPA correctly requires the DOE to have a long-term management and disposal facility licensed and in operation before the agency can take title to and transport civilian nuclear waste. The DOE, in its consent-based presentations have not clearly explained this to the public. Therefore, issues such as who would have title to nuclear waste in commercial or federal interim consolidated storage site go unaddressed. The DOE has a long history of hiding uncomfortable truths from the public.

1.7. The DOE must not fund the continued development of nuclear power, as it has been doing over many decades. The fist goal in the process for the management of INF is to stop producing it. Without a commitment to stop producing a waste product that the DOE has not been able to assure the safe storage, handling, transportation, and ultimate disposition of, any further statements and efforts by the DOE in this consent-based process are of dubious validity.

2. GENERAL COMMENTS ON DEVELOPING CONSENT-BASED PROCESS

2.1. DOE must first address and resolve issues that pose high risks for major radioactive releases into the environment. The DOE must provide full information on the statutory and regulatory requirements for the canisters containing INF that will be transported for temporary storage or permanent disposition. And, the DOE must provide full information regarding wether or not the various canister designs meet those requirements. The DOE cannot assume that nothing will go wrong in the storage, handling, and transport of the canisters and casks.

2.2. The DOE must not permit the transportation, storage, or permanent disposition of canisters that cannot be adequately monitored, inspected, repaired, maintained, and that are susceptible to short-term cracking and leaks of radioactivity. The DOE must not permit the transportation of canisters that do not have an early warning system to detect partial cracking.

2.3. The DOE must demonstrate that the federal government can fund, transport, manage the storage and permanent disposition of INF and High Level Nuclear Waste (HLNW).

2.4. The DOE must also demonstrate that the federal government is able to comply with all existing nuclear waste statutes, regulations, contracts, and agreements. This includes providing full information on the DOE Consent-Based website regarding those statutes, regulations, contracts, and agreements and how they will be enforced and complied with.

2.5. The DOE must explain their emergency response plans and plans to address the short-term and long-term consequences of accidents and radiation releases. The DOE must clearly state their plans to compensate individuals and communities that are impacted by radiation releases and other adverse impacts from INF and HLNW during transportation, storage, or final disposition.

2.6. The DOE must guarantee that monies are allocated to fully fund the transportation and storage of INF and HLNW, pursuant to federal and state recommendations. The federal government must guarantee that sufficient funds are allocated for as long as transport and/or storage of waste is need—to 120 years for short-term storage (per NRC definition of short-term) and for long-term storage, which is basically forever.

2.7. The DOE must have a system to safety transfer INF from one canister and/or casks to another canister and/or cask when required; for example, when a canister is leaking or the fuel must be placed in a more robust or transportation worthy canister or cask.

2.8. More than 100 organizations have endorsed improving the storage and security of nuclear waste at reactor sites through Hardened On-Reactor-Site Storage (HOSS). HOSS would first move waste (when sufficiently cooled) out of fuel pools to robust, hardened dry-cask storage. This would reduce the hazard of catastrophic fuel pool fires and better protecting the waste from natural disasters, industrial accidents, and military or terrorist attacks. HOSS would improve the safety and security of this waste for interim storage at, or as near as possible to, the reactor sites where it is generated. The DOE must implement these recommendations.

2.9. Depending on how long the waste remains in a proposed interim consolidated storage system, the waste may need to be transported multiple times, as community consent periods expire. The extended periods of storage may require siting of new consolidated storage operations. However, if a site becomes a de facto long-term or even permanent waste site, there would have been no technical qualification or scientific basis for choosing the site. Therefore, the willingness of a community to support the siting of a temporary storage facility would be violated, and the consent-based process would be meaningless, if not fraudulent.

2.10. Blue Ribbon Commission Report

The DOE must fully respond to the suggestions in the Report to the Secretary of Energy by The Blue Ribbon Commission on America's Nuclear Future. This would include Proposed Legislative Changes. The DOE should include an explanation of why it has taken four years for the DOE to respond to the admonitions for "prompt" actions by the DOE laid out in the Blue Ribbon Commission Report.

3. RESPONSE TO QUESTIONS

3.1. *(1) How can the Department of Energy ensure that the process for selecting a site is fair?*

> Consent based siting seeks to ensure fairness in the distribution of costs, benefits, risks and responsibilities now and in future generations. How, in your view, can fairness be best assured by the process for selecting a site?

3.1.1. Risks In Transportation and Storage of Canisters with Irradiated Nuclear Fuel

3.1.1.1. To be Fair, the DOE must first address the nature of the material that will be stored and transported.

3.1.1.2. To be Fair, the DOE must address the safety of the canisters and casks that are currently being used to store INF and will be used during transport of INF. for interim storage and/or permanent disposal. It is Commenters' understanding that a permanent INF disposal site demands a design that is based on the type of canister and cask that will used to permanently contain the fuel and that these containers will be uniform. However, the DOE has abandoned the effort to design such containers. So, we now have INF being stored at various nuclear reactor sites and federal facilities that do not meet the criteria for permanent disposal. They might not even meet criteria for transportation or interim consolidated storage at commercial or government facilities, if approved.

Therefore, the DOE must first establish the criteria for design of canisters and casks that must be constructed for permanent storage of commercial and atomic weapons INF. The DOE must explain how, when, and where INF will be transferred to canisters and casks for permanent disposal and the risks associated with the transfer of INF from one type of container to another. There must be detailed technical and environmental evaluations of these processes.

3.1.1.3. To be Fair, a community must know exactly what is going to take place at the chosen transportation route, the risks, and environmental consequences.

3.1.1.4. To be Fair, the DOE must identify the means of transportation and the proposed routes. The assertion that rail will be used is of limited use, if there is no nearby rail line and the closest rail line is not identified.

3.1.1.5. The DOE must conduct feasibility studies of the transportation routes, with opportunities for public input from the beginning, such as the scope of the study.

3.1.2. Availability of Documents and Relevant Information.

For the Consent-Based Process to be "fair" all relevant information must be readily available on the Internet prior to the initiation of any consent-based siting process. The information and links to relevant documents must be available on one dedicated DOE website, not scattered around on multiple websites and webpages.

The information that the DOE has provided on the website associated with the Consent-Based Siting Process and the disposal of Irradiated Nuclear Fuel and HLNW does not provide the public with sufficient information regarding: 1) the nature, locations, and amount of the Irradiated Nuclear Fuel and HLNW to be stored or disposed; 2) technical information regarding the canisters and casks that are being used or will be used to store, transport, and dispose of Irradiated Nuclear Fuel; 3) the scenarios associated with the transportation, storage, and eventual disposal of those canisters and casks; 4) the current federal statutes and regulations applicable to the storage, transportation, and disposition of Irradiated Nuclear Fuel and HLNW; 5) the transportation routes in the vicinity of the sources of the waste; 6) the transportation routes that would be used in various regions to transport the waste; 7) complete details regarding the of the types of facilities, the operations that would take place at those facilities, site requirements, and risks; 7) relevant technical

information regarding canisters and storage and transportation casks; 8) data and information on the financial aspects of the storage, transportation, and disposal of INF and HLNW (i.e., who pays for what, when, and how); 9) emergency planning; 10) funding for cleanup and compensation in the event of accidents and radiological releases, and 11) any other pertinent information, including document requested by the public pursuant to a Freedom of Information Act (FOIA) request.

3.1.3. Federal Facilities and Commercial Facilities.

Fairness demands clarification regarding the DOE's role in siting of commercial Irradiated SNF and HLNW storage or disposal sites. It appears that many members of the public, and DOE staff, are under the impression that this "Consent-Based Siting Process" also applies to commercial consolidated interim storage facilities. There appears to be confusion regarding the possible siting of a consolidated interim storage operation at a privately owned and operated facility, such as that proposed by Waste Control Specialists (WCS) in Andrews, Texas. Since this would be a private facility, licensed by the NRC, the role of the DOE in approving this facility it questionable. It does not appear that, legally, the DOE any authority to approve or not approve commercial sites. Therefore, the DOE must clarify the relevance of the "Consent-Based Siting Process" to commercially operated facilities. As it is WCS is claiming that their proposal is "consent-based," when such a process has not been established and is irrelevant to the siting of a commercial facility. The DOE must clarify this as soon as possible.

3.1.4. DOE Use of Commercial Storage Facilities.

As discussed above at 3.1.3, the DOE may be contemplating the use of commercial interim storage facilities to fulfill the role of a federal facility. The DOE must discuss the legal and regulatory authority to do so and possible changes in laws and regulations that would allow for such a scenario. The DOE must provide, as soon as possible, full information regarding the DOE's anticipated role in the establishment of commercial consolidated interim storage of Irradiated Nuclear Fuel.

3.1.5. Already the DOE has jumped the gun and gone ahead with plans for deep borehole testing in South Dakota before establishing the "consent-based siting process." Already local communities are in opposition to these plans, not having been informed and consulted in the first place. Already the DOE has gotten off to a bad start.

3.1.6. Siting Requirements.

Fairness demands an understanding of the siting requirements for specific types of facilities. It would not be fair for a community to spend time and resources if the land did not meet relevant siting requirements, such as mount of land, geology, seismicity, topography, surrounding land use, meteorology, hydrology, flora and fauna, transportation routes, and numerous other siting requirements. Information regarding the site feasibility requirements must be made publicly available as soon as possible.

3.1.7. Operational Requirements.

Fairness demands a full understanding of operational requirements of such facilities and operations; for example, nearness to rail lines and other transportation routes, water use, amount of land required, security requirements, specific operations (including transfer of fuel to new canisters or casks), technical specifications, need for spent fuel pool to safely transfer fuel from canisters, energy use, emergency response plans, and all operational requirements for consolidated interim storage and permanent deposition of INF and HLNW.

3.1.8. Siting Process Outcome.

Fairness requires that the DOE clearly define the type of outcome for a siting process, such as a written agreement. The DOE, apparently, desires to establish a process whereby the relevant local, county, state, and tribal governments would sign an agreement with the DOE. The DOE must clearly state what outcome they desire. If an agreement is the outcome, the DOE must define the type of agreement, duration, means to void, and other relevant aspects.

3.1.9. Land Use Requirements

Various local, county, state, and tribal jurisdictions have existing statutes and regulations and permitting processes that would be applicable to the siting of the operations proposed by the DOE. Fairness requires that the DOE, government agencies, and the public recognize and comply with applicable land-use statutes, regulations, codes, and processes. The DOE must explain how, exactly, the Consent-Based Siting Process would seek to comply with those requirements.

3.1.10. Use of Federal Lands

The western United States has thousands of acres of federal lands administered by the Bureau of Land Management (BLM), and the DOE and other federal entities own and have access to lands that the DOE might think are suitable for storage and/or disposal of INF and HLNW. The DOE must clearly explain how the Consent-Based Siting Process is affected by the status of the land to be used for storage or disposal operations, whether federal, state, tribal, local, or private holdings.

3.1.11. Use of Other Lands.

The DOE must explain the process whereby the DOE will be authorized to explore lands owned by other entities and conduct site characterization work. The DOE must provide information regarding the process of transferring lands to the DOE, if the lands are owned by other entities.

3.1.12. Fairness in Distribution.

In order to “ensure fairness in the distribution of costs, benefits, risks and responsibilities now and in future generations,” the DOE must provide clear, complete, and understandable data and information on those “costs, benefits, risks and responsibilities now and in future generations.”

3.1.13. Fairness in DOE Meetings

The DOE must provide a schedule of all meetings conducted by the DOE related to the Consent-Based Siting Process. Meetings between the DOE and 1) other government agencies and entities (federal, state, tribal, local), 2) private parties and companies, 3) non-governmental organizations, 4) major contractors, and 5) any other relevant entities. All meetings should be open to the public and the DOE should provide a free conference call number so that anyone who cannot attend can listen to the meeting. There should be a public question period after any meeting and, if relevant, an opportunity for public comment. The DOE would do well to review the NRC meeting policies and procedures. DOE procedures regarding meetings must be established prior to the commencement of the siting process.

Apparently, the DOE staff has been having meetings with local officials on a personal basis or in small groups and has not announced these meetings, nor made transcripts or minutes of these meetings available. These kinds of closed door meetings are not conducive to the establishment of public trust.

3.1.14. It is unfair to assume that the DOE can develop a "fair" process. By its very nature, this siting process will not be fair. An example of why a siting process in Texas will not be fair, is that, historically, Texas had actively suppressed voter participation, so that any vote for or against a siting proposal or for or against local or state representatives that will be making these decisions will not be "fair." There is a history of social, economic, physical, cultural, personal, familial intimidation of individuals, organizations, and groups who are opposed to developments, such as the siting of nuclear waste disposal or storage sites or other nuclear industry facilities. This means that people and communities fear the loss of jobs, family, friendships, economic opportunities, and other repercussions if they speak out against proposals, such as a consolidated interim storage site or permanent disposal site. Individuals and communities have already suffered from these repercussions and, if the DOE really cared about a "fair" process, they would be aware of what has happened in areas of Texas, New Mexico, Utah, and other states.

3.1.15. Protecting the Public

For the process to be Fair, the DOE must protect community members and their families from personal, physical, and economic intimidation and adverse repercussions. The history of the nuclear fuel cycle involves adverse personal, social, political, cultural, economic and other consequences to those members of the public and organizations that have not gotten with the nuclear program. People who have questioned or challenged industry and government actions, proposals, and their impacts have suffered. There are hundreds of stories of people who have been intimidated (including death threats), lost their jobs, or have been otherwise adversely impacted because of their opposition to proposed or existing nuclear fuel chain operations and the regulatory and industrial foundations of those operations. The DOE should expect the same to happen in locations where some governments and members of the public support the siting of a federal or commercial nuclear waste storage or disposal operation and some do not.

The DOE must clearly state how it will support and protect the right of community

members to freely seek information and ask questions, freely express their opinions, and freely seek administrative and legal redress if they believe that DOE or other government entity decisions are not protective of public health and safety and the environment or do not comply with applicable law.

3.1.16. For the process to be Fair, the DOE must identify all aspects of the process that might not be Fair, and provide a plan to eliminate those aspects of the process that are not Fair.

3.1.17. Informed Consent

To be Fair, consent must be "Informed" consent. Therefore, the DOE must clearly identify the types of information that must be readily to communities as part of the consent-based siting process. Some types of information have been discussed above. Clearly, the DOE does not yet even have a process to make significant information, data, and documents available as part of the process to develop a consent-based process. The DOE has historically been more interested in keeping information from the public than making information readily available to the public. This must change.

3.1.18. Transportation

3.1.18.1. To be Fair, the DOE must engage the communities on the proposed transportation routes. The communities on these routes must be part of the consent-based siting process. At this time, it does not appear that the DOE intends to acknowledge the stake that these communities have in this process and include them in any meaningful way. This is a big mistake.

3.1.18.2. The DOE must make transportation maps available as soon as possible when an area is under consideration as a site for either a commercial or federal consolidated interim storage site, permanent INF repository, disposal of HLNW, or related facility. The public must be made aware of transportation routes as soon as possible. The maps for transportation of nuclear fuel to Yucca Mountain are available, but not to other proposed locations.

3.1.18.3. The previous plans to transport INF to the proposed Yucca Mt. Repository included a plan to transport hundreds of the casks by train on a route that goes through Denver and Grand Junction, Colorado. Recently, I viewed the route for many miles from a bus on Interstate 70 from Grand Junction to Denver and later took a train on that route from Denver to Grand Junction. Unless the casks are no wider than an Amtrak passenger train, it would be impossible to use that route. The tracks lay in a narrow route that drops off to the Colorado River canyon and is close to steep rock slopes. There are also narrow tunnels. It does not appear that that railroad route is at all feasible, and I have no knowledge of a feasibility study that demonstrates that INF canisters can, if fact, be safely transported by rail between Denver and Grand Junction, will pose no reasonable threat to the Colorado River, and that any accident that causes a cask to crash down into the River will easily and

safely be retrieved. Given the problems with the Colorado River train route, one can only imagine the problems with other, un-identified, routes.

3.1.18.4. The Blue Ribbon Commission Report addressed the need for Early Preparation for the Eventual Large-Scale Transport of Spent Nuclear Fuel and High-Level Waste to Consolidated Storage and Disposal Facilities. The DOE must address the Commission's suggestions for planning for the associated transportation needs. This process must be part and parcel of the siting process.

3.2. *(2) What models and experience should the Department of Energy use in designing the process?*

3.2.1. Historical Experiences

The DOE has stated that it wants to learn from the past regarding consent-based processes. The DOE is well aware of the false starts in the siting process, so the DOE should fully report on the mistakes it has made in the past and how it intends to correct those mistakes.

3.3. *(3) Who should be involved in the process for selecting a site, and what is their role?*

3.3.1. Already there are private entities in Texas and New Mexico that desire to construct and license commercial interim storage facilities. The DOE has made no mention of these operations and the communities that will be impacted. Already, by not holding any meetings near these proposed sites, the DOE has used its power to limit their participation in the process. The DOE has not been honest in discussing these sites and the fact that DOE consent is not at all required for the NRC to license these sites. With private facilites, it made be that federally owned interim storage facilities are not required, but the DOE has not addressed this in the process thus far.

3.3.2. The DOE must hold local workshops and work to include community members from all walks of life, economic and cultural groups, and educational levels. Thus far the process has not been inclusive.

3.4. *(4) What information and resources do you think would facilitate your participation?*

3.4.1. All relevant information must be readily available in a timely manner on the Internet in one centralized website, with links to relevant information, statutes, regulations, policies, sources of INF, transportation routes, comments, industry information, and involved local, state, and federal agencies and decision makers.

3.4.2. The DOE must make available relevant information associated with the acceptable geologic formations and locations for a possible deep geologic repository. It is a waste of DOE and every one else's time and resources to contemplate the location of a deep geologic repository in a location that is not feasible due to geologic, hydro-geologic, seismic, meteorologic, and other characteristics of the location.

3.4.3. If the DOE sticks to the current plan for availability of information and resources, this project will be a failure.

3.5. *(5) What else should be considered?*

3.5.1. The DOE should not be able to buy off communities with promises of jobs, financial incentives, and other rewards. This approach divides communities.

3.5.2. The DOE should provide meaningful opportunities for additional public input on the consent-based process as it proceeds.

Thank you for providing the opportunity to comment.

Sincerely,

Sarah Fields
Director
sarah@uraniumwatch.org

John Weisheit
Conservation Director
Living Rivers
P.O. Box 344
Moab, Utah 84543

Consent-Based Siting

From: Allison Fisher [mailto:afisher@citizen org]
Sent: Sunday, July 31, 2016 6:48 PM
To: Consent Based Siting <consentbasedsiting@hq doe gov>
Subject: Public Citizen Consent-based siting comments

July 29, 2016

U.S. Department of Energy, Office of Nuclear Energy

1000 Independence Ave SW

Washington, DC 20585

RE: Response to Invitation for Public Comment on Consent-based Siting

Public Citizen is a national consumer advocacy organization with more than 400,000 members and supporters across the country As an organization dedicated to protecting America s communities and households, we promote policies and regulations that keep families safe from polluting and toxic energy sources and their byproducts

Public Citizen has a long record of challenging nuclear construction and operation while at the same time fighting for regulations that safeguard our communities against risks associated with nuclear power and radioactive waste We support the scientific consensus that finds deep geological disposal as the best available solution for isolating nuclear waste – which will be dangerous for millennia – from the public and environment Further, we believe that we have an obligation to future generations to find a safe, permanent solution for managing nuclear materials they had no part in creating However, we do not feel that a community, tribal region or state should unwillingly bear this responsibility For these reasons, we support the Blue Ribbon Commission on America s Nuclear Future s recommendation to implement an explicitly adaptive, staged and consent-based approach to nuclear waste disposal

We welcome the opportunity provided by the U S Department of Energy to submit comments on the agency s nascent effort to design a consent-based siting process

However we want to emphasize that achieving consent-based siting should not be a means to continue our reliance on this outdated and expensive technology But rather, lay the foundation for a fair and just process for siting a nuclear waste management facility and well position the federal government to – after decades of failure – meet its nuclear waste management commitments If done right, consent-based siting could begin to restore the loss of trust and confidence in DOE s ability to find a viable and permanent solution to our waste crisis

I. How can the Department ensure that the process for selecting a site is fair?

An exact process for site selection cannot be prescribed By its very nature, a fair and effective process should be responsive and tailored to those who would be impacted by siting That said, there are specific principles that should be applied to this process:

Informed - Communities must know what they are consenting to at each stage of the process.

Early and frequent public engagement activities should offer the public, community leaders, experts and agency representatives multiple opportunities to exchange information Information must be accessible and offered through a variety of platforms The full range of cost and risks associated with the project must be disclosed and verified, as well as the alternatives being considered Achieving informed consent is not an end, but an ongoing exercise that responds to new information and findings as well as new generations

Inclusive - Consent should be granted by those most impacted, including states, tribes and communities. A broad range of state, tribal and local stakeholders should be included in the decision-making process, and efforts must be made to increase the number of community members who recognize themselves and their communities as stakeholders in the siting process. People and entities that would financially benefit from the siting process should be clearly disclosed.

Collaborative - Consent can't be achieved through a top-down process. Activities related to outreach, engagement and education must be planned in coordination with appropriate stakeholders. Any agreements or decision-making must result from mutual input and understanding, and be responsive to the concerns of citizens. Those most impacted should have a voice throughout the process.

Just - Consent should not be bought. Financial compensation and other incentives must be reasonable, not used as coercion, and negotiated with full public disclosure.

Transparent - Consent must be pursued through an open process. Real consent can be achieved and maintained only through trust. Open access to information includes disclosure of funding and any conflicts of interest with the sources of information. All meetings, hearings and communications must be open to the public and on record.

Legitimate - A consent-based siting process must not just be the policy of the Department of Energy, but the law of the land.

Balanced- Consent will require sharing of power among federal executive and legislative branches, state and local governments and people in communities. Negotiating and decision-making power must be shared among affected federal, state and local entities, including those counties through which radioactive waste would be transported. States should also be granted some authority over regulation of the facility.

Flexible - Consent can be withdrawn. The consent-based siting process must provide ample opportunity and defined moments to correct course or completely withdraw from the siting process.

Contractual - States, tribes and communities must have clear recourse if the terms of consent are breached.

Finally, before a consent-based process can be pursued, a baseline criterion for site selection must be met that demonstrates protection of public health and safety, and the environment

Beyond site characterization and standards, there are a number of transportation issues that need to be resolved before this process should move forward Site selection and transportation are not separate processes They are inextricably linked and must be presented and planned for as such It would be unfair to engage a community that does not meet minimum site standards or have not been informed about transportation plans and risks

II. What models and experience should the Department use in designing the process?

In addition to models and experiences DOE should incorporate into the process, there are models the agency should avoid and experiences that DOE should learn from

At the outset, it should be recognized that designing and implementing a fair and legitimate process is wholly jeopardized by the proposed consolidated nuclear waste site in Andrews County, Texas By suggesting that this community has already demonstrated consent, DOE is undermining the very process it is attempting to design By failing to hold public hearings in Texas and New Mexico, areas that are not only targeted for waste storage, but have vast knowledge and experience with siting waste facilities, DOE is casting its public engagement process as selective and farcical By refusing to acknowledge DOE s role in the proposed site, that of client, the agency is abdicating its responsibility as custodian of our nation s stockpile of radioactive waste

Like Texas, DOE must learn from its experience in North Dakota, where the agency attempted to launch a $35 million, five-year project to determine the feasibility of deep borehole disposal In January, the agency announced the contractors who won the borehole research and development project, but failed to ever notify the community selected for hosting the project of its existence Locals did not learn of the project until an article appeared in the newspaper in the capital city of Bismarck Not even minimal public engagement or notification was given The project was abandoned in March after the community quickly organized against it There are clear lessens here, but perhaps the least obvious is that DOE cannot function as multiple agencies with separate and conflicting missions

DOE also needs to look to its predecessor in siting nuclear waste facilities The Office of the U S Nuclear Negotiator, established under the 1987 Nuclear Waste Policy Amendment, was a short-lived attempt to identify a site for hosting a high-level nuclear waste repository or an interim storage facility primarily through the use of incentives and economic benefits Unsuccessful, the office was eliminated in 1995 Like the consent-based process, the nuclear waste negotiator s goal was to find a volunteer community to host nuclear waste either indefinitely or for the short-term It would serve DOE to understand explicitly the flaws of the former agency, provide documentation acknowledging the failings of the nuclear waste negotiator and provide recommendations detailing how to avoid repeating them in this new process

These two examples barely scratch the surface of experiences DOE should learn from and avoid, but rather demonstrate that DOE must reflect on its past and present to move forward with any measure of success Below we offer five examples of models DOE should consider in its consent-based siting design Again, this list is not exhaustive, but begins to address some key elements that are currently lacking in DOE activity and the agency s culture

Public Engagement

In 1996, the National Environmental Justice Advisory Council (NEJAC) – a federal advisory committee to the U S Environmental Protection Agency – created a model guide for engaging the public In 2012, the NEJAC updated the guide, *Model Guidelines for Public Participation*, to reflect more current needs, concerns and best practices The model guide was intended to be adopted by all federal agencies "engaged in public participation efforts and who seek to meaningfully engage environmental justice stakeholders in decision-making processes " The critical element of the approach detailed in the model guide is that "all persons and groups who are potentially interested, concerned or affected by an action should be included (or given equal opportunity to participate) in the decision-making process " This reflects the approach necessary for an effective consent-based process and therefore DOE should adopt this model and its recommendations in its design

Public Funding

Meaningful and substantive public participation can be further achieved by providing funding for those interested in developing independent reports, studies and analysis of the proposed action Inequality of resources and perceived or real conflict of motives among DOE and the potential host community represent an enormous barrier to building trust and leveling the playing field in the process Public funding for community representatives and trusted public interested groups could go a long way toward addressing these discrepancies Unfortunately, in the U S , the intervener funding model has not been employed for federal actions However, DOE can look to Canada, which offers intervener funding in the environmental assessment of significant projects as a model - though it should be noted that the Canadian process is not perfect and should not be adopted without modification Constraints in this model including, limited funding, expectation of intervener financial contributions, short-time frames for funding availability and delayed funding reimbursement to interveners should be addressed in a funding mechanism established for community participation in the siting process

Institutionalized Community Participation

To ensure initial and ongoing citizen oversight and engagement in the process DOE should consider models that institutionalize community and stakeholder insight and voice into decisions that directly affect their lives, livelihoods and environment, such as citizens advisory panels In the U S this model has often been implemented after an industrial disaster has occurred – as was the case in Alaska after the Exxon Valdez accident revealed the need for a formal citizen oversight body However, an industry accident or disaster should not be a prerequisite for a citizens advisory panel In fact, the United Nations has endorsed such councils as ongoing, structured mechanisms for enhancing communication, collaboration and trust among citizens, government and industry, and for reducing risks of negative environmental and economic impact from industry Citizen councils are an ideal complement to governmental oversight, especially for an agency that has a poor record of being responsive and trusted by the public

Openness and Transparency

In part, distrust of DOE is rooted in the fact that the agency has a poor record on openness and transparency In 2009, in an evaluation of agency Open Government Plans – the blueprints for openness mandated by the Obama administration s 2009 Open Government Directive – DOE finished in 35th place, dead last of the agencies required to create a plan While the agency may have improved in the subsequent years, it is still far from adequate As openness and transparency must be a hallmark of a consent-based siting, DOE must overhaul its policies and culture that deliberately shut the public out To begin, DOE can adopt the *Best Practices for Open and Accountable Government* first created by the Project on Government Oversight in 2013

Shared Power and Control

In order to establish trust and equity in the siting process, states must share in regulatory and enforcement authority over the proposed nuclear waste facility Nuclear waste – in all its forms – is the only hazardous material that is exempt from state and local oversight This must change for states to have a meaningful role in the siting process and any contracts that result from that process

The Waste Isolation Pilot Plant (WIPP) in New Mexico offers a useful model for power sharing among federal and state regulatory entities The WIPP facility has been held up as an example for successful siting, but that success came after many delays and near collapses at multiple stages precisely because the federal government attempted to overpower state authority and ignore state input It was not until legislation was passed to give state authority to regulate waste at WIPP under the Resource Conservation and Recovery Act (RCRA), including issuing a hazardous waste permit for the facility, that the project moved forward

It is this experience – both process and outcome – that DOE should examine in developing a collaborative and balanced process

III. Who should be involved in the process for selecting a site, and what is their role?

While multiple federal, state and local government and non-governmental actors will likely be involved in the site selection process, we are limiting our comments to the makeup and role of the impacted community

The National Environmental Policy Act (NEPA) should be the guideline for establishing the boundaries of the impacted community, where federal agency actions typically look at a 50-mile radius There will likely be several communities within this boundary, which could also cross county and state lines To facilitate and formalize the communities role in the siting decision-making process, each community could establish a Citizens Advisory Panel made up of community stakeholders drawn from community and neighborhood groups; community service

organizations (health, welfare, and others); educational institutions and academia; environmental organizations; business; the medical and first responder community; non-governmental organizations; religious communities; indigenous peoples; civic/public interest groups; unions and other employment related organizations These panels could set up a technical advisory committee as well as issue specific committees to address different areas of the site selection process

These panels should play a critical role in facilitating pubic engagement and education, and play a consultation and concurrence role in decision-making and contract negotiations

IV. What information and resources do you think would facilitate your participation?

All information relevant to the siting of a nuclear waste facility should be made available There should also be a public record of all meetings, hearings and other events related to siting activity These records should include, where appropriate, participant list, transcripts, video and materials But while providing the necessary technical information and a transparent account of siting activity is vital, merely making information available is not enough Perhaps just as important as the question of what is available is how it will be made available and what strategies will be employed to get community members to interact with the information provided

Access and engagement need to be considered alongside information Information should be targeted, applicable and customized to the specific communities including incorporation of language, geography and cultural characteristics Engagement efforts must include an explanation of why the siting process is relevant to individual groups of stakeholders and, as a foundation for dialogue; the agency should articulate its goals, expectations and limitations

Communities should also have public funding available to develop their own body of research, information, materials and strategies for disseminating the information to community members The goal should be for the community to have the technical understanding and assistance to effectively participate in the siting decisions
In fact, information should not be just provided, but exchanged A two-way process of distributing and receiving information among all stakeholders will foster collaboration and trust Approaching the community as a resource is essential

V. What else should be considered?

It is well established that lack of trust is a significant challenge for DOE as the agency mandated to manage our nation s lethal waste for the foreseeable future (and beyond) As the BRC noted in its final report, "the overall record of DOE and of the federal government as a whole, however, has not inspired widespread confidence or trust in our nation s nuclear waste management program " With that recognition, the BRC proposed that only the creation of a new, single-purpose organization could provide the stability, focus and credibility essential to getting the waste program back on track We disagree with this assessment Creating a new agency does not resolve the issue of trust that plagues the federal government and DOE in particular, when it comes to waste management Rather DOE should strive to restore trust in the agency and correct the behaviors and culture that has led to this widely acknowledged crisis of confidence

To that end, DOE should consider using the consent-based siting design process as an opportunity to engage in trust building activities In addition to the outreach and public input activities already underway, DOE should:

Stop promoting nuclear power - DOE has, in part, framed the need for a nuclear waste repository as essential to maintaining our use of nuclear power and by doing so is alienating members of the public who want a solution to the waste crisis but want to shift away from nuclear as an energy source. DOE's role in managing nuclear waste is to fulfill its legal obligation to take title of the waste from industry and above all to ensure that the waste is safely isolated from the public and the environment. It is not to make nuclear power more attractive as an energy source. By conflating its role as waste manager with nuclear advocate, DOE is, at the overset, introducing wariness and skepticism into the process.

Acknowledge past and present mistakes – From mismanaged federal facilities and unmanaged contractors, to disregard for public input, to whistleblower retaliation, DOE is far from a model agency. To begin to restore trust, DOE should own its short comings and announce a break with the past by taking corrective measures. For example, a recent report by the Government Accountability Office found that DOE's nuclear program almost never holds its civilian contractors accountable for unlawful retaliation against whistleblowers. It noted that the agency has taken little or no action against contractors responsible for creating chilled work environments at nuclear sites across the country and noted that the agency has failed to create effective policies for holding those contractors accountable. It is difficult to trust an agency that does not protect and value employees that raise unsafe, illegal or wasteful practices.

Be responsive to public input – A predominant sentiment heard at the eight public meetings DOE hosted around the country was "why should we participate in this process, because our input is never incorporated into your plans or policies." An effective consent-based siting process is going to require DOE to be a partner, not an autocrat. Start now, by reflecting public input in your consent-based siting draft proposal and providing rationale for input that is excluded.

Actively oppose efforts by the private sector to license and operate consolidated waste facilities – The WCS consolidated interim storage proposal in Texas is at cross-purposes with DOE's pursuit of a consent-based siting process and clearly defies the spirit and intent of waste storage management has envisioned by the Nuclear Waste Policy Act. Rather than ignore this affront to DOE's role, responsibility and approach to managing our nations' stockpile of radioactive waste, the agency should actively oppose it and refuse to be a client of WCS.

Reconsider consolidated storage – DOE's pursuit of consolidating nuclear waste at one or more facilities is ill-conceived and motivated by economics rather than safety. In fact, it would needlessly require the waste to be moved twice, it would draw resources and attention away from siting a permanent repository, and it could condemn those temporary sites to indefinite waste management facilities. With exception, waste that is vulnerable and presents an environmental, safety or security threat should be moved and secured at a second location. At the very least, DOE should embrace policies that reduce the likelihood that a consolidated storage facility, like the proposed site in Andrews County, Texas, would not become a de facto permanent waste management site. Linking the licensing of storage to the licensing of a permanent repository is essential to an effective integrated waste management program and consistent with BRC findings. And provides another reason why the Texas proposal is not only premature, but is derailing efforts to reset our federal waste program and should be opposed.

Implement transportation recommendations – A 2006 National Academy of Science (NAS) report concluded that significantly more research is needed before an unprecedented, large-scale transport program is launched, including: full-scale crash testing of transport packages under severe accident conditions; a study of security issues; and a study of very-long-duration, high-temperature fires. The NAS report found DOE must take steps to adequately plan for a national spent fuel transportation campaign and engage with stakeholders. But nearly a decade later, many of the report's recommendations have yet to be implemented.

Refrain from setting deadlines that are unachievable – DOE's June 2013, *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste* lays out target dates for operations of a pilot interim storage facility by 2021, siting and licensing of a larger interim storage facility to be available by 2025, and availability of a geologic repository by 2048. Yet, Secretary Moniz has already acknowledged that those targets are unrealistic. DOE has a long history of setting deadlines that are aspirational, rather than founded in concrete forethought and planning. Beyond frustration, this fact has contributed to distrust and lack of confidence in the agency's efficacy.

DOE has asked the public to participate in this process with the promise of good faith and commitment by the agency to overhaul its approach to nuclear waste management Public Citizen, though deeply disappointed in DOE s failure to recognize its role and responsibility to the people of Andrews County, offers these comments in kind We hope that this represents not a futile exercise, but an honest and actual effort to reform not only DOE s process, but its culture – both of which have led to a nearly complete erosion of public trust – and to believe that the agency has the competence to manage our nation s nuclear waste dilemma We urge DOE to incorporate our comments into its consent-based siting design process

Thank you for your consideration,

Allison Fisher
Outreach Director, Public Citizen s Climate and Energy Program

http://www.energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf

http://www.exchangemonitor.com/publication/exchange-monitor/doe-axes-north-dakota-borehole-project-2/

https://www.epa.gov/environmentaljustice/model-guidelines-public-participation

http://www.pwsrcac.org/

http://www.unep.org/pdf/uyb_2013_new.pdf

http://pogoblog.typepad.com/pogo/2012/02/building-a-better-energygov-how-doe-can-take-steps-towards-achieving-the-principles-of-open-governme.html

http://www.pogo.org/our-work/resources/2013/best-practices-for-open-and-accountable-government.html?referrer=https://www.google.com/

http://www.wipp.energy.gov/library/pioneering/LongRoad2.pdf

http://www.energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf

https://www.documentcloud.org/documents/2993549-OUO-DRAFT-GAO-16-618-361580.html

https://www.citizen.org/documents/NASTransportStudy.pdf

http://www.energy.gov/sites/prod/files/Strategy%20for%20the%20Management%20and%20Disposal%20of%20Used%20Nuclear%20Fuel%20and%20High%20Level%20Radioactive%20Waste.pdf

http://www.platts.com/latest-news/electric-power/washington/us-doe-plans-to-launch-consent-based-process-21649031

Consent-Based Siting

From: paul@freywine.com [mailto:paul@freywine.com]
Sent: Sunday, July 31, 2016 4:58 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Supersonic Earthquake Shear Not Addressed

Dry casks storing radioactive waste have never been tested for the newly discovered Supershear that can occur during earthquakes.
Currently dry casks in California are at risk during the next major earthquake which can happen any day. Nuclear reactor waste sites in California should be renamed for what they really are, namely they should be called the California Nuclear Waste Dump Experimental Research Stations whose ongoing study is to see what happens during the next major earthquake. Until there is Supersonic Earthquake Shear Testing on these casks, California reactors should stop operating and creating more waste, and current nuclear waste should be moved out of earthquake country.

Paul Frey
Frey Winery
Buyer of Organic Grapes that grow near Diablo Canyon

Consent-Based Siting

From: karenfuller001@gmail.com [mailto:karenfuller001@gmail.com]
Sent: Sunday, July 31, 2016 10:36 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

Don't threaten our water, our safety, our future with nuclear radioactivity. The earth is a precious fragile place, do not put us at risk. Have mercy and think ahead.
Karen Fuller
Nyc

Sent from my iPhone

Consent-Based Siting

From: Fuller Consulting [mailto:fullercogm@gmail.com]
Sent: Sunday, July 31, 2016 9:20 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

I have been personally involved in two siting processes, one of which was successful while the other one was not. One was for a municipal waste landfill (successful), the other was for a low-level radioactive waste disposal/storage site (unsuccessful). There were several things done in the successful siting process that should be done as part of siting a high-level radioactive disposal/storage site.

First, the community was given the power to say no to the site at any time during the selection process. The power to say no at any time made it possible for all members of the community including those who were very wary of accepting a waste site to fully consider the potential for accepting the site without worrying that by not saying no to it immediately they would be forced to accept a decision made by outsiders at a later time.

Second, the entire local community was fully informed of and about the potential waste site. While the local government was the official spokesperson and decider for the community both the local government and the site proposer fully informed and involved anyone who expressed an interest and paid attention to and responded to their concerns. The community was given sufficient funds to employ experts of their own choosing to learn about the potential harms and benefits of the waste site. In addition, there was enough time allowed in the selection process to allow the community to fully consider their options.

Third, the site proposer agreed to use the best known technology (in construction, in operation, in closure and in monitoring) to protect the community and the environment. In addition, the site proposer agreed to use an extra layer of natural protection not required by law or regulation but which was required by the community to give the community confidence that the site's potential harms would be further mitigated. This acceptance by the site proposer of the community's safety requirements even though the site proposer did not think that it was necessary made the community's acceptance of the site possible.

Finally, the community was guaranteed that there would be a known, finite amount of waste that could be legally accepted at the site. This knowledge gave the community a clear understanding of the sum total of harms and benefits to be expected from the waste site. Because of the existence of many other municipal waste disposal sites throughout the country this was not a difficult condition to be agreed to which made the siting possible.

I think that it is this final community guarantee of a known, finite amount of radioactive waste which was the straw that broke the camel's back in the unsuccessful siting of a low-level radioactive waste disposal/storage site although the community's ability to say no was not completely clear in the process either. These two things are essential if a siting process for

a high-level radioactive waste site is to be successful.

Because of the long lasting dangers of high-level radioactive waste and the somewhat reasonable requirement that there be only one or a small number of disposal/storage sites I do not think that it will be possible to successfully site one now. Unless there is an agreement that future production of high-level radioactive waste will be stopped and that there is a known, finite amount of waste to be disposed/stored siting will not be possible.

Thank you,
Ernest Fuller

Consent-Based Siting

From: James Gibbs [mailto:jgibbs66@gmail.com]
Sent: Friday, July 29, 2016 4:59 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

I do NOT give consent to more radioactive waste dumps until the nuclear industry stops making more waste, and DOE fixes all the problems it has already created with waste dumps, contaminated areas, and abandoned uranium mines around the country; and Congress establishes a truly independent process to find and designate a permanent, deep-geological radioactive waste ***disposal*** (NOT storage) site – OTHER THAN Yucca Mt., Nevada.

Thanks.
Concerned citizen
James Gibbs
1819 Dobson St
Evanston, IL 60202

Consent-Based Siting

From: Mark M Giese [mailto:m.mk@att.net]
Sent: Wednesday, July 13, 2016 1:36 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to Invitation for Public Comment

Idahoans want nothing to do with accepting more nuclear waste.

Our opposition to nuclear waste shipments and interim storage is unwavering.

Thank you.

--Mark M Giese

1520 Bryn Mawr Ave

Racine, WI 53403

From: Steve Gifford [mailto:scgiff7@gmail.com]
Sent: Thursday, July 28, 2016 5:36 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: stop the insanity!

Stop the insanity of creating nuclear waste, store what there is in hardened onsite storage, and straighten up!

--
All the best, Steve
kindnesspoems.blogspot.com
Climate change is a crisis.
Let's treat it like one. Let's mobilize.
TheClimateMobilization.org

Consent-Based Siting

From: Donna Gilmore [mailto:dgilmore@cox.net]
Sent: Sunday, July 31, 2016 2:58 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: Griffith, Andrew <ANDREW.GRIFFITH@nuclear.energy.gov>; Kotek, John <John.Kotek@Nuclear.Energy.Gov>; Mindi Smith - New Mexico Governor's Office <mindi.smith@state.nm.us>; Ken Alex <ken.alex@gov.ca.gov>; Kevin Barker - CEC <kevin.barker@energy.ca.gov>; Sepideh Khosrowjah <sepideh.khosrowjah@cpuc.ca.gov>; Ken Alex <ken.alex@gov.ca.gov>; Joseph Street <joseph.street@coastal.ca.gov>; Michal Freedhoff <michal_freedhoff@epw.senate.gov>; Mark Lombard <mark.lombard@nrc.gov>; Dave Freeman <greencowboysdf@gmail.com>; City Council - San Clemente <CityCouncil2@san-clemente.org>; Toni Iseman <SEEGULS@aol.com>; Jerry Kern <JKern@ci.oceanside.ca.us>
Subject: Response to IPC - DOE Consent Based Siting for Spent Nuclear Fuel risks major radioactive leaks

Attached are comments to the DOE regarding Consent-Based Siting including the proposed DOE Consolidated Interim Storage Pilot Plan. I look forwarding to continuing my discussions with Andy Griffith. Now that the DOE is aware the thin-walled spent fuel nuclear waste canisters the DOE proposes to transport and store cannot be inspected, are subject to short-term cracks and have other serious flaws that could result in radioactive leaks in storage and transport, I hope we can work together to resolve these critical issues.

Here is a short link to the attached comments.
http://bit.ly/SOStoDOE

Thank you,

Donna Gilmore
SanOnofreSafety.org
San Clemente, CA
949-204-7794

July 31, 2016

TO: U.S. Department of Energy
Office of Nuclear Energy, Response to IPC
1000 Independence Ave SW.
Washington, DC 20585
consentbasedsiting@hq.doe.gov

FR: Donna Gilmore
SanOnofreSafety.org
San Clemente, CA
dgilmore@cox.net
949-204-7794

RE: Response to IPC – DOE's CIS Nuclear Waste Plan Risks Major Radioactive Leaks

It is premature to focus on "consent" criteria until urgent critical legal and safety issues are resolved. No "informed" community would accept DOE's current Consolidated Interim Storage (CIS) pilot plan if they knew the plan included unsafe transport and storage of highly irradiated spent nuclear fuel in canisters that do not meet current Nuclear Waste Policy Act (NWPA) requirements.

U.S. dry storage thin steel canister systems cannot be inspected, maintained, repaired, adequately monitored to avoid radioactive leaks, and the DOE pilot plan has no plan for replacing failing canisters or retrieval of fuel, as required by NWPA.

The DOE consent meetings did not disclose the major safety flaws in their proposed CIS plan and there are no public hearings scheduled regarding the pilot plan in spite of numerous public concerns about storage and transport issues. Instead, the DOE booklet distributed at these meetings and on the DOE website implies all U.S. nuclear waste is safely stored.

The DOE should advocate for and demand utility licensees comply with NWPA safety requirements and should not accept lower safety standards. Any proposed legislation that reduces safety requirements should be actively opposed by the DOE. The Nuclear Regulatory Commission (NRC) has approved canisters for short-term storage that do not to meet many NWPA DOE requirements. The following are examples of NWPA legal and safety requirements that the NRC and DOE CIS pilot plan do not comply with:

- provide continuous monitoring, management, and maintenance of spent fuel and waste for the foreseeable future [including short-term storage];
- minimize the impacts of transportation and handling of such fuel and waste;
- provide for public confidence in the ability of such system to safely dispose of the fuel and waste;
- impose minimal adverse effects on the local community and the local environment;
- provide a high probability that the facility will meet applicable environmental, health, and safety requirements in a timely fashion.

NWPA Subtitle C Monitored Retrievable Storage, Section 141(b)(1) and Section 144
http://energy.gov/sites/prod/files/edg/media/nwpa_2004.pdf

It is an unnecessary major safety risk to transport and store waste at a consolidated interim storage site, especially with the heavy U.S. use of high burnup fuel that can cause the Zirconium cladding to become brittle and shatter like glass. The issue of whether just train vibrations can cause this is still being studied. Interim storage can best be accomplished through the safest dry storage of spent fuel at the site of generation, except that when there is a clear and present danger, spent fuel should be transferred to a nearby more stable site, possibly another reactor site, for storage. This complies with the NWPA requirement to *minimize the impacts of transportation and handling of such fuel and waste*.

The NRC approves high burnup fuel based on how it performs in the reactor without considering the impacts of how it performs in storage or transport. The DOE should take an active role in finding a way to prevent this practice. Since the DOE and the public pay the consequences for NRC action, it's up to both of us to advocate for improved safety standards at the NRC that comply with NWPA.

All dry storage systems must provide storage in a manner and location that is as safe as possible to prevent radioactive leaks in both short and long term storage. This requires a system that provides defense in depth, is fully inspectable, maintainable, repairable and not subject to critical degradation (such as corrosion and cracking). It must provide a continuous early warning monitoring system that warns prior to a radiation release and have a plan in place for safely retrieving and monitoring spent fuel without destroying the containers. Emergency Planning should be provided and funded, including public access to continuous radiation monitoring. The proposed DOE pilot system does not meet any of these requirements. The NRC only requires quarterly radiation monitoring. The DOE must do better to meet NWPA requirements.

Most U.S. commercial independent spent fuel storage installations (ISFSI) do **not** meet the above safety requirements. The NRC acknowledges the over 2000 U.S. thin-walled (mostly ½" thick) steel spent nuclear fuel dry storage canisters cannot be inspected (even on the outside), so no one knows the condition of the canisters, fuel or internal critical parts (such as the fuel storage baskets). They cannot be repaired and maintained and have no continuous or other early-warning monitoring system prior to radioactive leaks.

According to DOE inventory data, most of these thin-walled canisters have been in use less than 10 years. The NRC states leaks can happen 16 years after cracks start. They state the Koeberg nuclear plant had a similar component (a waste water tank) leak in only 17 years. The Koeberg tank cracks were deeper than the thickness of most U.S. thin-wall canisters (0.61" vs. 0.50"). Holtec president, Dr. Kris Singh, one of the major manufacturers of these thin-wall canister systems, admits even if you could find the cracks, even a microscopic through-wall crack will releases millions of curies of radioactivity into the environment, and even if it was possible to repair them, this would introduce a rough area for future cracking.

The Nuclear Regulatory Commission (NRC) approved most of these facilities and containers for 20 years by ignoring aging management issues that may occur after 20 years and by ignoring NWPA DOE Monitored Retrievable Storage requirements. The NRC has approved a few license renewals in spite of the following unresolved critical problems in the thin-walled (mostly ½" thick) welded stainless steel canister systems.

- **CANNOT BE MAINTAINED:** canisters cannot be inspected (inside or out), repaired or maintained. Fuel and interior critical structures (such as fuel assembly storage baskets) cannot be inspected without destroying the canister, so it is not feasible to inspect them. No current on-site capabilities for replacing failing canisters or resolving problems with canisters or fuel. Canisters have been misloaded, but the NRC has not required inspection of contents.
- **SHORT-TERM RADIATION RISKS:** The NRC states canisters may leak after 16 years once a crack starts. The Koeberg waste water tank leaked in 17 years. A Sandia Lab analysis shows cracks can grow faster in hotter canisters (Attachment B). A Diablo Canyon canister has all the conditions for cracking in a 2-year old canister. No seismic evaluations are required for cracked canisters or degraded concrete storage overpacks. Each canister contains more radioactive Cesium-137 than released from Chernobyl.
- **UNSAFE FOR TRANSPORT:** Canisters are susceptible to undetected cracks that can continue to grow through the wall of the canister. Even partially cracked canisters are not approved for transport (NRC 10 CFR § 71.85). Zirconium clad fuel allowed to burned longer in reactors (high burnup fuel) is subject to embrittlement even after dry storage and may shatter like glass, especially during transport (with or without an accident).
- **NO CONTINUOUS MONITORING:** Canisters cannot be continuously monitored to prevent radioactive releases. Radiation monitoring is only required quarterly.

- **NO EMERGENCY PLANNING:** No off-site emergency planning required for nuclear waste storage installations. No publicly accessible, timely, or continuous radiation monitoring in spite of the above problems.

It is the DOE's responsibility to advocate for and enforce NWPA safety requirements, as required by the DOE Standard Contract. Most other countries have standardized on dry storage systems that meet NWPA and other safety requirements, so there is no good reason the U.S. cannot do the same. However, we need the DOE to play an active role to make this happen.

The DOE must demonstrate that the federal government can fund, transport, and manage nuclear waste without significant short-term or long-term radioactive leaks and demonstrate that the federal government can comply with existing nuclear waste laws, contracts and agreements. This is currently not the case. At the DOE consent-based meetings, the issue of lack of public trust of the DOE was a major issue acknowledged by the DOE. Enforcing instead of ignoring NWPA requirements may help the DOE build public trust.

The DOE *Integrated Waste Management Consent-Based Siting* booklet distributed at the DOE Consent-Based Siting meetings and on the DOE website implies the current U.S. dry storage systems are safe (page 21). Correcting this misinformation would be a good first step in improving public trust. *http://www.energy.gov/sites/prod/files/2016/05/f31/Booklet_16_05_17.pdf*

Other issues related to consent.

- **The federal government must guarantee sufficient funds** will be allocated for as long as the waste needs be transported and needs be stored -- up to 120 years for short-term storage (per NRC definition of short-term) and for long-term storage, which is basically forever. Communities impacted by a radioactive release need to be adequately financially compensated.
- **States and Tribal Nations must have legal authority** to set higher standards for such things as storage and transport containers, aging management and radiation exposure levels. States must have enforcement authority for nuclear waste stored in or near their communities based on potential radioactive contamination zones. They also must have adequate funding to administer and enforce these requirements.
- **The DOE must adequately address major transport infrastructure issues** affecting the safe transport of spent fuel through our communities.
- **Each state and locality must be legally authorized to establish its own criteria for standing and volunteer status**, and no further requirements may be set by the federal government except that any expression of interest must affirm that it is consistent with the requirements of Executive Order 12898 regarding Environmental Justice.

Until such time as these issues are resolved, no informed communities would agree to host spent nuclear fuel waste. The Governor of New Mexico April 10, 2015 letter to Energy Secretary Moniz supported consent. However, the letter stated the CIS site would use proven technology and a safe system, which is not true. This is not informed consent.

The DOE should discontinue expending resources on "consent". Instead, it is urgent the DOE take a leadership role in resolving the issues addressed in these comments. If you don't, who will? Each thin-walled steel canister contains about as much Cesium-137 as was released from Chernobyl and some of the existing canisters could start leaking in the near future with no plan in place to mitigate leaks.

See Attachments and SanOnofreSafety.org for references and additional information.

ATTACHMENT A – REFERENCES AND ADDITIONAL SUBSTANTIATION

REFERENCES AND ADDITIONAL SUBSTANTIATION

- **Thin-walled spent fuel canisters cannot be inspected and may leak 16 years after loaded.**

  The majority of current U.S. irradiated spent fuel storage facilities use thin-walled (mostly 1/2" thick) stainless steel canisters that the NRC acknowledges cannot currently be inspected or repaired and are vulnerable to cracking and leaking 16 years after a crack starts.

  Summary of August 5, 2014 Public Meeting with the Nuclear Energy Institute on Chloride-Induced Stress Corrosion Cracking Regulatory Issue Resolution Protocol.
  http://pbadupws.nrc.gov/docs/ML1425/ML14258A081.pdf

- **Partially cracked canisters are not approved for transport and cannot be repaired**

  Partially cracked canisters are not approved for transport (NRC regulation 10 CFR § 71.85). DOE inventory records show most of the U.S. thin-wall canisters have been in use less than 10 years. It is unknown if any of them have partial cracks, since they cannot be inspected.
  https://sanonofresafety.files.wordpress.com/2015/10/d32-caskinventoryisfsichartandtable2016-06-26.pdf

- **Storage containers must meet these requirements**

  Storage containers must be designed to be inspectable (inside and out), repairable, maintainable, not subject to structural cracks, and have continuous early-warning monitoring prior to radiation leaks. Sites must have provisions for replacing failing fuel or failing canisters, such as empty spent fuel pools.

  Storage container requirements must be based on meeting short and long term needs, rather than on how much money Congress is willing to allocate each year. The DOE's current recommendation is the latter (partially due to Congress redirecting existing funds that were designated for a permanent repository).

  Most other countries use thick-walled (about 10" to 20" thick) irradiated spent fuel storage casks that meet or exceed NWPA monitored retrievable storage requirements, such as Germany and Japan (including at Fukushima). Those countries also store their irradiated spent fuel containers in reinforced structures for additional environmental protection.

- **Radiation monitoring must be required**

  Near real-time radiation monitoring with public access should be required.

- **DOE must improve its performance**

  The DOE must demonstrate that the federal government can fund, transport, and manage nuclear waste without significant radioactive leaks and demonstrate that the federal government can comply with existing nuclear waste laws, contracts and agreements. They have not done this.

- **Funding inadequate**

  The federal government must guarantee sufficient funds will be allocated for as long as the waste needs be transported and needs be stored -- up to 120 years for short-term storage (per NRC definition of short-term) and for long-term storage, which is basically forever. Communities impacted by a radioactive release need to be adequately financially compensated.

- **More State and Tribal Nation legal authority**

  States and Tribal Nations must have legal authority to set higher standards for such things as storage and transport containers, aging management and radiation exposure levels. States must have enforcement authority for nuclear waste stored in or near their communities based on potential radioactive contamination zones. They also must have adequate funding to administer and enforce these requirements.

  Each state and locality must be legally authorized to establish its own criteria for standing and volunteer status, and no further requirements may be set by the federal government except that any expression of interest must affirm that it is consistent with the requirements of Executive Order 12898 regarding Environmental Justice.

  States and communities currently have no legal rights to set higher standards for storage and transport and have no legal recourse for DOE mismanaged facilities or for DOE broken promises. The State of Idaho is one of the few states with a legal agreement, yet the DOE has not met the conditions of that contract. DOE's promise to remove nuclear waste from Idaho by 2035 appears to be a goal rather than a commitment.
  https://www.deq.idaho.gov/inl-oversight/oversight-agreements/1995-settlement-agreement/

- **Transport safety and funding issues unresolved**

  The DOE must address major transport infrastructure issues and the safety of transporting irradiated spent fuel through our communities. Communities must have on-line access to transport accident records and status of transport infrastructure for any potential routes used for transport. Some canisters may require up to 45 years of cooling before they meet Department of Transportation radiation limits (Attachment C – Transport).

- **Current DOE sites have radioactive leaks**

  Current DOE managed sites consistently have radioactive leaks into the environment from leaking or exploding inferior storage containers, such as Hanford in Washington, Savannah River Site in South Carolina, the Waste Isolation Pilot Project (WIPP) in New Mexico, Idaho National Lab and other sites.

  There is a pattern of selecting inferior containers that are not even sufficient for short-term storage – containers that cannot be inspected, monitored, repaired and maintained. In essence, these storage containers as designed will inevitably fail and leak radiation. The DOE must demonstrate they can resolve these issues before moving forward with any consent-based siting process.

- **DOE pilot project will inevitably fail with radioactive leaks**

  The proposed DOE irradiated spent fuel nuclear waste storage plan as designed will inevitably fail with highly radioactive leaks. It proposes transporting and storing existing thin-walled stainless steel canisters (1/2" to 5/8" thick) that cannot be inspected, repaired, maintained, have no early warning system prior to radioactive leaks, can corrode and crack, and can start leaking millions of curies of radioactivity after 20 years of storage, possibly sooner. A 2015 Sandia Lab report shows that once cracks start in hotter thin-walled stainless steel canisters, they can grow through the wall of the canister in less than 5 years (Attachment B - Sandia Chart).

  A failure of even one of these "Chernobyl" canisters could be catastrophic. There is potential for explosions, due to the unstable and pyrophoric nature of these materials when exposed to air. (*Damaged Spent Nuclear Fuel at U.S. DOE Facilities*, *Experience and Lessons Learned*, *INL,* Nov 2005 INL/EXT-05-00760, Page 4 & 5). *https://inldigitallibrary.inl.gov/sti/3396549.pdf*

The DOE pilot design has no provisions to address these issues and provides no remediation for failing canisters. Most of the over 2000 U.S. thin-walled canisters have been in use less than 20 years, so we have not seen through-wall cracks yet. However, the DOE must address this issue in their plans. The NRC's initial 20-year dry storage container certification considers "out of scope" any problems that may occur after 20 years. In their relicensing the NRC aging management plan (NUREG-1927 Rev 1 Draft) requires canisters with 75% through-wall cracks be taken out of service. However, the method to accomplish this or even inspect and measure cracks does not exist for canisters filled with irradiated spent fuel.
http://pbadupws.nrc.gov/docs/ML1605/ML16053A199.html
NRC regulations do not allow the transportation of canisters with even partial cracks (10 CFR § 71.85 *Packaging and Transportation of Radioactive Materials*).

Neither the outside or inside structure of these thin-walled welded canisters can be inspected, let alone repaired. Other countries use thick-walled casks that do not have these problems.

Both the DOE and NRC have chosen to continue endorsing the inferior technology even though NRC Commissioners directed staff to "encourage the adoption of state of the art technology for storage and transportation". *Staff Requirements – COMDEK-09-0001 – Revisiting the Paradigm for Spent Fuel Storage and Transportation Regulatory Programs*, February 18, 2010
http://pbadupws.nrc.gov/docs/ML1004/ML100491511.pdf

NRC Director of Spent Fuel Management Division, Mark Lombard states **inspecting these canisters "is not a now thing"** *(https://youtu.be/QtFs9u5Z2CA).*

Dr. Kris Singh, Holtec thin-walled canister President, states that **even a microscopic crack will release millions of curies of radiation into the environment and that the canisters are not repairable**. *(https://youtu.be/euaFZt0YPi4).*

Canisters may need to stay on-site for up to 45 years before they are cool enough to meet Department of Transportation radiation dose requirements (Attachment – Transport).

- **Would you buy a car that could not be inspected?**

Would you buy a car for your family that could not be inspected, maintained, and repaired and provided no warning before the engine or brakes failed? That is basically what you are asking our families to do with these thin-walled irradiated spent fuel storage canisters. The Delorean cars looked good until the stainless steel 304 alloy panels began corroding. This is the same material used in most of the over 2000 U.S. thin-walled stainless steel canisters. NRC material engineers state that operating experience with both 304 and 316 stainless steel alloys demonstrate these problems. Numerous environmental and other factors can initiate corrosion and cracking (e.g., corrosive salt particles and from sulfites in air pollution and vehicle exhaust).

Additional resources and information at SanOnofreSafety.org

ATTACHMENT B – Sandia Chart

Thin-walled stainless steel U.S. irradiated spent fuel storage canisters at higher temperatures will have faster crack growth rate. The Sandia Chart below shows higher temperatures can cause canisters to penetrate the wall in less than 5 years. This chart assumes canister wall is 0.625” (5/8”) thick. The majority of the U.S. canisters are only 0.50” (1/2”) thick. It is unknown when a crack will start, but these canisters are subject to corrosion and cracking from environmental conditions such as chloride salts, air pollution (sulfides), pitting, and microscopic scratches. The report states that canisters such as those at Diablo Canyon have temperatures in these heat ranges.

Draft Geologic Disposal Requirements Basis for STAD Specification, A. Ilgen, C. Bryan, and E. Hardin, Sandia National Laboratories, March 25, 2015, FCRD-NFST-2013-000723 SAND2015-2175R, PDF Page 36 & 46 *http://prod.sandia.gov/techlib/access-control.cgi/2015/152175r.pdf*

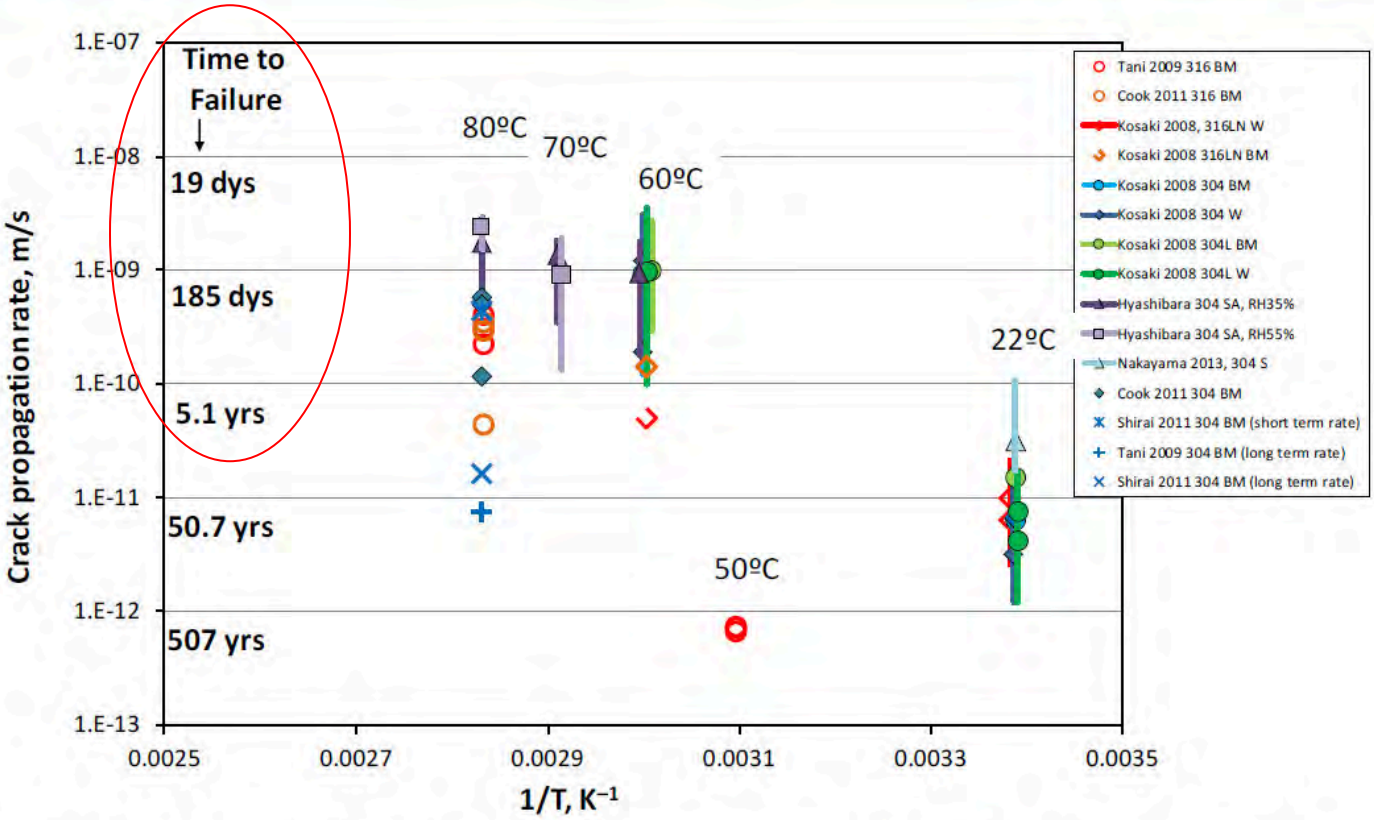


Figure E-5. SCC propagation rates for atmospheric corrosion of 304SS and 316SS. BM –base metal; W–weld sample; SA–solution annealed; S–sensitized. Bars represent reported ranges (if more than one), while symbols represent average values. Time to failure corresponds to the time required to penetrate a 0.625” thick canister wall.

ATTACHMENT C – Transport

Canisters with 37 spent fuel assemblies may require up to 45 years to cool (after removal from the reactor) before they are safe enough to transport (~20 kW) per Dept. of Transportation radiation limits.

Research and Development Activities Related to the Direct Disposal of Dual Purpose Canisters, William Boyle, Director, Office of Used Nuclear Fuel Disposition R&D (NE-53), U.S. Department of Energy, Nuclear Waste Technical Review Board Meeting, April 16, 2013 *http://www.nwtrb.gov/meetings/2013/april/boyle.pdf*

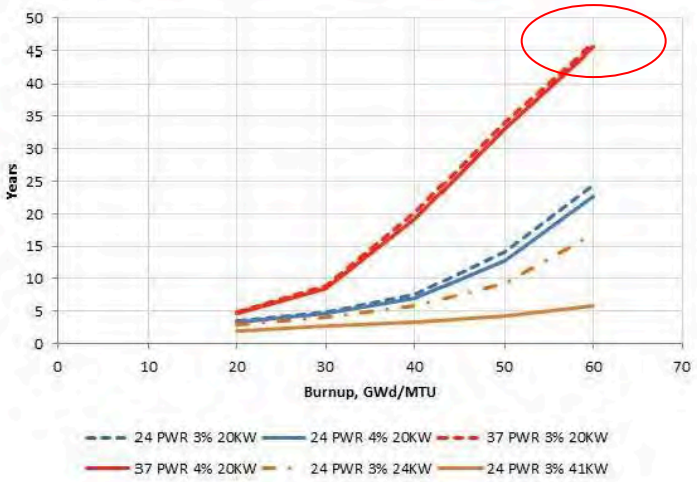
Safety Evaluation Report Docket No. 71-9302, NUHOMS-MP197HB, Certificate of Compliance No. 9302, Rev. 7, Page 14
http://pbadupws.nrc.gov/docs/ML1411/ML14114A132.pdf
Note: The only NRC approved high burnup transport cask is the NUHOMS MP197HB.

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Long-Term Performance Challenges

- **Thermal Load Management**
  - DPCs are now loaded at about 20 kW
  - Canister design storage limits are typically 24 kW, maximum currently available is rated to 40.8 kW for storage
  - Hottest waste packages considered for Yucca Mountain emplacement were 18 kW
  - Other repository design concepts call for much cooler waste packages (e.g., SKB calls for initial load per package ≤ 1.7 kW)
- **Other performance considerations**
  - Engineered barrier performance at elevated temperatures (e.g., clay-based backfill/buffer performance)
  - Criticality control

Estimated Cooling Time for PWR fuel to Reach Specified Thermal Power, as a Function of Canister Size and Burnup



Consent-Based Siting

From: John B. Gilpin [mailto:john.b.gilpin@gmail.com]
Sent: Wednesday, July 27, 2016 7:51 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

I do NOT give consent to more radioactive waste dumps until,

- The nuclear industry stops making more waste
- DOE fixes the problems it has already created with waste dumps, contaminated areas, and abandoned uranium mines around the country
- Congress establishes a truly independent process to find and designate a permanent, deep-geological radioactive waste ***disposal*** (NOT storage) site – OTHER THAN Yucca Mt., Nevada

Consent-Based Siting

From: GINSBERG, Ellen [mailto:ecg@nei.org]
Sent: Friday, July 29, 2016 6:37 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Cc: Ernest.Moniz@Hq.Doe.gov; Croley, Steven <Steven.Croley@Hq.Doe.Gov>; margaret.doane@nrc.gov
Subject: Response to IPC

Dear Associate Deputy Assistant Secretary Griffith,

On behalf of the commercial nuclear industry, attached please find the comments of the Nuclear Energy Institute, Inc. (NEI) responding to the U.S. Department of Energy's Invitation for Public Comment (IPC) to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities, 80 Fed. Reg. 79,872 (Dec. 23, 2015).

We thank the Department in advance for its consideration of NEI's comments.

Ellen C. Ginsberg
Vice President, General Counsel and Secretary
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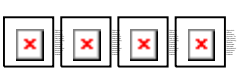

ELLEN C. GINSBERG
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NUCLEAR ENERGY INSTITUTE

July 29, 2016

Via First Class Mail and Email (consentbasedsiting@hq.doe.gov)

Mr. Andrew Griffith
Associate Deputy Assistant Secretary, Fuel Cycle Technologies
U.S. Department of Energy
Office of Nuclear Energy
1000 Independence Ave., SW
Washington D.C. 20585

Subject: Response of the Nuclear Energy Institute to DOE Invitation for Public Comment (IPC) to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities

Dear Associate Deputy Assistant Secretary Griffith:

On behalf of the commercial nuclear industry, the Nuclear Energy Institute, Inc. (NEI)[1] is pleased to comment on the U.S. Department of Energy's Invitation for Public Comment (IPC) to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities, 80 Fed. Reg. 79,872 (Dec. 23, 2015). The Invitation states that the Department "is implementing a consent-based siting process to establish an integrated waste management system to transport, store, and dispose of commercial spent nuclear fuel and high level defense radioactive waste," and that DOE commits to "work with communities, tribal governments and states across the country that express interest in hosting any of the facilities identified as part of an integrated waste management system."

Nuclear energy is an integral part of the country's diversified electricity generation portfolio and is by far the country's largest source of emission-free electricity. Nuclear energy provides a safe, affordable, and reliable electricity resource that currently provides 20% of the nation's

[1] NEI is responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including regulatory, financial, technical and legislative issues. NEI members include all companies licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

electricity. With $40–50 billion in annual electricity sales and over 100,000 personnel involved in production, the nuclear energy industry is an engine for job creation and America's economic growth.

In its Invitation, DOE notes that although commercial nuclear energy has been generated for over half a century, the United States does not have a permanent disposal solution for spent nuclear fuel (SNF) and high-level waste (HLW), and that previous attempts to develop long-term solutions for storage and disposal of this waste "have resulted in controversy, litigation, protracted delays, and ultimately a failure to address the problem." Notably, the Invitation does not allude to DOE's role in creating that controversy, litigation, delay and failure to resolve the radioactive waste disposal problem, or mention that the Nuclear Waste Policy Act ("NWPA") continues to require DOE to develop a disposal facility at Yucca Mountain.

Although the Invitation implies that DOE plans to implement a consent-based siting process, we respectfully suggest that the Department must follow current law, under which the proposed Yucca Mountain project remains the only SNF and HLW repository authorized to date. DOE should therefore request money from Congress to support the efforts of the U.S. Nuclear Regulatory Commission to complete the Yucca Mountain licensing review. If DOE does proceed with a consent-based siting approach, we emphasize that this would not, and legally cannot, substitute for compliance with the NWPA.

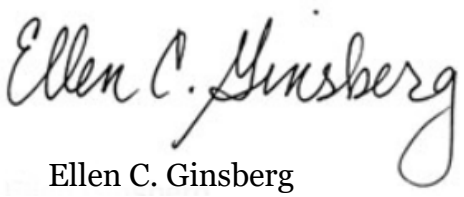
Moreover, any new DOE siting process should be used only in instances where the Department is establishing a *new* facility. Such a process is not appropriate, nor should it be imposed, for projects where siting assent has already been obtained or is currently being negotiated, as is the case for the interim storage projects proposed for Andrews County, Texas and southeast New Mexico.

In addition, DOE has an obligation to nuclear utilities and their customers, as well as other stakeholders, not to divert money from the Nuclear Waste Fund (NWF) for programs not authorized by the Nuclear Waste Policy Act. Because Congress has not approved a new nuclear waste disposal program, NWF money should not be used to explore the siting of a new radioactive waste disposal facility. In this regard, we distinguish siting a new nuclear waste disposal facility from funding benefits for the Yucca Mountain project, as the latter is authorized under the NWPA.

NEI's comments also discuss a number of domestic and international nuclear waste storage and disposal projects that could provide useful insights as DOE considers a consent-based siting process. With regard to the examples of unsuccessful siting, we urge the Department to explore the reasons for the failures that occurred and apply those lessons-learned to DOE's future siting efforts.

We thank the Department in advance for its consideration of NEI's comments.

Sincerely,



Ellen C. Ginsberg

Attachment

cc: The Honorable Ernest Moniz, Secretary, U.S. Department of Energy
Stephen Croley, Esq., General Counsel, Department of Energy
Margaret Doane, Esq., General Counsel, U.S. Nuclear Regulatory Commission

NEI RESPONSE TO DOE INVITATION FOR PUBLIC COMMENT TO INFORM THE DESIGN OF A CONSENT-BASED SITING PROCESS FOR NUCLEAR WASTE STORAGE AND DISPOSAL FACILITIES

On behalf of the commercial nuclear industry, the Nuclear Energy Institute, Inc. ("NEI")[1] is pleased to comment on the U.S. Department of Energy's "Invitation for Public Comment (IPC) to Inform the Design of a Consent-Based Siting Process for Nuclear Waste Storage and Disposal Facilities," 80 Fed. Reg. 79,872 (Dec. 23, 2015).[2] NEI's responses to the questions posed by the Department of Energy ("DOE" or "the Department") are set forth below.

> *IPC Question 1: How can the Department of Energy ensure that the process for selecting a site is fair? Consent-based siting seeks to ensure fairness in the distribution of costs, benefits, risks and responsibilities now and in future generations. How, in your view, can fairness be best assured by the process for selecting a site?*

I. NEI Response to IPC Question 1

A. Introduction and Overview

We commend DOE for recognizing that developing and presenting to the public a fair consent-based waste storage or disposal facility siting process is critically important to its ultimate success. According to Merriam-Webster, "fair" is defined as "in accordance with the rules or standards; legitimate." Synonyms include just, equitable, honest, upright and trustworthy. By including specific steps and features that convey DOE's commitment to fairness, to a just, equitable and honest process, DOE can instill in the public, confidence in that process.

By adhering to those steps and satisfying all of its obligations, including those under the Nuclear Waste Policy Act ("NWPA")[3] and any future nuclear storage and disposal

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[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including regulatory, financial, technical and legislative issues. NEI members include all companies licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

[2] The Department of Energy plans to conduct a consent-based siting process in multiple phases. During this first phase, DOE will seek public input regarding the most important elements to consider in a consent-based siting process. The second phase will focus on "designing a consent-based siting process to serve as a framework for collaborating with potentially interested host communities." In later phases, DOE will use the resulting process to work with interested communities. As the Department recognizes, many key questions relating to a consent-based siting process have yet to be resolved. *See* U.S. Dep't. of Energy, *Integrated Waste Management-Consent-Based Siting* (2016), pp. 9, 11-12. http://energy.gov/ne/downloads/integrated-waste-management-and-consent-based-siting-booklet ("DOE Consent-Based Siting Briefing").

[3] *See* Nuclear Waste Policy Act of 1982, H.R. 3809, 97th Cong. Pub. L. 97-425 (1982) ("NWPA").

programs, DOE can give the public confidence that the U.S. government will be a trustworthy partner as a proposed project proceeds. This is not to say, however, that even after a fair siting process is put into place and followed, there will not be dissenters who oppose the project. Rather, a fair siting process sponsored by a trustworthy partner (be it the government or a private developer) should be capable of withstanding public and legal scrutiny, and is more likely to lead to durable consent.

A fair siting process can take many forms but all share certain common features including, as a minimum, the following:

- Opportunity for interested parties to express their views
- Availability of sufficient resources to evaluate differing views
- Flexibility in the terms of the siting framework and the form of consent
- Transparency and a rational decision-making process
- A defined and expeditious schedule for milestones and decision-making
- Compliance with the obligations of the decision made.[4]

Properly implementing each of those features will maximize the likelihood of obtaining consent to the siting of a nuclear waste storage or disposal facility. Collectively, these attributes should engender trust in the siting process and in those responsible for implementing it. Without that trust, in our view, no siting process will lead to durable consent.

Although DOE seeks to construct a fair consent-based siting process, the Department undermines its own potential for success by its continuing failure to comply with the Nuclear Waste Policy Act.[5] DOE's noncompliance suggests that obligations arising under future siting decisions may remain unsatisfied *even if those decisions are reflected in federal law*. DOE's unilateral termination of the nuclear waste repository project at Yucca Mountain is unfair to the nuclear electric customers and utilities that

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[4] These attributes are consistent with those identified by the 2012 Blue Ribbon Commission Report. *See* U.S. Dept. Energy, *Report to the Secretary of Energy from the Blue Ribbon Commission on America's Nuclear Future* (January 2012) ("Blue Ribbon Commission"); DOE Consent Based Siting Briefing, p. 10.

[5] In enacting the NWPA, Congress developed, and the President signed into law, a carefully-crafted process that provided an unparalleled opportunity for state, local, and tribal participation in the siting process, including the right to a state siting veto. More than seven years have passed since the Department unilaterally determined that Yucca Mountain was "not a workable option," terminated the program, and tried to withdraw its license application. *NARUC v. DOE*, 680 F.3d 819, 821 (D.C. Cir. 2012). That notwithstanding, Section 160 of the NWPA designates Yucca Mountain, Nevada as the sole site to be characterized for a spent nuclear fuel and high level waste repository. 42 U.S.C. § 10172. The NWPA requires the Secretary to conduct "an orderly phase-out of site specific activities at all candidate sites other than the Yucca Mountain site" and "and terminate all site specific activities . . . at all candidate sites other than the Yucca Mountain site . . . ." 42 U.S.C. § 10172(a)(1)-(2). In addition, Section 161(a) of the NWPA prohibits the Secretary from "conduct[ing] site-specific activities with respect to a second repository unless Congress has specifically authorized and appropriated funds for such activities." 42 U.S.C. § 10172(a).

have paid more than $20 billion into the Nuclear Waste Fund ("NWF"),[6] to the utilities with decommissioned nuclear plants who wish to allow their sites to be returned to potentially unrestricted uses, to the local jurisdictions that supported (and continue to support) the Yucca Mountain project, and to the nation's taxpayers who must now pay for DOE's inaction. DOE's credibility—and the public confidence it seeks to engender as it attempts to construct a fair consent-based siting process—will continue to be undercut as long as the unlawful termination of the Yucca Mountain program continues.

DOE can begin to remedy negative perceptions regarding its credibility and willingness to meet its statutory responsibilities by supporting the efforts of the U.S. Nuclear Regulatory Commission ("NRC") to complete the review of the Department's Yucca Mountain repository license application. The Department's efforts to develop a consent-based siting program for *future projects* are more likely to be taken seriously by the public and stakeholders if, in parallel, DOE meets its legal obligation to continue the Yucca Mountain program. However, we emphasize that action on a consent-based siting program does not and legally cannot substitute for compliance with the Nuclear Waste Policy Act, which remains in force.

Another overarching point: if DOE does go forward with a consent-based siting process, it would be unfair and likely counterproductive to impose such a new process on existing, *i.e.*, relatively advanced, projects. Where local jurisdictions and states have voluntarily engaged in negotiations with potential interim storage facility developers, DOE should allow those interactions to proceed without intervention.[7] This point has very practical implications, as at least two projects to develop consolidated interim SNF storage facilities in the United States are well underway. In April of this year, Waste Control Specialists ("WCS") filed its application for an NRC license for a facility to be located in Andrews County, Texas. A second interim storage facility is being planned by Holtec International ("Holtec") in southeastern New Mexico; Holtec is expected to file the NRC license application for that site later this year. Both WCS and Holtec have expended considerable effort to gain the consent of their respective host states and communities. The Department should not interfere with the WCS and Holtec efforts (and perhaps others that may be in the offing in the near term) by imposing on them any consent-based siting process DOE ultimately develops. Nor should DOE require the WCS and Holtec projects to be stayed or delayed while DOE determines whether there are other communities that also might be interested in hosting storage or disposal facilities. Grafting a new siting process onto ongoing projects would be particularly unfair and provide no measureable benefit. Effectively or actually mandating a new siting process retroactively would create delay and/or burden for the project sponsors,

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6 U.S. Dep't of Energy, Office of the Inspector General and Office of Audits and Inspection, *"Audit Report: Department of Energy Nuclear Waste Fund's Fiscal year 2015 Financial Statement Audit,"* OAI-FS-16-03, p. 15 (2015); The Nuclear Waste Fund is established in the NWPA, § 302(c), 42 U.S.C. 10222(c).

7 As DOE recognizes, "voluntary efforts to site a consolidated waste storage facility have emerged in Texas and New Mexico, where a private waste management company and a consortium of local governments, respectively, have indicated interest in developing such a facility." *See* DOE Consent-Based Siting Briefing, p. 8.

the potential host jurisdictions, and the consumers of the storage services to be provided.

B. Attributes of a Fair Consent-based Siting Process

1. Opportunity for Interested Parties to Express their Views

Experience strongly suggests that consent to the siting of a new nuclear waste facility will not be obtained unless the host community, the host state, and the public have a fairly in-depth understanding of any given project. Further, both proponents and opponents should have an opportunity to air their views. And meaningful and constructive interaction can be formal or informal. How early that engagement begins and how frequently it occurs are more important than the specific process that governs the engagement.

For a proposed government-owned storage or disposal facility, it would be reasonable to expect DOE to interact with representatives of the local and host state government, as well as with local community members and other stakeholders. Whether government or private, the project sponsor should interact with elected or appointed officials as well as with local residents. Those interactions may take the form of public meetings in which there is an opportunity for discussion, and/or written comments and responses. Ultimately, the public should be apprised of any agreement related to the project, including information on the contours of the project/process, terms and conditions, and other commitments made by the relevant parties.

Particularly with respect to siting a nuclear waste storage facility, DOE (or the private developer if there is one) should explain to interested members of the public how the facility will fit into an integrated waste disposal program. This information will allow local jurisdictions and the state to examine the program's expected duration, potential monetary and other benefits, and potential costs. Regardless of whether DOE is the project developer or merely the consumer of available storage or disposal capacity, the Department should seek to build lasting and trusting partnerships with communities willing to host the facility.

Existing adjudicatory processes established pursuant to the Atomic Energy Act of 1954 ("AEA") and the National Environmental Policy Act ("NEPA") offer additional opportunities for stakeholders and states and local governments to provide input on and obtain relevant information about a proposed project. For example, in the context of the Yucca Mountain repository licensing process, NRC regulations provide that the Commission "shall permit intervention by the State and local governmental body (county, municipality or other subdivision) in which the geologic repository operations area is located, and by any affected Federally-recognized Indian Tribe." 73 Fed. Reg.

63,029, 63,031 (citing 10 C.F.R. § 2.309(d)(2)(iii)).[8] Commission regulations also "afford an interested State, local governmental body (county, municipality or other subdivision), and Federally-recognized Indian Tribe that has not been admitted as a party . . . a reasonable opportunity to participate in a hearing" on the Yucca Mountain license application. 10 C.F.R. § 2.315(c). The interested governmental entity would have a broad right of participation despite not being a full party to the proceeding. NRC regulations also require that the interested governmental entity "shall be permitted to introduce evidence, interrogate witnesses where cross examination by the parties is permitted, advise the Commission without requiring the representative to take a position with respect to the issue, file proposed findings in those proceedings where findings are permitted, and petition for review by the Commission . . . with respect to the admitted contentions." 73 Fed. Reg. 63,029, 63,031.

Importantly, the adjudicatory process often leads to resolution of issues through settlement or other actions. It is fairly common for a license applicant to revise its application or negotiate a settlement to resolve issues that are the subject of admitted contentions. By resolving issues of concern, parties can achieve meaningful and lasting consent. For example, during a recent NRC licensing proceeding on the renewal of the Prairie Island Nuclear Generating Plant Independent Spent Fuel Storage Installation ("ISFSI") license, applicant Northern States Power and intervenor Prairie Island Indian Community settled all of the Community's contentions,[9] which resulted in termination of the proceeding.

Beyond the adjudicatory process, NRC regulations require detailed safety and environmental reviews of a proposed storage or repository project, both of which allow members of the public to air concerns. When conducting its detailed safety review of an application, the NRC staff generally holds public meetings so that the NRC staff can ask the applicant questions and receive additional (written) input on the application. In performing the environmental review for a storage or disposal site, as required by NEPA and NRC regulations, the NRC staff will engage stakeholders in determining the scope of the review. The agency's evaluation and conclusions under NEPA are documented in a

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[8] In response to DOE's 2008 application to construct a geologic repository at Yucca Mountain in Nye County, Nevada, the NRC issued a Notice of Hearing and Opportunity to Petition for Leave to Intervene on the DOE Yucca Mountain Application. 73 Fed. Reg. 63,029 (Oct. 22, 2008).

[9] *Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Independent Spent Fuel Storage Installation), Order (Approving Settlement and Dismissal of Contentions 2 through 4), slip op. (Mar. 10, 2015) (unpublished). Applicant Northern States Power and the intervenor, the Prairie Island Indian Community, developed a Cultural Resource Management Plan that the applicant followed when implementing its ISFSI expansion. Pursuant to the Plan, the applicant conducted testing at the proposed ISFSI location pursuant to a joint protocol with the Community; the Community participated in the testing and concurred in the testing report. Additionally, the applicant revised its aging management program on high burnup fuel and agreed to a license condition requiring the submittal to the Community of certain evaluations related to the continued storage of high burnup fuel in the ISFSI. *See Northern States Power Co.* (Prairie Island Nuclear Generating Plant, Independent Spent Fuel Storage Installation), LBP-15-30, 82 N.R.C. ___, slip op. (Nov. 4, 2015).

draft Environmental Impact Statement ("EIS"); members of the public may comment on the draft EIS and have their views considered.[10]

2. Availability of Financial Resources to Evaluate Differing Views about the Project

Depending on the nuclear waste storage or disposal project being proposed, a consent-based siting process may include the opportunity for local jurisdictions to obtain funds to evaluate the project.[11] In general, fairness dictates that the parties in interest (e.g., the host location and the state) should have sufficient resources to ensure that they can base their opinion on accurate information. In fact, potential host communities and states will likely expect to receive funds for studies and other evaluations. The mechanics of the funding may, for example, take the form of a grant by a federal or state government entity, or a private project sponsor.[12]

DOE's proposal for consent-based siting implies that a new nuclear waste disposal project other than that at Yucca Mountain may be developed.[13] Because no new nuclear waste disposal program has been approved by Congress, no money from the Nuclear Waste Fund should be used to explore siting a new disposal facility. We distinguish siting a new nuclear waste disposal facility from funding benefits for Yucca Mountain, as those benefits may be funded with money from the NWF.[14] While we support some funding for local investigation and evaluation, we emphasize that without a change in the law, money from the Nuclear Waste Fund may not be diverted to support an alternative nuclear waste disposal program.[15]

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[10] There also may be other Federal agencies (*e.g.*, the U.S. Department of Interior, the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the U.S. Federal Railway Administration) and State agencies with jurisdiction over some aspects of the siting of nuclear waste storage and disposal facilities that may provide additional opportunities for public participation in administrative processes.

[11] *See* DOE Consent-Based Siting Briefing, p. 11.

[12] Local jurisdictions, in particular Nye County, NV, have long been supportive of the Yucca Mountain project. This may reflect their knowledge of the project's purpose and the scientific evaluations supporting it, as well as their interactions with officials representing DOE and the nuclear industry. In addition to the avenues previously discussed, the NRC's Yucca Mountain regulations specifically provide for research and development programs to address safety questions. *See* 10 C.F.R. §§ 63.21(c)(16), 63.32(b)(4).

[13] *See* DOE Consent-Based Siting Briefing, pp. 26-29. *See also NARUC v. DOE*, 736 F.3d 517, 519 (D.C. Cir. 2013). *See also* Yucca Mountain Development Resolution, H.J. Res. 87, 107th Congress, Pub. L. 107-200 (2002).

[14] *See* Report of the Blue Ribbon Commission, p. 58; NWPA, 42 U.S.C. 10222.

3. Flexibility in the Siting Framework and the Form of Consent

In developing a consent-based siting process, DOE should (and apparently does) recognize that a restrictive, one-size-fits-all definition of and approach to "consent" is likely to be counter-productive.[16] Each potential location for a proposed facility will be different, ranging from somewhat different to vastly different. The host communities may have different local customs, different views on federal, state and local government action, and different views on siting industrial facilities generally as well as nuclear storage or disposal facilities in particular. Those differences are both real and important. They should be carefully considered in any consent-based siting process, as recognizing them is likely to be key to a project developer's success in obtaining consent. These differences require that the Department develop a somewhat flexible siting framework: the process and the form of consent may need to differ from location to location, from state to state, and among tribal governments. DOE also should anticipate that the conditions that the government or a private developer might be asked to satisfy will vary from site to site.[17]

Similarly, there may be different expressions that meet the objective of consent. Of critical import, however, is ensuring that once an agreement is made, it is durable. A consent-based siting agreement must be able to withstand changes in politics and administrations because project developers (whether the government or a private entity) require sufficient certainty that they can make a reasonable decision based on likelihood of the success of the project. A siting agreement could be embodied in a law passed by a state legislature or Indian tribe council. A contract between a state and developer also could provide the certainty required to encourage investment in siting, licensing and constructing a storage or disposal facility. In sum, the form of the consent may vary, but its essential features must create sufficient certainty to encourage and facilitate investment of time and money.

4. Transparency and a Rational Decision-making Process

We recognize that decisions will be made by the project developer (be it the government or a private entity) and by the state and local jurisdiction that would host the facility. The need for a transparent and rational decision-making process applies to all of these interested parties, although these comments are oriented primarily toward the Department and the project developer.[18] Solid decision-making is more likely to lead to

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[16] *See* DOE Consent-Based Siting Briefing, pp. 10-12.

[17] We recognize that, at least at this time, it is difficult if not impossible to identify all the ways in which a siting process might be tailored to fit the circumstances of a particular situation, but including some form of the six features suggested in the introduction to question 1 would help provide both the appropriate structure and the needed flexibility.

[18] In its report, the Blue Ribbon Commission addressed the need for transparency in the siting process, defining "transparent" as the opportunity for all stakeholders to understand key decisions and engage in the process in a meaningful way. Similarly, in its Consent-Based Siting Briefing, DOE also recognizes the need to: "establish and maintain the information-sharing and transparency mechanisms that will be

consent if the decision-makers are credible and have gained the trust of the affected community; if they have appropriately considered the information accrued; and if they explain the bases for the choice being made in a timely, objective, and comprehensible manner. Those features should create transparency and lead to a rational decision.

However, following the approach outlined in these comments will not necessarily create unanimity of view in support of a decision to site and operate a nuclear waste storage or disposal facility in a particular community or state. There may be some citizens, legislators or other policymakers who, for whatever reason, simply do not believe it is in their interest for their jurisdiction to host such a facility. That should not, therefore, be the measure of consent.

DOE should recognize that even assuming a fair siting procedure that allows for affected or interested parties to participate, a consent-based siting process does not connote consensus by all of these parties. In fact, an expectation of unanimity simply is unrealistic. Throughout our nation's history, decisions made and implemented have rarely, if ever, received unanimous, or even near-unanimous, approval. As just one example, the Department of Energy Organization Act of 1977, which created the Department, passed both Houses of Congress with large majorities, but was by no means unanimous.[19] Yet it cannot be credibly argued that the Department was created without the consent of the Federal legislature.

5. A Defined and Expeditious Schedule for Milestones and Decision-making

Should DOE obtain the necessary statutory authority for a consent-based siting process, that process, once implemented for any given project, must proceed expeditiously. An expeditious, timely process, one for which the schedule is well communicated and maintained and firm commitments are met, is a necessary component for establishing and maintaining trust. In contrast, to those who are not deeply involved or generally knowledgeable, delay may appear to reflect waning support for the project, a failure to obtain necessary funds to support the siting process or project itself, or a myriad of other problems. Simply stated, delay is likely to engender public distrust and, potentially, hostility.[20]

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needed to build confidence in the process, assure all participants that they are working from the same shared basis of knowledge, and establish trust that future facilities will be sited and operated in a manner that fully protects the public and the environment. DOE has endorsed the proposition that prospective host jurisdictions must be recognized as partners . . . ." Report of the Blue Ribbon Commission at Sec. 6, p. 47; DOE Consent Based Siting Briefing at p. 12.

[19] *See* https://www.congress.gov/bill/95th-congress/senate-bill/826/actions (providing the legislative history of Senate Bill No. 826). Prior to being signed into law as Pub. Law 95-91, S.826 passed the House of Representatives by a vote of 353-57 and the Senate by a vote of 76-14.

[20] The Department is aware of this issue. In its Consent-Based Siting Briefing, DOE identifies as a key issue "how to balance the need for flexibility and adaptability in a staged process with the need for assurance that the process will move forward. Rigid deadlines have been a hallmark of previous waste

The importance of timeliness in developing a fair consent-based siting approach is vividly demonstrated by the criticism DOE has received for its delay. More than eighteen years have elapsed since the Department missed the January 31, 1998 statutory deadline to begin disposal of the nation's commercial spent nuclear fuel. More than seven years have passed since DOE deemed the Yucca Mountain repository project "unworkable" and unilaterally terminated the program. And more than three years have passed since DOE published its January 2013 Strategy for the Management and Disposal of Used Nuclear Fuel and High Level Radioactive Waste ("DOE Strategy"), wherein DOE announced that it would pursue a consent-based strategy. If DOE does create a consent-based siting process for new projects, stakeholders will need assurance that the process is likely to yield results that justify the effort and expense.

6. Compliance with the Obligations of the Decision Made

It is axiomatic that a fair process is one in which all parties to an agreement comply with the terms of that agreement, fulfill commitments made, and satisfy any conditions that may have been established. It would be ideal to have an iron-clad means of enforcing a consent-based siting decision, but as a practical matter, even that could be subjected to years of litigation and inaction.

As noted above, the Department's decision to jettison the Yucca Mountain repository program without any basis or authority to do so is exactly the kind of failure to meet an obligation that DOE should avoid going forward. Not only is DOE's action patently unfair, but it has already forced U.S. taxpayers to foot the bill for almost $5 billion in damages to compensate Standard Contract holders and their customers.[21] No siting process will be successful if the parties do not abide by the decision culminating from that process.

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management efforts that have not worked well. At the same time, Congress, stakeholders, and the public must have confidence that progress is being made." DOE Consent-Based Siting Briefing, at p. 11.

[21] U.S. Department of Energy, Office of the Inspector General and Office of Audits and Inspection, *"Audit Report: Department of Energy Nuclear Waste Fund's Fiscal year 2015 Financial Statement Audit,"* OAI-FS-16-03, at attachment pg. 20 (December 2015). By its own estimate, DOE's liability could reach $ 29 billion, assuming that the Department meets its NWPA obligation to remove commercial spent nuclear fuel from interim storage facilities by 2021.

> *IPC Question 2: What models and experience should the Department of Energy use in designing the process? The challenges and opportunities of site selection drive us to continue to learn from previous or ongoing examples. From your perspective, what experience and models do you think are the most relevant to consider and draw from in designing the process for selecting a site?*

II. NEI Response to IPC Question 2

There are several real-world examples of domestic and international nuclear waste storage and disposal projects that should be considered as DOE seeks to establish a new, consent-based process for siting nuclear waste storage and disposal facilities. As DOE has recognized,[22] some of these examples provide useful information on how to design such a process. There are also lessons to be learned from those efforts that failed. [23] As a general precept it may be reasonable to expect that a current host jurisdiction will be more receptive to siting a nuclear waste storage and disposal facility if the host community is familiar and comfortable with safely-conducted nuclear activities, such as nuclear power generation or low-level radioactive waste disposal. It also stands to reason that where host communities have built positive working relationships with a plant owner or operator and the local and/or Federal regulatory agencies that provide oversight, community members may be more inclined to consent to a proposal to site a new storage and disposal facility. By contrast, when DOE or a private developer is seeking to site its facility in a community that has not had previous experience with a nuclear (or even another large industrial facility), the care and attention given to the kinds of outreach described above becomes even more critical.

Further, there may be value in DOE's considering use of site-specific advisory boards similar to the eight "local" Environmental Management Site-Specific Advisory Boards (EMSSABs) that have been constituted pursuant to the Federal Advisory Committee Act ("FACA"). The use of these boards allows the general public to have access to information relevant to specific DOE sites undergoing environmental remediation. Advisory board presentations, reviews and recommendations are publicly available. The recommendations are not legal requirements. While only one FACA-chartered agency-wide EM SSAB exists, these 8 local boards[24] have been organized under its umbrella

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[22] *See* DOE Consent-Based Siting Briefing, pp. 13-14.

[23] These non-technical failures of the nuclear waste program would include the termination of the Yucca Mountain program, the termination of the Nuclear Waste Negotiator's Monitored Retrievable Storage (MRS) facility siting efforts, the termination of the second repository program, and the termination of the Hanford (Washington) and Deaf Smith County (Texas) site characterization efforts, among others. These examples illustrate that consent-based siting is not necessarily the panacea for the problems that have beset the nuclear waste program. While consent from the host jurisdictions may reduce the likelihood of failure, many factors, including political will, contribute to a program's success or failure.

[24] These local boards include the Hanford Advisory Board, Idaho National Laboratory Citizens Advisory Board, Northern New Mexico Citizens' Advisory Board, Nevada SSAB, Oak Ridge SSAB, Savannah River Site Citizens Advisory Board, and Portsmouth SSAB and Paducah Citizens Advisory Board.

charter. DOE has a long history with these sites and these local EMSSABs, and has developed extensive practices for dissemination of information to the public through the local boards as well as receiving recommendation and other inputs from them. Building on this experience, DOE should consider establishing somewhat similar local boards for sponsored consent-based sites, not as an approval entity but rather as a local, multi-interest group of citizens who may make observations and recommendations.

A. Lessons Learned from Successful Facility Siting Efforts

1. Olkiluoto Island Geologic Repository, Finland

The 2015 decision to grant a license to construct a geologic nuclear waste disposal facility at Olkiluoto Island in Finland suggests that building on previous positive experience can be an effective means of obtaining consent for a future project. As summarized in the 2012 Blue Ribbon Commission Report (at p. 49), Finland began its efforts to site a deep geologic repository with a three-step process: a nationwide screening process was undertaken in 1983; preliminary site investigations were conducted from 1986 to 1992; and detailed site investigations and environmental impact assessments on four sites were conducted from 1993 through 2000. All four sites were found to be technically suitable for a geologic repository but local support for a repository was strongest in the sites that each already hosted two operating nuclear reactors—Olkiluoto Island in the community of Eurajoki, and the community of Loviisa.[25]

Although the local Olkiluoto community arguably had a basis for concluding that a repository could be constructed and operated safely (and that Finnish regulators would ensure that was the case), the Eurajoki municipal council voted against the Olkiluoto site when it was first identified as a potential site in 1987. In its efforts to reverse Eurajoki's initial opposition to the repository, the company charged with developing the repository addressed the need for more effective financial benefits for hosting the facility (including tax revenues and a municipal compensation package), and also improved its community engagement program.[26] By the time the municipal council voted again in 2000 on a decision in principle to host a repository, it voted 20-7 in favor of the project. The Finnish government followed with a positive decision-in-principle in December 2000, and Finland's parliament overwhelmingly approved of the program by a vote of 159 to 3 in May 2001.

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[25] The two reactors at Olkiluoto commenced operation in 1978 and 1980, respectively. A third nuclear reactor is now under construction at Olkiluoto, and a repository for low and intermediate level waste began operating at the same site in 1992.

[26] Gibney, Elizabeth, *Why Finland Now Leads the World in Nuclear Waste Storage*, Nature, Dec. 2, 2015, *available at* http://www.nature.com/news/why-finland-now-leads-the-world-in-nuclear-waste-storage-1.18903 (last visited May 5, 2016).

Although any ultimate licensing decision is based on technical matters related to safety and environmental stewardship, the 2015 decision granting the Olkiluoto repository license also was supported by the community This is attributable, at least in part, to its twenty years of experience with other safely operated nuclear projects. The community also had an understanding of and appreciation for the associated regulatory processes, which apparently allowed it to put into context various actions by the project developer.

2. Waste Control Specialists Consolidated Interim Storage Facility

On April 28, 2016, Waste Control Specialists ("WCS") submitted to the NRC a license application to construct and operate a Consolidated Interim Storage Facility ("CISF") for commercial used nuclear fuel at its 14,000 acre facility in Andrews County, Texas. As proposed, the CISF would be built adjacent to WCS's existing low level radioactive waste ("LLRW") disposal facilities.[27] We understand that this project has been received positively at both the local and state levels.

WCS's history of safe disposal operations has been a significant factor in its approach to obtaining consent for the CISF. Construction of the first hazardous waste landfill began in 1995 at the WCS Andrews County Facility. WCS now holds multiple state and federal licenses and permits to treat, store, and dispose of LLRW at its Andrews County facility. WCS operates several other independent storage and disposal facilities: a Hazardous Waste Facility, a Byproduct Disposal Facility, a LLRW storage pad, a Federal Waste Facility, and the Texas Compact Waste Facility. WCS began disposing of commercial LLRW disposal from the Texas Compact (the States of Texas and Vermont) in 2012. In 2013, WCS began providing similar disposal options for DOE at the Federal Waste Facility. The Texas legislature began allowing LLRW disposal from additional states in 2011 and in 2014, the WCS LLRW license was amended to allow the disposal of large quantities of depleted uranium.

The stringent regulatory scheme under which the CISF facility will be licensed and operated also is likely to have helped foster confidence its activities can be carried out safely and competently. Licensing, permitting, and oversight for WCS's hazardous material and LLRW disposal operations are currently managed by a strong state regulator, the Texas Commission on Environmental Quality (TCEQ).[28] For the proposed CISF, the NRC will determine whether a license should be granted and will oversee CISF performance once it is operational. The NRC also will review the fabrication of the storage casks, inspect the operations of the interim storage facility prior to cask loading, observe initial cask loadings, and periodically inspect cask loading operations. The Texas TCEQ would likely continue to monitor additional site activity as part of the state giving its consent.

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[27] The sources of information for this discussion include the WCS website (*e.g.*, http://www.wcstexas.com/about-wcs/economic-impact) and the website for the proposed CISF (*e.g.*, http://wcsstorage.com/project-overview/; http://wcsstorage.com/faq/).

[28] Under the NRC Agreement State program, Texas has the authority to license and inspect byproduct, source, or special nuclear materials used or possessed within its borders.

In addition to WCS's history and the rigorous regulatory framework under which this facility would be licensed and operate, WCS has made significant efforts to earn consent from the local community and the State of Texas. WCS engaged in months of discussions with various members of the local community. When WCS presented its proposal to Andrews County in December 2014, the Andrews County Commissioners Court unanimously adopted a resolution of support for the project.[29] The resolution notes that Andrews County currently receives five percent of the gross receipts from disposals at the two operating LLRW facilities (thus far totaling over $7.85 million to Andrews County), expected to total more than $3 million per year. Further, the county resolution notes that the TCEQ believes a consolidated interim storage facility in Texas "is not only feasible but could be highly successful," provided the project "minimizes local and state opposition through stakeholder meetings, finding volunteer communities, financial incentives, and a process that is considered fair and technically rigorous."

WCS earned, and continues to have, consent for its operations through its positive history and outreach, and the additional opportunities for public participation as part of the regulatory licensing process. Thus, while mandating a new consent-based siting process would not be productive for the WCS CISF project at this point, DOE could usefully engage in additional outreach to enhance the likelihood of the WCS project's success.

3. H0ltec Storage Facility

On April 29, 2015, Holtec International announced that it had signed a memorandum of agreement (MOA) with the Eddy-Lea Energy Alliance (ELEA)—a company owned by New Mexico's Eddy and Lea counties and the cities of Carlsbad and Hobbs. The MOA set forth the parties' intent to establish a facility to store commercial used nuclear fuel until a geologic repository for permanent disposal becomes available. Holtec anticipates submitting an application for a NRC license later this year.

Holtec is undertaking activities intended to facilitate the development of the community's and the state's "consent." Apart from Hotec's proposal and history, the counties are familiar with nuclear operations generally. The Department of Energy has been disposing of long-lived low-level radioactive wastes (LLRW) in the Waste Isolation Pilot Plant (WIPP) in Eddy County since 1999 and in 2010, URENCO USA began operating a nuclear fuel enrichment facility in Lea County.

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[29] Among other things, the resolution acknowledges that "WCS has consistently shown its commitment to the environment and the citizens of Andrews County by . . . designing and operating safe, state-of-the-art radioactive materials facilities, working to ensure that Andrews County shares in economic benefits because of WCS operations, and working to ensure that local stakeholders are kept informed and made an integral part of the decision-making process concerning WCS operations" (http://www.co.andrews.tx.us/docs/WCS_Resolution.pdf).

Further, as the project developer, Holtec has also engaged in extensive outreach with the local community/counties and the State of New Mexico. Following months of discussions with the local community/counties and State government officials, New Mexico Governor Susana Martinez wrote to U.S. Secretary of Energy Dr. Ernest Moniz, to express her "support of the community leaders who continue to spearhead the effort to bring a consolidated interim storage facility for spent fuel to southeastern New Mexico."[30] Holtec is continuing to engage the community and state as it finalizes the NRC license application. As is the case with the WCS CISF project, no new consent-based siting process is needed for the Holtec project. Here too, DOE could usefully engage in additional outreach to support the project's success.

4. Nye County, Nevada, Early Warning Drilling Program (re Yucca Mountain)

The Nye County, Nevada Early Warning Drilling Program[31] illustrates how government funding of technical research can engender local community consent. The early warning drilling program was initiated as part of the Nye County Nuclear Waste Repository Project Office Independent Scientific Investigations Program. The purpose of Nye County's program was to provide geologic and hydrologic information that county officials believed should be included as part of DOE's characterization of the Yucca Mountain repository. Nye County sought to perform technical studies of an area located in a complex hydro-geologic system in the vicinity of Yucca Mountain. The Early Warning Drilling Program investigated (1) the origin of certain spring deposits; (2) the geology and hydraulic properties of the valley floor sediments; (3) recharge; and (4) ground-water flow patterns. Once it developed an understanding of the information resulting from the research, Nye County concluded that DOE's proposed monitoring system could be better designed to protect Nye County's water resources.

The Early Warning Drilling Program provided resources that enabled the local community to educate itself and reach its own conclusion on whether to support a proposed nuclear waste disposal facility. This is the type of support that could be provided to a potential host community, so that it can independently evaluate any risks associated with a proposed project.

5. Cigéo Deep Geologic Disposal Facility

Cigéo is the proposed nuclear waste geologic disposal facility to be built in France by ANDRA, the public entity in charge of the long-term management of all radioactive

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[30] Letter from the honorable Susana Martinez, Governor of New Mexico, to Dr. Ernest Moniz, Secretary of U.S. Department of Energy, April 10, 2015 (letter discussed the support from New Mexico to bring a consolidated interim storage facility to southeastern New Mexico).

[31] The sources of information for this discussion include the Nye County Nuclear Waste Repository Project Office website at http://www.nyecounty.com/ewdpmain.htm.

waste in France.[32] In 2006, the French Parliament implemented reversible deep geologic disposal as the solution for the long-term management of high level radioactive wastes. In 2009-2010, the French government approved an approximately 30km^2 site in a primarily rural area in northeastern France for further study.

Pursuant to the requirements of the Aarhus Convention, in 2013 France's National Public Debate Commission commenced the mandatory debate on Cigéo. A special public debate commission was convened and conducted several months of preparatory work, including consultation meetings and informing the public about the proposed process and project. The public debate, held from May 2013 through early 2014, included two large public meetings and small group discussions in villages surrounding the proposed site. Online debate sessions were also held, and a citizens' conference was conducted in 2014. The local press agreed to publish the public's questions and the answers provided by the special debate commission every Sunday. The public debate period was extended by an additional two months, as allowed by law, giving the community a voice.

The license application to construct Cigéo is expected to be filed in 2017 and construction is expected to begin in 2020. A pilot phase of disposal could start as soon as 2025. After Cigéo commences operation, ANDRA has proposed to hold regular meetings for stakeholders (review bodies, elected representatives, representatives of civil society, waste generators, etc.) to provide a forum for examining, among other things, feedback on the project's operation and the latest scientific and technical knowledge on geologic disposal.

The efforts undertaken at Cigéo to build community consent provide a number of useful insights that should be considered if DOE develops a consent-based siting program in the U.S. Indeed, the U.S. Nuclear Waste Technical Review Board ("NWTRB") has recognized the Cigéo project's long-standing efforts to gain and retain public trust, describing these efforts as a "dynamic and sustained effort to engage interested and affected parties," and establish "a strong and long-standing local presence."[33] The NWTRB observed that education is important to Cigéo's engagement activities, but so are "listening respectfully, responding to all questions, soliciting the residents' opinions and values, and adopting at least some suggestions" from the public. These efforts have resulted in "reservoir of trust" that "means that technical issues can be debated without rancor and that the implementer is given the benefit of doubt as it proceeds to plan for the repository's development." *Id*. It might be said that consent thereby developed may be the ultimate definition of success.

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[32] The sources of information for this discussion include the Cigéo website (http://cigeo.com/en/) and the ANDRA website (http://www.andra.fr/international/).

[33] Letter from Ewing, R., Chairman, U.S. NWTRB, to the Hon. Rodney P. Frelinghuysen (Sept. 16, 2013), available at http://www.nwtrb.gov/corr/rce013.pdf.

6. Canadian Nuclear Waste Management Organization

The Canadian Nuclear Waste Management Organization ("CNWMO") has developed a process for "identifying an informed and willing host community for a deep geologic repository for the long-term management of used nuclear fuel in Canada."[34] The principles of the CNWMO site selection process include helping to ensure that any community selected to host a repository is informed and willing to host it, ensuring the community carefully considers the repository's benefits and risks, and ensuring the community is involved in the assessment of any related health, environmental, social, economic, and cultural effects.[35] The CNWMO process requires that CNWMO representatives take actions both to build trust and educate community members.

Briefly summarized, the six siting-related steps that the CNWMO follows are:

1. The Canadian NWMO initiates the siting process with a broad program to provide information, answer questions and build awareness among Canadians about the project and siting process.
2. Communities identify their interest in learning more, and the Canadian NWMO provides detailed briefing and conducts an initial screening.
3. For interested communities, a preliminary assessment of potential suitability is conducted.
4. A detailed site evaluation is completed at the site identified as having strong potential to meet project requirements outlined in the preliminary assessment.
5. Communities with confirmed suitable sites decide whether they are willing to accept the project and propose the terms and conditions on which they would have the project proceed.
6. The Canadian NWMO and the community with the preferred site enter into a formal agreement to host the project.[36]

We note that in an effort to build trust and maintain open communication, the Canadian NWMO process gives potential host communities engaged in the site selection process the right to withdraw and end their involvement at any point until a final agreement is signed, subject to all regulatory requirements being met and approval received.[37] While having this feature may be desirable from the perspective of the host community or state, it also creates considerable uncertainty at all steps in the process. It may lead to project sponsors viewing interim commitments as sufficiently unreliable that they are unwilling to invest the millions of dollars up front, as is necessary in these projects.

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[34] Nuclear Waste Management Organization, Moving Forward Together: Process for Selecting a Site for Canada's Deep Geological Repository for Used Nuclear Fuel, p. 3, May 2010.

[35] Nuclear Waste Management Organization, *Guiding Principles,* https://www.nwmo.ca/en/Site-selection/About-the-Process/Guiding-Principles.

[36] Canadian Nuclear Waste Management Organization, Steps in the Process, https://www.nwmo.ca/en/Site-selection/Steps-in-the-Process.

[37] Nuclear Waste Management Organization, *supra* note 34, at 17.

While we fully agree that there should be opportunity to decline to consent, it must come well before the 11th hour.

B. Lessons Learned from Unsuccessful Facility Siting Efforts

1. The Nuclear Waste Negotiator Process

The 1987 amendments to the Nuclear Waste Policy Act added Title IV, establishing the Nuclear Waste Negotiator (*see* 42 U.S.C. §§ 10241–10251). The Negotiator was charged with trying to find a State or Indian Tribe willing to host a repository or monitored retrievable storage ("MRS") facility[38] at a qualified site "on reasonable terms," and to "negotiate with any State or Indian Tribe which expresses an interest in hosting a repository or monitored retrievable storage facility." NWPA Sec. 402(b)(2), 42 U.S.C. § 10242.

Once confirmed, the Negotiator began an effort to identify States and Tribes willing to consider hosting a repository or monitored retrievable storage (MRS) facility. After a significant outreach program, sixteen Tribes and four counties asked to participate in the Negotiator's program. The Negotiator created a phased program, inviting those jurisdictions to participate in the initial phases without commitment to subsequent phases. Each phase entitled participants to receive defined grants from the Negotiator to fund exploration of their interest in becoming a volunteer host. For example, Phase I participants each received a grant of $100,000. Eight Tribes applied for the $200,000 Phase IIA grants, the other Phase I participants having withdrawn.[39] The participating tribes retained experts, visited existing dry storage facilities and reprocessing plants, and otherwise educated themselves on what hosting an MRS facility would entail. Applications for $2.8 million Phase IIB grants were received from the Mescalero Apache Tribe and some of the other Phase 2A participants.

Despite the expressions of interest, prior to the disbursement of Phase IIB grants, members of Congress sponsored an amendment to the FY 1993 energy and water appropriations bill that blocked further funding for the Negotiator's grants to any of the interested Tribes. The Negotiator's efforts fell victim to politics, which provides a cautionary tale about the need to potentially cast a wide net in terms of outreach. That is, while it is unclear at this point whether the Negotiator's efforts ultimately would have been successful, DOE and private project sponsors should not overlook the host state's congressional delegations as well as others in Congress who may be asked to vote on a bill affecting a particular project. Reaching out to as many stakeholders as possible may facilitate consent but may not be sufficient to eliminate all objections.

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[38] A "monitored retrievable storage facility" is defined as a facility for storing high-level radioactive waste and spent nuclear fuel from civilian nuclear activities that permits monitoring and management "for the foreseeable future" and "as long as may be necessary," and provides for ready retrieval. NWPA §§ 2(34) and 141(b)(1), 42 U.S.C. §§ 10101(2)(34) and 10161 (b)(1)(A-D).

[39] Two local communities were interested in Phase IIA participation but were blocked by their governors.

2. DOE's North Dakota Borehole Drilling Test Project

The cancellation of the recent borehole drilling test project in North Dakota illustrates how certain action and inaction can impede efforts to earn community consent. Following the Department's announcement of a research and development plan for deep borehole disposal in its January 2013 Strategy, DOE announced in January of this year that it had selected a Battelle Memorial Institute-led team to drill a test borehole of over 16,000 feet into a rock formation near Rugby, North Dakota. The described purpose was to "explor[e] the science needed for utilization of deep boreholes in crystalline rock formations," including for potential disposal of some high level radioactive wastes."[40] Two months later, the Department cancelled the project "in response to formal opposition from the local county commission." The reason articulated for this outcome was that "local officials and residents worried the study would lead to future nuclear waste storage in the area."[41] This concern was compounded by the fact that residents and county officials "felt out of the loop during the process," pointing to the somewhat extraordinary fact that county officials "learned of the project by reading the newspaper in January."[42]

This example is clear on its face. Even though DOE followed the procurement process associated with the project, overcoming opposition and potentially gaining consent depends on early and ongoing outreach to the community, members of the public, State and federal representatives and many others. The failure to effectively do so in this case contributed to the cancellation of the proposed project.

We note, however, that this example is not intended to stand for the proposition that early and extensive outreach necessarily will lead to consent from the host community state and others. Rather, it demonstrates that without such outreach and attention to all constituent interests, it is highly likely that those who oppose the project will not be persuaded to reconsider and that those "on the fence" will not have the information to develop the trust necessary to consent to a proposed project going forward.

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[40] *Energy Department Selects Battelle Team for a Deep Borehole Field Test in North Dakota*, Jan. 5, 2016, available at http://www.energy.gov/articles/energy-department-selects-battelle-team-deep-borehole-field-test-north-dakota.

[41] *DOE Axes North Dakota Borehole Project*, Mar. 4, 2016, available at http://www.exchangemonitor.com/publication/exchange-monitor/doe-axes-north-dakota-borehole-project-2/.

[42] *Id.*

> *IPC Question 3: Who should be involved in the process for selecting a site, and what is their role? The Department believes that there may be a wide range of communities who will want to learn more and be involved in selecting a site. Participation in the process for selecting a site carries important responsibilities. What are your views on who should be involved and the roles participants should have?*

III. NEI Response to IPC Question 3

NEI believes the following entities should be involved in a consent-based process for selecting a nuclear waste site.

Federal Government (DOE). For proposed sites for which DOE either is the project developer or will be a consumer of the waste storage or disposal services, the Department will need to take action to earn the trust, and in turn the consent, of the host state and community. As noted elsewhere in these comments, DOE's siting process must be fair, transparent, and rational. It must allow affected parties to express their views, provide flexibility in the form of consent required, impose and adhere to a reasonably expeditious schedule for decision-making, and provide for compliance with the obligations of the siting decision once made.

As the project developer, DOE should undertake outreach programs to address the host community's concerns, and to provide financial and technical assistance to host communities and States. These resources will be needed for the host jurisdictions to educate residents, conduct their own technological inquiries, evaluate differing views about the project, etc. [43] These efforts must be initiated early and should continue during facility operation. Federal financial and technical assistance to host communities and States should facilitate their ability to gauge support for the project. Absent that information, the host jurisdiction may not be in a position to formally propose a site for hosting a facility, or formally accept a proposal to host a facility. (Such a collaborative approach is consistent with that generally described in the DOE Consent-Based Siting Briefing.)

Applicant (if other than DOE). Although the Department's Invitation for Public Comment does not specifically address the question of regulatory authority for a new consent-based siting process, we assume that the Department would implement the process. If not, the other Federal or private entities involved should be responsible for implementing the process and undertaking the role outlined above. Further, the applicant must ensure that it continues to build on any existing consent (for projects to be located in communities with significant nuclear experience), and works to earn and

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[43] The Report of the Blue Ribbon Commission (p. 47) makes a similar point concerning the importance of crafting a siting process that is "standards and science-based" in the sense that "the public can have confidence that all facilities meet rigorous, objective, and consistently applied standards of safety and environmental protection." *See also* the DOE Consent-Based Siting Briefing, p. 10.

maintain the consent with the host community(ies), through information sharing, responsiveness to concerns raised, education, and other activities.

Host State/Tribe/Locality. These entities must be involved in the process for selecting a nuclear waste site. Further, DOE will be responsible for educating the host community, county, and/or state about the process of nuclear waste facility siting, the relevant licensing and regulatory oversight processes, and the potential benefits that may be provided for hosting a storage or disposal facility. Additionally, DOE should ensure the host jurisdictions have a public forum (formal or informal) to articulate safety concerns, to discuss potential economic benefits, and otherwise engage with federal government representatives. The host jurisdictions must be engaged as early in the process as possible, and interactions must continue following operation.

Nuclear Industry. The nuclear industry looks forward to the opportunity to assist in providing information to communities interested in hosting a storage or disposal facility. Additionally, any consent based siting process must recognize the industry's integral interest in storage and disposal of used nuclear fuel.

> *IPC Question 4: What information and resources do you think would facilitate your participation? The Department of Energy is committed to ensuring that people and communities have sufficient information and access to resources for engaging fully and effectively in siting. What information and resources would be essential to enable you to learn the most about and participate in the siting process?*

IV. NEI Response to IPC Question 4

As a minimum, the Department should provide a definitive project description and a statement of the criteria to be used in a consent-based siting effort. The industry and other stakeholders should be given as much information as possible so that each can perform an in-depth evaluation of the potential site in a timely fashion. Additionally, DOE's resolution of key issues such as those listed at pp. 11-12 of the Consent-Based Siting Briefing will provide additional clarity and detail that should facilitate the informed participation of all interested parties.

> *IPC Question 5: What else should be considered? The questions posed in this document are a starting point for discussion on the design of the process for consent-based siting of nuclear waste facilities, the Department of Energy would like to hear about and discuss any related questions, issues, and ideas that you think are important.*

V. NEI Response to IPC Question 5

As this question recognizes, the Department's proposal to create a consent-based siting process for future nuclear waste facilities raises a number of important legal, practical,

and policy issues. DOE will need to resolve these complex issues before moving forward with a proposed process. A list of initial questions that warrant DOE's consideration appears below.

A. Legislative Issues

According to the Department's *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste*, Jan. 2013 ("Strategy"),[44] DOE intends to have (1) a pilot interim storage facility operating in 2021 (focusing on accepting used fuel from shutdown sites); (2) a larger, full scale interim storage facility operating four years later in 2025 that has "sufficient capacity to provide flexibility in the waste management system" and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and (3) a geologic repository available by 2048. See also DOE's summary of the Administration's Strategy at 80 Fed. Reg. 79,872 (Dec. 23, 2015).

The Invitation for Public Comment does not discuss how the Department plans to meet these proposed milestones in the Strategy. The public will need that that information to prepare meaningful and comprehensive responsive comments. For example, will the Department seek the legislative authority that it has long stated it needs for interim storage and, if so, when? Does DOE intend to develop more than one interim storage facility, or repository? If so, how much capacity does the Department anticipate is needed for each facility?

Is there any basis in the Nuclear Waste Policy Act for the use of a DOE consent-based siting process in connection with future nuclear waste storage or disposal facilities?

Does the Department plan to seek legislative authority specifically for a consent-based siting process before initiating that process? If so, what would be the statutory basis for DOE to create and implement a consent-based siting process?

B. Issues relating to the Concept of "Consent-based Siting"

How does DOE intend to manage and administer the project?

DOE abolished its Office of Civilian Radioactive Waste Management—will it re-establish OCRWM, establish another office, or try to run the project out of the Office of Nuclear Energy?

What type of authority will the DOE or the administering individual/entity have? How will DOE establish and monitor accountability for the program?

What criteria does DOE plan to use to distinguish among multiple sites?

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44 *See* http://www.energy.gov/downloads/strategy-management-and-disposal-used-nuclear-fuel-and-high-level-radioactive-waste.

From what entities must consent to the siting of a new nuclear waste facility be obtained?

Does consent given at an initial or early stage of the siting process have to be "refreshed" or reconfirmed at subsequent stages of the siting process?

Is there a point at which further consent from the consenting host jurisdiction is no longer needed? If so, when is that point?

Will a siting commitment negotiated through the DOE consent-based siting process be subject to veto by a state legislature or by Congress, in the event an elected official disagrees with the decision of a host community that has volunteered to site a nuclear waste facility?

Under what circumstances, if any, may consent to the siting of a nuclear waste facility be revoked? What entities (community/town, county, state) would have authority to revoke consent?

What, if any, consequences should attach to the host community's withdrawal of consent at various stages of the process? For example, could monetary and other benefits provided to the host jurisdiction be withdrawn?

How can the consent-based siting process ensure that any result is fair and effective from the perspective of Standard Contract holders?

What steps, if any, can or should be taken to prevent rescission of consent, once the process becomes final?

Putting aside the question of the source of funding (Nuclear Waste Fund vs. general appropriations), does the Department propose to provide financial assistance to potential host communities through the consent-based siting process? How will DOE gauge the appropriate level of funding?

What types of interested parties should be entitled to such funding (*e.g.*, tribes, host communities, host counties, host states, environmental organizations, potential private participants, private participants (such as site developers, vendors, utilities)?

Consent-Based Siting

From: John/Sally Weaver Glick [mailto:jswglick@gmail.com]
Sent: Friday, July 29, 2016 4:06 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

To: Department of Energy

This country, indeed the entire globe, cannot tolerate more toxic waste, especially radioactive waste. We MUST NOT generate more nuclear waste, and MUST NOT store existing nuclear waste anywhere near where people live, near sources of water or in locations that may be disturbed by human or geological activity.

We have clean alternatives to energy creation, and must pursue these instead of nuclear power. We must also pursue incentives to reduce unnecessary use of energy, and continuously ramp down our total energy consumption as a nation. We can learn much from other nations who are well ahead of the U.S. on this path.

Sincerely and with urgency,
John Glick
Elkhart County
Indiana

Consent-Based Siting

From: Nezhad, Cyrus
Sent: Friday, April 29, 2016 2:28 PM
To: Consent Based Siting
Subject: FW: Consent-Based Waste Siting Meeting - Sacramento, April 26, 2016

From: William P Gloege [mailto:wpgloege@gmail.com]
Sent: Thursday, April 28, 2016 9:44 PM
To: Nezhad, Cyrus <Cyrus.Nezhad@hq.doe.gov>
Subject: Consent-Based Waste Siting Meeting - Sacramento, April 26, 2016

Dear Mr. Nezhad,

It was a pleasure meeting and talking with you on Tuesday in Sacramento.

I think this process is going to work for DOE. It just has to be done carefully and tactfully to be a success.

Benefits of accepting a site must be communicated to communities. Waste could turn out to be a valuable commodity as fuel for future reactor technologies. That seems pretty certain from what I've heard from scientists. Of course, DOE can't over-promise, but these future benefits should be carefully researched and potential communities should be made aware of results.

One request I have is to find out how the dias speaker panel was selected and by whom. Is this public information?

I was disappointed to see Rochelle Becker in a favored speaker position since she has devoted her life and organization to shutting nuclear plants for decades.

Speakers and the whole process should be free of individuals with such agendas and biases if DOE wants a credible, workable outcome - which I feel the Secretary does truly want.

I also hope this process is moved forward expeditiously, given the President's urgent emphasis on addressing the climate problem. Since the relatively few nuclear reactors in America (compared to the total number of power plants which I think is around 6,000) are turning out 63.3% of our emission-free electricity right now, nuclear power is obviously a power source we need to emphasize and expand if we are to curb the menace of global warming.

It is important to realize America is the special nation, since the world looks to us for guidance on such global issues as climate change. This makes our choices and speedy movement toward ways of addressing the problem all the more important.

Our non-profit, volunteer expert citizen group, I want to emphasize again, is an environmental one. We are not committed to any single power source. We just want a source that is ready and capable of meeting the challenge of powering America without carbon emissions. In terms of scale, we see nuclear as the obvious choice today. .

Thank you.

William Gloege
president, Californians for Green Nuclear Power
CGNP.org
http://facebook.com/GreenNuclearPower

Consent-Based Siting

From: Ed Gogol [mailto:ed@mra500.net]
Sent: Monday, July 25, 2016 11:42 AM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

This plan is absurd. There can be no safe solution to disposal of nuclear waste that remains deadly for thousands of years. The only safe solution is to shut all nuclear power plants immediately, and replace them with safe, clean, truly renewable solar and wind power. Please make certain this happens immediately.

Ed Gogol
835 Arbor Lane, Glenview IL 60025
224-565-1500

Consent-Based Siting

From: Olga Comcast [mailto:oguerra@comcast.net]
Sent: Sunday, July 31, 2016 11:37 PM
To: Consent Based Siting <consentbasedsiting@hq.doe.gov>
Subject: Response to IPC

I am strongly opposed to "Consent Based Siting" of nuclear waste around the US.

This process is biased against communities struggling financially due to factory closings and the global economy. Choosing an atomic waste dump is tempting to towns and villages so anxious to increase short term income and economic survival that they are willing to sacrifice long-term environmental damage in return for that income.

At its heart, the *consent based process* is an environmental justice violation as well as a DOE method to avoid finding an appropriate scientifically viable site to dump by foisting it on impoverished citizens who will not mount a protest.

Nuclear waste remains toxic for tens of thousands of years. The *consent based siting* proposed by the DOE lures currently underemployed citizens to commit their hometown community for hundreds of future generations of potential genetic damage in return for a short term income gain to a few individuals, who own that land.

Furthermore, as nuclear waste remains toxic for tens of thousands of years, a de-centralized solution to its storage will require perpetual isolation, maintenance, monitoring and warnings in hundreds or thousands of sites. This is inefficient and bound to fail, with disastrous consequences. Breaches of security, corrosion, lapses of management &/or funding are certain to occur over this unimaginable time span. Your proposed decentralized solution is exactly the opposite of Finland's Onkalo spent nuclear fuel repository based on the KBS-3 method developed in Sweden. I wonder if you have studied this alternative? Though not perfect, it is vastly better than your proposed plan.

Your proposal is a dystopian solution that will make countless communities pay with their health and the health of their children's children ad infinitum for the folly of an industry that went ahead full throttle with no solution for its waste.

To quote a well-known Iroquois principal: "In every deliberation, we must consider the impact on the seventh generation." In the case of nuclear waste, we must consider the impact on over 1,000 generations. Is toxic radioactive waste scattered across America the legacy we want to leave our descendants? NO!

WE THE PEOPLE DO NOT CONSENT.

Thank you for your consideration.

Sincerely,
Olga Guerra