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NUCLEAR REACTOR DECOMMISSIONING: STAKEHOLDER VIEWS

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED THIRTEENTH CONGRESS

SECOND SESSION

MAY 14, 2014

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ONE HUNDRED THIRTEENTH CONGRESS
SECOND SESSION

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NUCLEAR REACTOR DECOMMISSIONING: STAKEHOLDER VIEWS

WEDNESDAY, MAY 14, 2014

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee met, pursuant to notice, at 10:02 a.m. in room 406, Dirksen Senate Building, Hon. Barbara Boxer (chairman of the committee) presiding.

Present: Senators Boxer, Sanders, Markey, Vitter, Sessions and Inhofe.

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. Good morning.

We have a wonderful panel here and several members. We are going to keep our opening statements to three to 4 minutes each. We have a vote in an hour.

We are holding a hearing on the issues facing communities located near decommissioning nuclear reactors.

Last year, four nuclear reactors were shut down permanently, including those at California San Onofre, which closed because of a severe safety failure. A fifth reactor at the Vermont Yankee plant will close at the end of this year and analysts have predicted more closures will follow.

The San Onofre closures may bring some relief to California communities worried about the reactor's safety but I am concerned that the Nuclear Regulatory Commission is not doing everything it can to keep these communities safe during the decommissioning process, including maintaining all emergency response capabilities.

The people who live and work nearby need to have a voice in the decommissioning process and we will hear from a representative of one of those communities today.

When reactors shut down, they stop producing energy. However, all of the highly radioactive fuel must remain stored in a large pool of cooling water five to 7 years after it comes out of the reactor core because it is far too dangerous to remove.

Today, I plan to discuss studies that have shown that an accident or terror attack on a crowded spent fuel pool could result in spontaneous fire and the release of large quantities of radiation. We don't want that to happen.

The NRC has also determined that an earthquake would be the most likely cause of a spent fuel pool accident. It seems that some

of these plants are located on or near earthquake faults. We must ensure that these scenarios are addressed.

At San Onofre, the spent fuel pools were designed to hold a total of 600 spent fuel assemblies but currently they hold more than 2,600. That over crowding puts them at risk of serious safety consequences if they experience an accident or terror attack. Make no mistake, the reactors may be shut down but the risk of an accident or an attack has not gone away.

While NRC Chairman Allison Macfarlane co-authored a paper that found that the long term land contamination consequences for spent fuel fire "could be significantly worse than Chernobyl," NRC has taken no action thus far to ensure appropriate levels of protection are in place.

In fact, every time operators of decommissioning reactors have asked to be exempted from NRC's emergency response regulations, the NRC has said yes. That means no more evacuation zones or planning, no more warning sirens and no more emergency relocation centers.

NRC justifies this by saying a spent fuel fire at a decommissioning reactor would take 10 hours to ignite after an accident or terror attack occurred. NRC also assumes that 10 hours would be enough to fix the problem.

Hoping that the consequences of a catastrophe on a spent fuel pool could be stopped within 10 hours is not responsible or realistic. For examples, less than 10 hours after the earthquake and tsunami at Fukushima, high levels of radiation were already being measured outside the reactor buildings and most of the fire trucks and the pumps that were supposed to provide water to cool the reactors were found to be unusable. I think we remember that.

We just cannot assume that everything will go as NRC hopes. You don't go into the situation with just hope. You have to have a plan. That is why yesterday I introduced the Safe and Secure Decommissioning Act of 2014.

This bill prohibits the NRC from approving any emergency response or security exemption requests that are supposed to protect against a spent fuel accident until all the spent fuel is placed into safer, dry cast storage. I have also co-sponsored two other bills by Senators Sanders and Markey.

Safety for the American people is our No. 1 priority and it doesn't change whether a nuclear facility is fully operational or shut down. I look forward to hearing from witnesses so we can make sure we get all the information we need to keep communities located near decommissioning reactors as safe as they can be.

With that, I will call on Senator Inhofe.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Thank you, Madam Chairman.

I have been critical of the NRC over a lot of things. Current electricity markets and the lack of demand for new nuclear power plants means that the NRC has a budget that I believe is too big. The NRC's budget has allowed its staff to swell to what I believe are unjustifiable levels which has resulted in development of new and unnecessary regulations.

Putting that aside, I have full confidence in the NRC's ability to handle the nuclear decommissioning process. They have done it successfully many times and the agency is handling the current decommissioning projects well.

I know there are some, including Senators Sanders and Boxer, who are concerned that the level of community engagement allowed by the NRC and the plant operators during the decommissioning process has been lacking and this justifies the need for additional Federal legislation or NRC regulations. I don't think that is the case.

All the plants currently undergoing decommissioning have gone out of their way to engage the public. They have allowed the public to air their concerns and frustrations and have communicated what they are doing at every step of the process.

To me, this kind of responsiveness is exactly what we need. We should not legislate something that is working well on a voluntary basis. Other concerns have been raised over the safety of spent fuels that have been removed from reactors and decommissioned plants.

I am going to shorten my statement in accordance with the timeframe that we have here.

This committee and the NRC have been particularly concerned about the U.S. nuclear fleet risk to the Fukushima like event. Importantly, at Fukushima, the spent fuel structures were not compromised and neither was the fuel inside them.

Regardless, the NRC staff conducted a study on the U.S. fleet's spent fuel pool risk and concluded, "The likelihood of a radiological release is very low, about 1 time in 10,000,000 years or lower." The study predicted no early fatalities attributable to radiation exposure.

"Consequently, our staff concluded expediting movement of spent fuel from the pool does not provide a substantial safety enhancement."

They also recommended that this issue be put to rest and that the agency's time and resources be spent on other priorities. Knowing this, calls to expedite the transfer of fuel from pools to casks are unwarranted as the calls to maintain security and regulatory protocols at unnecessarily high levels at decommissioning sites.

Pushes like this add tremendously to the cumulative cost of operating and maintaining a nuclear plant. That cannot be understated. The nuclear power industry is incredibly important to this country. It accounts for 20 percent of our electricity generation, but many plants are hobbling along right now.

The cumulative cost of the regulations on the industry, whether from the EPA with its impeding 316(b) rule, with which we are all very familiar, or the NRC with its front end and back end regulatory control of our plants' operations are the main threat to the nuclear industry's future.

We, on this committee, need to treat these assets as what they are, intentionally valuable. I think this is a well-balanced committee and I have quite specific questions and I do want to make sure we get the answers in the record, Madam Chairman.

Thank you for holding this meeting.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON JAMES M. INHOFE, U.S. SENATOR
FROM THE STATE OF OKLAHOMA

I have been critical of the Nuclear Regulatory Commission over many things. For one, current electricity markets and the lack of demand for new nuclear power plants means that the NRC has a budget that's too big. The NRC's budget has allowed its staff to swell to unjustifiable levels, which has resulted in the development of new and unnecessary regulations. Putting that aside, I have full confidence in the NRC's ability to handle the nuclear decommissioning process. They've done it successfully many times, and the agency is handling the current decommissioning projects well. I know some are concerned that the level of community engagement allowed by NRC and the plant operators during the decommissioning process has been lacking, and that this justifies the need for additional Federal legislation or NRC regulations, but I don't think this is necessary.

All of the plants currently undergoing decommissioning have gone out of their way to engage the public. They have allowed the public to air their concerns and frustrations, and they have communicated what they're doing at every step of the process. To me, this kind of responsiveness is exactly what we need. We should not legislate something that's working well on a voluntary basis. Other concerns have been raised over the safety of spent fuel that has been removed from the reactors of decommissioned plants. Spent fuel must spend a time in pools after being removed from a reactor so they can cool down. Once cool enough, they can be stored in dry casks and eventually placed at Yucca Mountain for long term storage. And it's important to note that when fuel is removed from the reactor and placed in spent fuel pools, the risk profile of the site goes down dramatically.

This Committee and the NRC have been particularly concerned about the U.S. nuclear fleet's risk to a Fukushima-like event. Importantly, at Fukushima the spent fuel structures were not compromised and neither was the fuel inside them. Regardless, the NRC staff conducted a study on the U.S. fleet's spent fuel pool risk and concluded that "the likelihood of a radiological release[is] very low (about 1 time in 10 million years or lower) . . . [and] the study predicted no early fatalities attributable to radiation exposure." Consequently, the staff concluded that "expediting movement of spent fuel from the pool does not provide a substantial safety enhancement." They also recommended that this issue be put to rest and that the agency's time and resources be spent on other priorities. Knowing this, calls to expedite the transfer of fuel from pools to casks are unwarranted, as are calls to maintain security and regulatory protocols at unnecessarily high levels at decommissioning sites.

Pushes like this add tremendously to the cumulative cost of operating and maintaining a nuclear power plant. And that can't be underestimated. The nuclear power industry is incredibly important to this country. It accounts for 20 percent of our electricity generation, but many plants are hobbling along in profitability right now. The cumulative cost of regulations on the industry—whether from the EPA with its impending 316(b) rule or the NRC with its front-end and back-end regulatory control over a plant's operations—are the main threat to the nuclear industry's future. We on this committee need to treat these assets for what they are—intensely valuable, fully depreciated societal treasures that provide the Nation with the cheap, clean, and reliable electricity we need to create jobs and prosperity.

Senator BOXER. Without a doubt, we will do that.

Senator Sanders.

OPENING STATEMENT OF HON. BERNARD SANDERS, U.S. SENATOR FROM THE STATE OF VERMONT

Senator SANDERS. Madam Chair, thank you very much for holding this hearing which I will tell you deals with an issue of great importance to the people of the State of Vermont and States around this country which have nuclear plants that are being decommissioned.

As you know, when one closes down a nuclear power plant, it means lost jobs. In the case of the Yankee Nuclear power plant, we are talking about several hundred jobs. It means lost revenue to the community and lost revenue to the State. Mostly, it is an issue of safety. People want to know what is happening in that plant and the nature of the decommissioning.

We in Vermont are very concerned that the decommissioning process could take up to 60 years. Let me repeat that. There are some suggestions that the decommissioning of Vermont Yankee could take up to 60 years. Frankly, that is not acceptable to the people of the State of Vermont but that could happen under the current NRC rules.

The licensee in Vermont has a long history of safety and disclosure problems, despite NRC oversight including the collapse of a cooling tower and multiple leaks of radioactive material. The prospect of letting a dangerous plant sit there decade after decade after decade makes the people of the State of Vermont very uncomfortable.

I am sure Vermonters are not alone in their concern. I suspect, Chairman Boxer, that same concern exists in California and in other States with nuclear power plants that are being shut down.

The problem we are dealing with is that the NRC now does not allow host States, the States that host the nuclear power plant, any kind of meaningful role in crafting the decommissioning plant despite the obvious impact to those States. A plant is sitting in a State, the plant's closing has enormous impact on the State, yet the State has very, very little say in how that plant is being closed.

For my conservative friends who worry about local control, I would suggest this is very much a local control issue. At best, currently, States have a token opportunity to provide public comment after the plant is already finalized, but this is not good enough.

In our case, the Vermont Yankee licensee could adopt a decommissioning plan that ignores needs and interests of Vermonters and the State would have no recourse. To my mind, that is unfair and unreasonable.

I want to acknowledge the significance of the agreement that the State of Vermont struck with Entergy, which owns Vermont Yankee, which was approved by the Public Service Board in March and which signals an improved relationship. That is a step forward.

However, even this agreement does not address many of the most difficult issues. Under current law, there is no assurance that the concerns of the State or impacted local communities will be reasonably addressed. I think they should. I think most fair minded people would think the State being impacted by the decommissioning should have a seat at the table.

This is an issue in every State currently facing decommissioning and could be a problem for many other States with plants that may be decommissioned in the future, including States like California, Florida, Wisconsin, New Jersey, New Jersey and Ohio.

This is not a Democrat, Republican or Independent issue. It is not an urban or rural issue. It is certainly not a pro-nuclear or anti-nuclear issue. This is simply about ensuring that States have the opportunity to play a meaningful in a decision that has enormous impact on the people of that State, on that State's economy, on its environment and on its communities.

I want to thank the Chair for holding this hearing which addresses these issues. With that, Madam Chair, I would yield.

Senator BOXER. Thank you.

Senator Vitter, followed by Senator Sessions.

OPENING STATEMENT OF HON. DAVID VITTER, U.S. SENATOR FROM THE STATE OF LOUISIANA

Senator VITTER. Thank you, Chairman Boxer, for convening this hearing.

I also want to thank our distinguished witnesses.

Certainly the regulations enforcing security and safety standards during decommissioning are very important to the country and certainly those who live and work right around these facilities. That is a factor we need to consider, particularly as more plants are forced to shut down in part, I think, due to an erratic regulatory environment. That is why today's hearing is crucial.

It is also crucial before changes are made to the decommissioning process to hear from those directly impacted and to hear from experts.

The good news is that since the 1960's, the U.S. has decommissioned 11 nuclear reactors with 17 still going through that process. Throughout this 50-plus year period, there has not been any mishap in the process that has resulted in harm to public safety.

That does not mean our process is perfect; it doesn't mean we shouldn't always look at it and reexamine it potentially but that is the good news. That does give us caution for significant changes.

Before changes are made, I certainly want to hear about the safety benefits of those changes also in relation to the costs. I also want to hear from the NRC, their experts and their employees. I am concerned about some push or changes to this process that is actually opposed by the Commission, that the Commission says will not add to safety but will take a lot of time and resources instead.

I think it is important to have this discussion about safety to make sure we continue to provide that safe environment for decommissioning.

I look forward to your testimony.

Senator BOXER. Senator, thank you.

Senator Sessions.

OPENING STATEMENT OF HON. JEFF SESSIONS, U.S. SENATOR FROM THE STATE OF ALABAMA

Senator SESSIONS. Thank you, Madam Chair, for this hearing.

Safe nuclear reactor decommissioning is a technical process, an expensive process and it takes time to do it safely and properly. It is a proven process.

Federal law, Senator Sanders, is supreme law. This process of nuclear power regulation has been preempted by the Federal Government. I think there are real problems arising if you give legal power to States to alter reactor decommissioning or other changes in reactors after it has been established differently at the beginning. It threatens the future of nuclear power.

It is an open process. All State and local stakeholders and the interested parties can appear, raise issues, complain, point out and make suggestions for improvement.

Current regulations are developed by professional staff at NRC and allow for up to 60 years to decommission plants, but it is a careful process. The safest and best way is to not go too fast. Let the plants cool down a bit before you go through the process.

Nuclear plant licensees are required to establish a financial mechanism to ensure they have the resources, estimated between $300 million to $400 million or more, to decommission plants. There have been no problems with that financial responsibility to date and we don't expect any.

In spite of these hurdles, the United States has successfully performed decommissioning work for nearly 50 years. More than 25 reactor locations have begun decommissioning processes and 11 have successfully completed it. Many of these sites have returned to productive use as green field sites.

It is vital as the Nation faces the shutdown of up to six nuclear reactors in a short amount of time that the public continues to have confidence in the scientific and technical assessments of the Nuclear Regulatory Commission. This is particularly true in face of the large number of nuclear power plants closure announcements. The industry gaining environment support worldwide is very fragile financially.

Kewaunee Power Station in Wisconsin, Vermont Yankee, Crystal River, San Onofre Units 2 and 3 in California, Oyster Creek in New Jersey are plants being closed. There is one area, however, where the public should be skeptical of political distortion in the decommissioning process and indeed, the blatant violation of laws and contracts.

The Nation continues to have no long-term storage for nuclear waste despite the 1987 nuclear waste policy amendments clearly designating Yucca Mountain as the Nation's sole permanent repository for nuclear waste. Despite the Department of Energy's legal obligation, no nuclear wastes have been collected.

Of the 25 sites where decommissioning has begun, all but 9 have nuclear waste stored onsite. After undergoing a decade long process costing hundreds of millions of dollars, reactor vessels, steam generators and buildings have been safely removed at 11 sites. Of the 11 sites, 7 of them still have fuel storage onsite waiting for the Federal Government to pick up the waste and move it to a repository.

In fact, beginning tomorrow, the Department of Energy will no longer be able to collect the waste fee from civilian nuclear power generators or their customers. This is because the D.C. Circuit Court on December 20, 2013 issued an order finding the government has failed to fulfill its contractual obligations and can no longer collect the money.

The Court brutally criticized the process and highlighted the obstruction by former NRC Chairman Jaczko and others. They found "Former NRC Chairman Gregory Jaczko orchestrated a systematic campaign of non-compliance. Jaczko unilaterally ordered Commission staff to terminate the Yucca Mountain review process in October 2010, instructed staff to remove key findings from reports evaluating the Yucca Mountain site and ignored the will of the fellow commissioners."

These are the problems we have which are causing stress in our nuclear industry. We have to put this matter to rest. I believe we can. I believe the NRC is capable and has worked for decades to develop this decommissioning process. We need to continue with it. If there are technical improvements, so be it.

It is now a cloud over the future of the nuclear industry. That is a threat to our financial future and we have to get it fixed.

Thank you, Madam Chair.

Senator BOXER. Thank you very much.

We will now turn to our panel. Michael Weber is Deputy Executive Director for Operations, Materials, Waste, Research, State, Tribal and Compliance Programs, at the NRC. Welcome, sir.

Next, we have Hon. Don Mosier, Council Member, city of Del Mar, California, one of the most beautiful places. Dr. Mosier was first elected to the Del Mar City Council in 2008. He served as Mayor in 2011. He is also a professor in the Department of Immunology and Microbial Science at the Scripps Research Institute. He has had longstanding safety concerns about the San Onofre Nuclear Plant, some of which he will share with us today.

Mr. Christopher Recchia is Commissioner of the Vermont Public Service Department. Mr. Geoffrey Fettus is Senior Attorney at the Natural Resources Defense Council. Mr. Marvin Fertel is President and Chief Executive Officer of Nuclear Energy Institute.

Gentlemen, you all come here with amazing credentials and we look forward to your testimony. We will begin with Mr. Weber.

STATEMENT OF MICHAEL WEBER, DEPUTY EXECUTIVE DIRECTOR, OPERATIONS, MATERIALS, WASTE, RESEARCH, STATE, TRIBAL AND COMPLIANCE PROGRAMS, U.S. NUCLEAR REGULATORY COMMISSION

Mr. WEBER. Good morning, Chairman Boxer, Ranking Member Vitter and members of the committee. It is my pleasure to appear before you today to present the views of the Nuclear Regulatory Commission.

In my testimony, I would like to highlight how NRC accomplishes its safety and security mission in the safe decommissioning of nuclear power plants, including the management of spent fuel generated by those plants during operations.

I will discuss the regulatory process for nuclear power plant decommissioning, including both our role and our engagement of stakeholders including individual citizens, State and local governments, tribal governments, industry and non-governmental organizations.

NRC's requirements and regulatory programs have evolved for nuclear power plant decommissioning since the agency was established in 1975. The decommissioning process commences for nuclear power plants with a formal written notification to the NRC by the licensee that nuclear operations have terminated and that fuel has been removed from the reactor core.

These notifications are publicly available and any individual can remain informed as the decommissioning process proceeds.

Within 2 years of permanent shutdown, NRC requires that licensees submit a report called the Post Shutdown Decommissioning Activities Report or PSDAR. That report is publicly available. No major decommissioning activities described in the report can begin any sooner than 90 days after the agency receives it. During our review of the report, the NRC holds a public meeting in the vicinity of the shut down nuclear power plant to receive public comments on that report.

There are three primary approaches that licensees can use to accomplish decommissioning in accordance with the NRC's regulations. First is immediate dismantlement or DECON; deferred dismantlement or SAFSTOR; and entombment or ENTOMB. The DECON option consists of prompt dismantlement and removal of radioactively contaminated equipment, structures and buildings.

Under the SAFSTOR alternative, licensees may promptly remove some of the contaminated equipment and structures but most of that material remains for some period of time in a safe, stable condition until it is subsequently decontaminated to levels that no longer require regulatory control.

During SAFSTOR, the spent nuclear fuel either remains safely and securely stored in the spent fuel pools or is removed to NRC-certified storage dry casks hosted at an onsite, independent spent fuel storage installation.

Licensees make the decisions on which alternative to pursue for decommissioning taking a variety of factors into consideration, including insuring plant safety first and foremost, the potential dose to the workers, availability of decommissioning funds, access to low level waste disposal facilities, potential use of the site and stakeholder input.

Anytime after decommissioning commences but at least 2 years before the licensee intends to seek termination of the license, the licensee must submit a license termination plan for the remainder of the decommissioning activities.

NRC makes that license termination plan publicly available on its website and after a detailed regulatory review of the plan, the NRC will approve this plan and issue a license amendment if the plan demonstrates the decommissioning can be accomplished safely and in accordance with the NRC's requirements.

Because the license termination plan is approved through a license amendment, there is an opportunity for the public, including State, local and tribal governments to request a hearing on that plan. In addition, there is the opportunity for stakeholders to comment on that plan without requesting a hearing.

Throughout the decommissioning process, the NRC continues to oversee the safe decommissioning as well as the security and compliance with our activities conducted by the licensee through onsite inspections. The NRC adjusts that level of oversight to insure safety and security as well as in response to the licensee's performance in conducting the decommissioning.

Since 1982, the NRC has overseen the successful completion of decommissioning at 11 nuclear power plants. Each of these completed sites was decommissioned in a safe and effective manner that supported termination of the license and release of the site for other uses.

As already alluded, a number of plants have recently announced their intent to also decommission, including Kewaunee, Crystal River and the San Onofre Nuclear Generating Stations. Vermont Yankee has also announced its intent to terminate operations by the end of 2014.

While the NRC believes that its regulatory program adequately protects public health and safety, we continually assess the lessons

learned from decommissioning to identify and make appropriate improvements to that process.

I thank you for the opportunity to present testimony and look forward to your questions.

[The prepared statement of Mr. Weber follows:]

WRITTEN STATEMENT

BY MICHAEL WEBER

DEPUTY EXECUTIVE DIRECTOR

FOR MATERIALS, WASTE, RESEARCH, TRIBAL, AND COMPLIANCE PROGRAMS

UNITED STATES NUCLEAR REGULATORY COMMISSION

TO THE

SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

May 14, 2014

Chairman Boxer, Ranking Member Vitter, and Members of the Committee, I appreciate the opportunity to appear before you today on behalf of the U.S. Nuclear Regulatory Commission (NRC).

In my testimony today, I would like to highlight how the NRC accomplishes its safety and security mission by ensuring the safe decommissioning of nuclear power plants, including the management of spent nuclear fuel generated by the plants. I will discuss the regulatory process for nuclear power plant decommissioning, including our role and the engagement of stakeholders, such as individual citizens, state and local government officials, Tribal governments, industry, and non-government organizations.

What is Decommissioning?

Decommissioning is the process of safely removing from service a nuclear power plant or other facility where nuclear materials are handled. This process primarily involves decontaminating the facility to reduce residual radioactivity to levels that the NRC has determined to be protective of public health and safety for releasing the property for unrestricted or, under certain conditions, restricted use. This often includes dismantling the facility or dedicating it to other purposes.

Evolution of the Decommissioning Process

Under the Atomic Energy Act of 1954, as amended, the NRC has sole responsibility for regulating radiological health and safety at commercial nuclear power plants. The NRC's requirements and regulatory program for nuclear power plant decommissioning have evolved since the agency was established in 1975. In the early years, the NRC focused on ensuring the safe construction and operation of nuclear power plants; therefore, decommissioning was not a priority from a safety or regulatory perspective. As time progressed, several plants permanently shut down. The Commission drew upon lessons learned from our initial experiences in nuclear decommissioning here in the United States and from the experience of other countries around the world to establish a regulatory program, requirements, and oversight capabilities with the specific objective of ensuring safety and security throughout the decommissioning process. Over time, as we heard from members of the public, industry representatives, and others, the NRC also recognized that the ideal time to begin planning for decommissioning is long before nuclear facilities are constructed and operated. This recognition is reflected in our current regulations, which require applicants for new facilities to describe how the design will minimize contamination of the facility and the environment, facilitate decommissioning, and minimize the generation of radioactive waste. NRC's regulations now require operating licensees to conduct operations in a manner that minimizes introduction of residual radioactivity into the site.

An Overview of the Decommissioning Process

The decommissioning process for nuclear power plants begins with the formal, written notifications to the NRC by the licensee that nuclear operations have permanently ceased and that the fuel has been removed from the reactor. These notifications are publicly available, so any individual can remain informed as decommissioning proceeds.

Within two years of permanent shutdown, NRC requires licensees to submit a report called the Post Shutdown Decommissioning Activities Report, or PSDAR for short. The PSDAR is a publicly available document. No major decommissioning activities described in the PSDAR can begin until 90 days after the agency receives this report and confirms that the licensee has provided the following three elements:

1. A description and schedule for the planned decommissioning;
2. An estimate of the expected costs of decommissioning; and
3. An evaluation of the potential environmental impacts of decommissioning.

The NRC reviews the report and may request that the licensee provide supplemental information to ensure that the report meets our requirements. During our review, the NRC holds a public meeting in the vicinity of the shutdown nuclear power plant to receive public comments on this report.

There are three primary approaches that licensees can use to accomplish decommissioning in accordance with NRC regulations: immediate dismantlement, or DECON; deferred dismantlement, or SAFSTOR; and entombment, or ENTOMB. DECON consists of prompt dismantlement and removal of radioactively contaminated equipment, structures, and buildings. The low-level waste removed is sent to a facility licensed to receive this type of material for disposal. The objective of the dismantlement and disposal activities is to safely remove radioactive contamination to achieve levels of radioactivity that NRC has determined are suitable for releasing the site, or portions of the site, from regulatory control. After a sufficient cooling period, the spent nuclear fuel in the spent fuel pools is transferred safely to NRC-certified dry storage casks and placed in an onsite Independent Spent Fuel Storage Installation. Decommissioning under the DECON option is typically accomplished in seven to 10 years, although NRC regulations allow up to 60 years for decommissioning to be completed.

Under SAFSTOR, licensees may promptly remove some radioactively contaminated equipment and structures. However, most of the radioactively contaminated material is placed

in a safe, stable condition until it is subsequently decontaminated to levels that no longer require regulatory control. During SAFSTOR, the spent nuclear fuel in the spent fuel pools either remains safely and securely stored in the pools or is transferred to NRC-certified storage dry casks at an onsite Independent Spent Fuel Storage Installation. This decommissioning approach must be completed within 60 years of permanent shutdown and allows substantial time for radioactive decay to reduce residual contamination levels. NRC estimates that after 50 years, the radiation dose rates in the plants have generally decreased to about one percent of the original levels at shutdown. The volume of radioactive waste that requires removal and disposal at a licensed disposal facility after 50 years is projected to be about 10 percent of the volume that exists at shutdown. Consequently, the eventual dismantling and decontamination of the remaining radioactive materials can be accomplished with significantly reduced doses to workers and lower volumes of low-level waste requiring disposal.

Licensees make decisions on which of these two approaches to pursue by taking a variety of factors into consideration, including: ensuring plant safety, potential dose to workers, availability of decommissioning funds, access to low-level waste disposal facilities, potential future uses of the site, and stakeholder input. Both DECON and SAFSTOR are equally viable options under NRC regulations.

The ENTOMB approach is permissible under NRC decommissioning regulations but has not yet been pursued by any NRC-licensed nuclear power plant. In this approach, some radioactive equipment and other materials may be removed from the site. The spent fuel would be transferred to onsite dry cask storage or transferred to a licensed facility off site. The rest of the plant would then be encased in a stable and durable structure to provide adequate protection and allow sufficient radioactive decay to reduce residual radioactive materials to achieve a condition in which the site can eventually be released for other uses in accordance with NRC's restricted release regulations. This method has been applied at a few Department of Energy sites that are not regulated by the NRC.

Any time after decommissioning commences, but at least two years before making a request to terminate the license, the licensee must submit a License Termination Plan for the remainder of decommissioning activities. The NRC makes the License Termination Plan publicly available on its website. After an initial acceptance review by the NRC, the NRC begins its regulatory review of the plan and conducts one or more public meetings in the vicinity of the site to receive public comments. A License Termination Plan contains five elements:

1. A description of the characteristics of the site (e.g., distribution of radioactive contamination, environmental properties that affect the risks associated with the contamination);
2. A description of the remaining dismantlement and decontamination activities planned to remove radioactively contaminated equipment, structures, and materials;
3. Plans for remediating the site;
4. Plans for conducting the final radiation survey to demonstrate that contamination levels have been sufficiently reduced to allow release of the site from regulatory controls upon termination of the license; and
5. An updated site-specific estimate of remaining decommissioning costs.

After a detailed regulatory review of the License Termination Plan, the NRC will approve the plan and issue a license amendment to reflect the plan approval, provided that the plan demonstrates that decommissioning will be completed safely and in compliance with NRC regulations. Because the License Termination Plan is approved through a license amendment, there is an opportunity for the public, as well as state, local, and Tribal governments, to request a hearing on the plan. This is in addition to the opportunity to comment on the plan without requesting a hearing.

Throughout the decommissioning process, the NRC continues to oversee the safety, security, and compliance of activities conducted by the licensee. The principal method for oversight is onsite inspections. These inspections are supplemented by observations of site

characterization and, before license termination, a radiological survey to confirm that radiation levels have been suitably reduced. At least one NRC resident inspector remains onsite during the initial phases of the decommissioning process until the complexity and risk associated with site operations are reduced. Eventually, resident inspectors are no longer necessary onsite on a daily basis, and NRC's oversight shifts to specialist inspectors from the regional offices or headquarters. The NRC will continue to adjust the level of oversight to ensure the site remains safe and secure and in response to the licensee's performance as warranted.

Decommissioning Progress

As noted earlier, the NRC has refined its regulatory program and regulations based on experience with nuclear decommissioning in the United States and abroad. Since 1982, the NRC has overseen the successful completion of decommissioning at 11 nuclear power plants. Each of the completed sites was decommissioned in a safe and effective manner that supported termination of the license and release of the sites for other uses, with one exception applicable at most sites: the portions of the site devoted to the onsite storage of spent nuclear fuel. These fuel storage facilities remain safe, secure, and under NRC oversight.

Currently there are 17 reactors in some stage of decommissioning.

Questions that often arise early in the decommissioning process are:

- When will the site be available for other uses?
- What will the site look like when decommissioning has been completed?
- Will it be a "green field" or will it look more like a power plant site?

The answers to these questions depend on the decommissioning approach selected by the licensee and the extent of decommissioning, the licensee's intention for future use of the site, and any specific requirements from or agreements with state and local entities.

For example, at the Rancho Seco site near Sacramento, the plant shutdown in 1989 and selected the DECON approach. The licensee dismantled and removed radioactive components

and decontaminated all of the structures in 2009, but chose to leave the reactor containment and auxiliary building intact. The Independent Spent Fuel Storage Installation and a low-level waste storage facility also remain onsite. Two fossil-fueled power plants were built at the site and use the former nuclear power plant's transmission lines, and vineyards have been planted on nearby land. Contrast that approach to the one used in decommissioning Maine Yankee in Wiscasset, Maine, which shutdown in 1996, selected DECON, and achieved "green field" status by the time decommissioning was completed in 2005. All structures were removed with the exception of the spent fuel storage installation, and the site was restored to its original condition with respect to residual radioactive contamination.

A third example is Big Rock Point near Charlevoix, Michigan, which shutdown in 1997, selected DECON, and completed decommissioning and license termination in 2007. Similar to Maine Yankee, and again with the exception of the spent fuel, the site was restored to its pre-existing condition, with the complete dismantlement and removal of contaminated and uncontaminated structures and buildings.

A final example is the Humboldt Bay nuclear power plant in Eureka, California, which shut down in 1976, selected the SAFSTOR approach, and is still being dismantled close to 40 years later. In 2013, the NRC received the License Termination Plan from the licensee and conducted a public meeting near the site to hear comments and answer questions from the public about the licensee's proposed plan. The NRC staff is conducting a detailed technical review of the plan, which should be completed by the end of 2014.

Of note, within the last year, several plants have shut down in advance of their license expiration dates, including Kewaunee in Carlton, Wisconsin; Crystal River Unit 3 in Crystal River, Florida; and San Onofre Nuclear Generating Station Units 2 and 3 in San Clemente, California. The operators of the Vermont Yankee Nuclear Power Station have also announced that they intend to permanently shut down the plant at the end of 2014. Consequently, the NRC staff is reviewing a variety of amendment and exemption requests associated with these

facilities to continue to ensure safety and security during their transition from operating to decommissioning status.

Closing

While the NRC believes its regulatory program adequately protects public health and safety, we continually assess the lessons learned from our decommissioning processes to identify appropriate program improvements

I thank you for the opportunity to appear before you today and I would be pleased to respond to any questions.

Questions for the Record
The Honorable Barbara Boxer

QUESTION 1. **How has the NRC demonstrated that a licensee of a decommissioning reactor would be able to mitigate the potential consequences of an accident at a spent nuclear fuel pool within ten hours if the accident was caused by a severe, unexpected initiating event, such as a massive and devastating earthquake or a terrorist attack? Please provide copies of any such analysis or documents.**

ANSWER.

Decommissioning power reactor licensees are required to have and maintain effective emergency plans that meet the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. Licensees that have proceeded to decommissioning an operating reactor have submitted requests from portions of these regulatory requirements. The NRC staff evaluates site-specific analyses supporting the licensee's request for exemptions from emergency plan requirements. The analyses would be used to provide the NRC reasonable assurance that in granting the exemption: (1) an offsite radiological release would not exceed the U.S. Environmental Protection Agency protective action guides at the site boundary for design basis accidents applicable to shutdown reactors, and (2) sufficient time would exist to initiate appropriate mitigating actions or offsite protective actions, if needed, to protect public health and safety in the unlikely event of a severe beyond design-basis accident resulting in loss of sufficient cooling in the pool.

In normal operations, the spent fuel pool is filled with water to keep the spent fuel cool. The staff has generally determined that 10 hours is a conservative minimum time available to

implement mitigation actions, and/or initiate protective offsite measures using a State and local government's comprehensive emergency management plan, if the water were to drain from the pool and jeopardize the ability to keep it sufficiently cooled. However, in a hypothetical spent fuel pool accident scenario, 10 hours is not the expected amount of time it would take for water to drain from the pool. A beyond design-basis accident that results in the water draining from the pool (whether a full or partial drain-down) would likely take much longer than 10 hours because of the robust construction of the spent fuel pool and the large volume of water in the pool. Furthermore, particularly for older fuel, air cooling and other heat removal mechanisms following loss of cooling water may be sufficient to keep the fuel cool indefinitely or would significantly extend the fuel heat-up time.

To be conservative, the exemption analysis and 10-hour criterion for mitigating the potential consequences pool do not credit the natural air cooling and water cooling in the spent fuel pool after the event. Instead, it is assumed that the fuel immediately begins to heat up without any natural removal of its energy.

The NRC staff accepts this simplified approach and time estimate in making its regulatory decisions whether to grant the exemption and if granted, when an exemption becomes effective (*e.g.*, typically 12-24 months after shutdown). The NRC staff reviews the analyses provided by the licensee to verify that a minimum of 10 hours is still available to restore cooling, or implement offsite protective measures, before the fuel slowly heats up to a temperature that could cause a zirconium fire. A licensee may in part rely upon the established capabilities it had for its operating reactor as required in 10 CFR 50.54(hh)(2) to mitigate the potential consequences of a severe accident at a spent fuel pool. In addition to normal plant structures, systems and components to maintain water levels and cooling to spent fuel are redundant and independently powered equipment needed to perform these functions are located onsite for

operating reactors. Decommissioning licensees may choose to retain some of these capabilities to provide assurance they can implement mitigation measures within 10 hours, or may commit to another strategy that provides similar assurance.

The NRC has developed draft interim staff guidance (ISG) entitled, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants," to address licensee exemption requests from certain NRC emergency planning (EP) requirements. The draft ISG provides a technical discussion and an overview of existing guidance for reviewing emergency planning exemption requests, as discussed above. The ISG generally describes the safety issues and guidance, including the use of the 10-hour criterion, that staff uses to review requests for exemptions to EP requirements.

In developing this guidance, the NRC relied upon its previous exemption review experience. Additionally, the guidance was informed by existing studies on spent fuel pool fires and risks. Earlier this year the NRC made the draft ISG available to the public for an extended review and comment period. The staff is updating the draft ISG to address the public comments, as necessary, and to incorporate experience gained from its review of current exemption requests. The staff is planning to publish a final ISG by the end of calendar year 2014. A copy of the draft ISG is enclosed for your information.

Questions for the Record
The Honorable Barbara Boxer

QUESTION 2. **NRC's pending Waste Confidence decision is supposed to legally demonstrate NRC's finding that there are no significant environmental consequences associated with the storage of spent nuclear fuel. The NRC also recently voted to approve a staff paper that concluded that there wasn't enough of a safety benefit associated with moving spent fuel into safer dry cask storage to require that to be done more quickly. Both of these documents base their conclusions in part on the existence of the emergency response regulations designed to respond to the off-site consequences of an accident or attack on spent fuel pools. Both of the documents refer repeatedly to these regulations, and NRC incorporated them into the accident models that NRC has used to form its waste confidence and accelerated spent fuel transfer conclusions. Why doesn't the NRC mention anywhere in these documents that it has no expectation that any of the offsite emergency response regulations will be in place at decommissioning reactors because it has always approved every request it receives for exemptions from them from licensees of decommissioning reactors?**

ANSWER.

The NRC only approves exemptions from the regulatory requirements established for operating nuclear power reactors for formal offsite radiological emergency preparedness plans when a decommissioning nuclear power reactor licensee requesting an exemption demonstrates that

such requirements are no longer necessary to ensure adequate protection of public health and safety. The NRC has granted such exemptions when a technical analysis has shown that there would be sufficient time to take measures to mitigate a significant spent fuel pool loss of cooling incident and, if needed, implement appropriate offsite protective measures using comprehensive (all hazard) emergency management plans in the unlikely event a significant radiological release were to occur. The NRC's extensive history of assessing spent fuel pool safety has shown that licensees have sufficient time to take action to mitigate a loss of spent fuel pool water. The NRC continues to require decommissioning licensees to maintain an emergency plan that provides for the detection and classification of an emergency, notification and coordination with offsite agencies, and the ability to assess and respond to an unlikely event of a radiological release at a decommissioning nuclear power reactor. Therefore, the granting of exemptions from portions of the emergency planning regulations has not, and would not, change the capability of decommissioning plants to initiate protective actions consistent with those assumed in the evaluation of the expedited transfer of spent fuel and waste confidence issues.

The staff's analysis in COMSECY-13-0030, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel," dated November 12, 2013, was conducted in a conservative manner to maximize the potential benefits associated with the expedited transfer of spent fuel to dry cask storage, and the staff concluded that expedited transfer would provide only a limited safety benefit that would not warrant the associated implementation costs. Decommissioning nuclear power plants were not evaluated in this regulatory analysis because of the much lower risks associated with spent fuel that has been removed from the reactor for an extended period of time. If additional research in this area were to be conducted, the findings would most likely demonstrate even lower risks.

With respect to the waste confidence generic environmental impact statement, the NRC is performing its analysis to fulfill the agency's obligations under the National Environmental Policy

Act and must make reasonable assumptions in doing so. The waste confidence analysis has no bearing on the granting or denial of an emergency plan or security exemption, nor does it serve as the basis to transfer spent nuclear fuel to dry cask storage on an accelerated basis. These issues will be the subject of site-specific analyses, if necessary. In the waste confidence proceeding, the NRC received comments specifically on the issue of exemptions from regulations. Although the rulemaking documents are not yet final, the analysis supporting the waste confidence environmental impact statement is a generic analysis that assumes that the current regulations remain in place for all licensees. Exemptions from the NRC's regulations are evaluated on a site-specific basis and consider the unique circumstances that may exist for a specific licensee. Therefore, the generic environmental impact statement does not assume that emergency planning exemptions are granted. Further, the analysis uses conservative assumptions to inform the analysis of accidents, and the environmental impacts are consistent with those that would be expected if a licensee were granted exemptions from offsite emergency plan requirements.

Questions for the Record
The Honorable Barbara Boxer

Question 3. **Mr. Weber, is it true that on May 14, 2014 in response to a wildfire that was burning at Camp Pendleton, that Southern California Edison took each of the following actions:**

a) Posted personnel at the south boundary of the San Onofre nuclear generating station?

b) Evacuated 13 employees from the part of the site that is near the south boundary?

c) Wet down vegetation at that part of the site that is near the south boundary as a precautionary measure to prevent the fire from spreading into the reactor site?

d) Dispatched some San Onofre personnel to Camp Pendleton to assist with the fire-fighting efforts?

ANSWER.

On May 14, 2014, an NRC region-based inspector was at the San Onofre Nuclear Generating Station, and he observed the fire. The inspector monitored the station response.

(a) Southern California Edison (SCE) assembled the plant fire brigade and posted them in the South Yard area, which is along the south boundary of the plant next to San Onofre State Beach.

(b) SCE conducted a precautionary evacuation of personnel who normally work in the South Yard area. The employees evacuated from that area were not essential for maintaining the safe operations of the plant.

(c) SCE wet down vegetation along the south edge of the South Yard area during the event. The vegetation that was wetted was located on San Onofre State Beach property. They stopped this activity about mid-afternoon, after the fire turned and began burning to the south, away from the plant.

(d) Yes, one pumper truck and its associated crew assisted the Camp Pendleton fire department in firefighting efforts.

Questions for the Record
The Honorable Thomas Carper

QUESTION 1. **Can you tell us the type of information the NRC is looking for during its review of the PSDAR? Why are your findings and conclusions of approval not publically available and what are the impediments to making them publically available.**

ANSWER.

The Post Shutdown Decommissioning Activities Report (PSDAR) is required by regulation to contain the following information: a description of the planned decommissioning activities and a schedule for accomplishment, an estimate of the expected costs of those activities, and a discussion that provides the reasons for concluding that the environmental impacts associated with the site-specific decommissioning activities will be bounded by the previously issued environmental impact statements. The licensee also is required to provide copies of the PSDAR to the affected States.

The NRC makes the PSDAR publicly available by noticing it in the Federal Register, holding a public meeting in the vicinity of the plant, and requesting public comments on the PSDAR. The NRC may request additional information from the licensee based on the staff review and public comments. The NRC does not approve the PSDAR but ensures it meets the information requirements and fully informs the public of the licensee's planned decommissioning activities. Written correspondence between the licensee and the NRC also is publicly available.

Questions for the Record
The Honorable Thomas Carper

QUESTION 2. **Before the recent plant closures, I believe the last wave of plant closures was in the mid-1990s. Much has happened in the last roughly 20 years. Is the NRC planning to formally review its decommissioning regulations to incorporate any updates or efficiencies learned from the plants that have been decommissioned or going through decommissioning?**

ANSWER.

The NRC has a comprehensive regulatory program for both operating reactors and for reactors performing decommissioning activities. Although only limited regulations and guidance exist that specifically address the transition of a reactor from operating to decommissioning, the NRC's existing regulatory framework provides appropriate means for licensees to amend their regulatory and safety programs commensurate with the reduction of the hazards at a permanently shutdown facility.

In the early 1990s, the NRC staff initiated an effort to revise the regulatory requirements for decommissioning nuclear power plants. In July 1996, this effort resulted in a major rule amendment that made fundamental changes to power reactor decommissioning by streamlining the process and reducing both licensee and NRC resource expenditures while maintaining safety, protecting the environment, and encouraging public involvement. The NRC staff continued efforts to improve the regulations for decommissioning nuclear power plants through 2001, when the NRC shifted its focus and priorities to addressing the events of September 11, 2001. At that time, given the lack of foreseeable plant closures, the NRC determined that the existing regulatory framework would ensure that the regulatory programs of any plant that may

shutdown would continue to provide reasonable assurance of safety during the transition to decommissioning.

Within the last year, the NRC's focus on the decommissioning of nuclear power reactors has increased with the recent shutdown of four nuclear power reactors, and the announcements of planned shutdowns of two other nuclear power reactors in the near future. Initially, the NRC staff realigned activities to focus on the licensing and inspection of recently shutdown nuclear power reactors as they transition from an operating to a decommissioning status. As a longer-term effort, the NRC staff is considering the lessons learned from the plants that shut down in the 1990s, including the prior rulemaking efforts, in combination with lessons learned from the recently shutdown plants, to identify recommendations for improvements in the regulatory framework for the transition of plants from operating to decommissioning. This effort by the staff will include a formal review of decommissioning regulations to assess the need for development of new guidance, rulemaking, and revisions to NRC policies and procedures.

Questions for the Record
The Honorable Thomas Carper

QUESTION 3. **I understand that Southern California Edison has created a community advisory group comprised of 18 local community leaders of diverse backgrounds. This panel is chartered to foster education and involvement of the surrounding communities in the decommissioning of the San Onofre Nuclear Power Plant. Do you see value in this type of community engagement and would you encourage other licensees facing decommissioning to establish the same type of community advisory groups?**

ANSWER.

Yes. The NRC recommends and encourages the use of community advisory groups to educate and involve communities for all decommissioning projects. For nuclear power plants, the creation of community advisory groups was first used at Maine Yankee and is considered a good practice by the nuclear power industry as documented in a 2005 Electric Power Research Institute Report (1011734), "Maine Yankee Decommissioning – Experience Report." However, as an independent safety regulator, the NRC does not require the licensees to form community advisory groups.

Questions for the Record
The Honorable Thomas Carper

QUESTION 4. **Do you believe a defueled reactor poses essentially the same off-site radiological emergency risk profile as an operating reactor? Why?**

ANSWER.

No. When a nuclear power plant permanently ceases operations and the licensee defuels the reactor, the risk to the public from an accident drops significantly, since the accident sequences that dominated the operating plant risk are no longer applicable. The primary remaining source of risk to the public is associated with potential accidents that involve the spent fuel stored in the spent fuel pool. Moreover, the predominant design-basis accident for a defueled reactor is a fuel handling accident. The risk of a radiological release from a spent fuel pool at a decommissioned plant would typically be lower than from a spent fuel pool at an operating facility. This is because the heat generated by spent fuel significantly decreases over time following transfer of the spent fuel from the reactor to the pool as fission products decay. In contrast, the amount of heat generated in a spent fuel pool at an operating reactor does not significantly decrease with time because of the additional heat discharged from newly transferred spent fuel as the spent fuel is removed from the reactor and placed in the spent fuel pool every 18 to 24 months.

Questions for the Record
The Honorable David Vitter

QUESTION 1. **Has the San Onofre Nuclear Generating Station (SONGS) staff provided the NRC with regular briefings and updates on their decommissioning activities?**

a) Have these included planned changes to their Emergency Plan consistent with maintaining safety in and around the plant, while reflecting the reduced risks at decommissioning plants?

ANSWER.

Representatives of Southern California Edison (SCE) have met with NRC management and staff to discuss in very general terms SCE's preliminary plans for decommissioning San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. An NRC Senior Resident Inspector is currently providing oversight of day-to-day activities at SONGS Units 2 and 3.

SCE staff and NRC staff have weekly conference calls to discuss administrative details, such as schedules for licensing activities, exemptions, and planned decommissioning activities. Periodically, meetings are held between the NRC technical staff and the licensee to discuss specific technical issues. For example, as stated in the response to Question 2 from Senator Vitter, the NRC staff has been briefed on SCE's emergency response and security capabilities.

The NRC also hosts meetings in the vicinity of the site to inform the public about decommissioning activities. The NRC hosted a public meeting in Carlsbad, California on September 26, 2013, following the decision by Southern California Edison to permanently shut

down SONGS Units 2 and 3. The NRC will host another meeting local to the San Onofre site following receipt of the licensee's Post Shutdown Decommissioning Activities Report (PSDAR).

SCE is required to submit its PSDAR and Integrated Spent Fuel Management Plan by June 2015. In that report, SCE will provide its detailed plan for decommissioning the SONGS facility. The NRC will review the PSDAR to verify that it is consistent with the applicable regulations. SCE is required to submit its plan for management of all spent fuel at the site to the NRC for review and preliminary approval.

a) During the discussions of licensing actions, SCE notified the NRC staff of its intention to request NRC review and approval of a change to the Emergency Plan for SONGS Units 2 and 3 to reflect the reduced risk at the facility due to its permanently shutdown and defueled status. SCE submitted its application to change the Emergency Plan on March 31, 2014 (available in the NRC's Agencywide Documents Access and management System (ADAMS) at Accession No. ML14092A314). The staff is currently reviewing the application.

Questions for the Record
The Honorable David Vitter

QUESTION 2. **Has the NRC Office of Nuclear Security and Incident Response been briefed by SONGS on their emergency response and security capabilities, and does the NRC participate in or observe any on-site drills performed by SONGs to verify their emergency response and security capabilities?**

a) Based on the on-site drills that have been performed in accordance with NRC requirements, is SONGS capable of maintaining the safety and security of the plant?

ANSWER.

Yes, the NRC staff has been briefed by San Onofre Nuclear Generating Station (SONGS) on its emergency response and security capabilities, and NSIR and Regional staff, as appropriate, participates in or observes onsite drills performed by SONGS as part of ongoing inspection activities to verify its emergency response and security capabilities.

The NRC's inspection program verifies that the licensee continues to meet security and emergency preparedness (EP) regulations. NRC inspectors from Headquarters and the Regional offices monitor licensees' security and EP-related activities throughout the year. The inspectors provide firsthand, independent assessments of plant conditions and licensee performance, document their findings in writing, and conduct follow-up inspections to ensure that the licensee has made any necessary corrections.

The NRC inspection program for SONGS includes NRC observation of licensee-conducted force-on-force exercises. Force-on-force inspections assess the ability of power reactor licensees to defend against the design basis threat for radiological sabotage and provide valuable insights that enable the NRC to evaluate the effectiveness of licensee security programs. They are an essential part of the oversight of the security of these facilities.

Licensees must demonstrate their ability to meet the existing EP exercise and drill requirements contained in their current emergency plan, including a biennial exercise conducted in coordination with offsite response organizations. As part of the NRC's evaluation of a licensee's EP exemption request, the staff requires that the licensee continue to conduct an exercise of its onsite emergency plan every two years and provide the opportunity for State or local governments to participate. Periodic drills also will be required to ensure that adequate emergency response capabilities are maintained between biennial exercises. Opportunities for NRC participation in exercises will continue to be coordinated through the NRC's Incident Response Program.

As a result of the continuing oversight of the SONGS licensee performance, NRC inspectors identified that SONGS implemented staffing changes to its emergency plan without the required prior NRC approval. The NRC issued an enforcement action against the licensee for this violation of NRC requirements. Although SONGS should have recognized that the changes required NRC review, the NRC believes that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at SONGS. However, the NRC is conducting a thorough review of the changes implemented at SONGS as part of the license amendment and exemption request processes to ensure that public health and safety and the environment continue to be protected.

(a) Based on the NRC Region IV Office's observation of SONGS emergency plan and security drills and exercises, the NRC continues to have reasonable assurance that SONGS remains capable of protecting the health and safety of the public in the event of an emergency at, or involving, the plant site.

Questions for the Record
The Honorable David Vitter

QUESTION 3. **Since the NRC staff studied the potential for fires to occur in spent fuel pools, what is their conclusion on the actual probability of such an event occurring?**

a. Has the NRC performed an analysis of the risks of a spent fuel pool fire?

b. If so, what did the NRC conclude?

c. Is the risk of a radiological release from a spent fuel pool the same for operating plants and non-operating plants?

ANSWER.

Over the past several decades, the NRC has periodically evaluated the safety of spent fuel pools, and has consistently concluded that spent fuel pools are robust structures that are likely to withstand severe earthquakes and other credible challenges and thus provide for safe storage of spent nuclear fuel. Two recent evaluations, including NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants" and COMSECY-13-0030, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel," have demonstrated that the risks of a radiological release form a spent fuel pool were very low.

(a) Over the past 35 years, NRC has sponsored a number of studies to evaluate various aspects of spent fuel pool safety, security, and risk. A summary of the past studies (including NUREG-1738 for decommissioning plants) is provided in SECY-13-0112, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor," or commonly known as the Spent Fuel Pool Study. A regulatory analysis that

analyzed spent fuel pools across the U.S. fleet of nuclear power plants was submitted to the Commission in COMSECY-13-0030. These studies have shown that spent fuel storage is safe and the risk of a release of radionuclides due to an accident is low. The analysis included a review of the risk of a release from a spent fuel pool fire.

(b) The results of NUREG-1738 indicated that the risk is low and well within the Commission's quantitative health objectives. The risk was found to be low because of the very low likelihood of a zirconium fire, even though the consequences from a zirconium fire could be serious. The results of more recent studies, such as the Spent Fuel Pool Study (SECY-13-0112) and COMSECY-13-0030 are consistent with earlier conclusions that spent fuel pools are robust structures that are likely to withstand severe earthquakes without leaking and exposing the fuel, which could lead to a fire.

(c) The risk of a radiological release from a spent fuel pool at a decommissioned plant would typically be lower than that from a spent fuel pool at an operating facility. This is because the heat generated by spent fuel significantly decreases over time following transfer of the spent fuel from the reactor to the pool as fission products decay. Moreover, the amount of heat generated in the spent fuel pool at a decommissioning plant continually decreases with time. In contrast, operating reactors have a slightly higher risk due to the placement of spent fuel in the pool every 18 to 24 months.

Questions for the Record
The Honorable David Vitter

QUESTION 4. **During the hearing, questions were raised regarding the number of fuel assemblies in the San Onofre Nuclear Generating Station spent fuel pools (SFP).**

a) Over the course of SONGS SFP history, have they redesigned their SFP to safely accommodate additional fuel assemblies beyond the number in original design?

b) Are they required to seek approval from the NRC to increase the number of spent fuel assemblies the SFP can safely store?

c) What was the NRC's oversight of any re-racking of fuel assemblies in the SFP?

d) Are the SFPs at SONGS licensed by the NRC to safely store the current number of fuel assemblies?

ANSWER.

a) Yes. At the time of initial licensing, the maximum storage capacity of the San Onofre Nuclear Generating Station Units 2 and 3 spent fuels pools was limited to 800 fuel assemblies per pool. The capacity was stated in the initial Technical Specifications and Final Safety Analysis Report. In 1989, Southern California Edison submitted a license amendment request (available in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession No. ML13303B063) to the NRC seeking to increase the capacity of the spent fuel pools to 1542 fuel assemblies per pool by changing the design of the spent fuel assembly storage racks. The NRC performed a detailed technical review of the request. In 1990, the NRC approved the amendment to the SONGS 2 and 3 operating license that expanded the storage limits of the spent fuel

pools (ADAMS Accession No. ML021990033). The amendment included the NRC staff's safety evaluation summarizing the results of its technical review. The NRC concluded that there was reasonable assurance that the activities authorized by the amendment could be conducted without endangering the health and safety of the public.

b) Yes. The Technical Specifications for San Onofre Nuclear Generating Station Units 2 and 3 specify the maximum storage capacity of the spent fuel pools. Southern California Edison is not allowed to exceed this storage capacity and is required to obtain NRC's approval prior to increasing the storage capacity.

c) The NRC provided oversight of the SONGS re-racking initiative through its safety reviews of license amendments and through its inspection activities. Prior to increasing the capacity of the spent fuel pools, the licensee was required to request an amendment of its operating license. The NRC staff performed a detailed technical review of the licensee's amendment application, and authorized the amendment after determining that there was reasonable assurance that the activities authorized by the amendment could be conducted without endangering the health and safety of the public.

The NRC regional inspection staff provides oversight of the activities at the plant. The NRC maintains at least two full-time resident inspectors at each operating nuclear facility during its operation. Since the permanent shutdown of SONGS Units 2 and 3, the NRC has maintained one resident inspector at the site. Resident inspectors primarily inspect day-to-day activities of the licensee. This inspection activity is supplemented by more specialized inspections conducted by personnel assigned to the NRC's regional office. The NRC has a procedure for inspecting spent fuel pool storage racks that, in part, determines whether the technical requirements detailed or referenced in the facility

Safety Analysis Report (SAR) associated with spent fuel storage racks have been adequately addressed in the construction/installation specification, drawings, and work procedures, and to determine by direct observation and independent evaluation of work, whether the licensee's work control system is functioning properly and whether the installation of spent fuel storage racks is in compliance with NRC requirements, licensee commitments, and applicable codes.

d) Yes. The number of assemblies stored in the spent fuel pools at SONGS is less than the number authorized by the facility's licenses, which reflect the increased capacity authorized by the 1990 amendment discussed in the response to (a) above.

Questions for the Record
The Honorable David Vitter

QUESTION 5. **SONGS announced a 20-year timeline for decommissioning which was presented to the public at the first Community Engagement Panel meeting in March. Does this 20-year timeline include moving spent fuel from the Units 2 and 3 Spent Fuel Pools to dry cask within 5 – 7 years of permanently ceasing operations?**

ANSWER.

Yes. Southern California Edison (SCE) presented a 20-year timeline at the last Community Engagement Panel meeting that was held on May 22, 2014. Included in this timeline were plans to begin offloading spent fuel from Units 2 and 3 late in 2015, with anticipation of completing movement of the spent fuel into dry cask storage in 2019. However, SCE has not yet formally provided the NRC with its planned spent fuel activities. This information should be included in the Post-Shutdown Decommissioning Activities Report scheduled for submittal by June 2015.

Questions for the Record
The Honorable David Vitter

QUESTION 6. **Southern California Edison created a Community Engagement Panel (CEP) to be a conduit of information to the local community around SONGS. It is comprised of 18 members including eight representatives of local governments; state and federal agencies; as well as labor, economic and environmental stakeholders. The CEP will have the opportunity to review and provide input on regulatory filings prior to their submittal to the NRC. The CEP has already held three public meetings including a workshop on spent fuel issues for SONGS. Has the NRC engaged with the SONGS Community Engagement Panel?**

ANSWER.

The NRC does not have a formal relationship with the Community Engagement Panel (CEP) because the Panel's role is to provide input to Southern California Edison's (SCE) decommissioning planning process as it develops the Post-Shutdown Decommissioning Activities Report (PSDAR) for formal submittal to the NRC. However, the NRC resident inspector assigned to SONGS has attended a CEP meeting and a workshop for observation purposes. He has been introduced to all panel members at those meetings. In addition, the NRC, including the resident inspector and Region IV management, has interacted with some of the panel members extensively over the past several years through various outreach activities. In particular, the NRC has met extensively with Mayor Tim Brown of San Clemente and Gene Stone of the Residents Organized for a Safe Environment. The CEP Chairman, David G. Victor, was invited to be a panel member at an NRC Commission public meeting on decommissioning on July 15, 2014.

Questions for the Record
The Honorable David Vitter

Question 7. **While we were discussing emergency response capabilities at this hearing, there were significant wildfires burning in southern California, and specifically in San Diego County near the San Onofre Nuclear Generating Station.**

a) Was there a fire burning at the plant? Did the plant lose offsite power at any time?

b) Was there an imminent threat to the Spent Fuel Pool or Independent Spent Fuel Storage Installation (ISFSI) pad?

c) Was there an imminent threat to the personnel, buildings or plant equipment? Did the fires trigger any required reporting of events to the NRC?

d) Did the plant staff have to initiate a response in accordance with their Emergency Plan? Was the NRC actively monitoring the situation on site?

e) Did the NRC have a representative physically present in the SONGS control room during the event?

ANSWER.

(a) There was no fire in the plant's owner-controlled area. A fire did occur on Camp Pendleton property on May 14, 2014, that approached within a half-mile of the owner-controlled area.

Given the fire's location, it did not present a threat to maintaining offsite power and, as such, San Onofre did not lose offsite power at any time. The plant has two offsite power

lines that come from San Diego County and two lines that come from Orange County. There were no electrical power issues with any of the four lines during the fire. The plant had two emergency diesel generators available during the event, which were not required to be used. Plant operators conducted a precautionary walk down at the start of the fire and verified the generators continued to be available and operable.

(b) There was no threat to the spent fuel pool or independent spent fuel storage installation at any time during the fire.

(c) There were no threats to personnel, buildings, or equipment at the plant at any time.

Southern California Edison issued a press release concerning the fire and was required to notify the NRC per Title 10 of the Code of Federal Regulations Part 72.75(b)(2). Southern California Edison submitted the required event notification on May 14, 2014.

(d,e) SCE did not enter its emergency plan, and the NRC independently verified that the emergency plan was not required to be entered.

Yes, the NRC actively monitored the situation on site, which included stationing a region-based NRC inspector in the San Onofre control room during the May 14, 2014, fire. The inspector provided real-time information to the headquarters Operations Center and Regional Incident Response Center and evaluated the adequacy of the licensee's actions.

Questions for the Record
The Honorable David Vitter

QUESTION 8. **Should there be a potential threat to any operating nuclear reactor, what are the NRC processes in place to determine the nature of the potential threat, ensure the capability of each site to address any threats and protect the workers on site and surrounding communities?**

a) How does the NRC perform the same oversight for safety at decommissioning nuclear sites like SONGS?

ANSWER.

Through its rulemaking, licensing, and inspection activities, the NRC evaluates the licensee's plans and procedures for identifying and responding to anticipated threats to the safe operation of the facility. The NRC has established regulations and policies that contain design standards and programmatic requirements to address normal operations, anticipated external events, and design basis accidents. The NRC reviews the licensee's plans for compliance with the regulations and policies through its licensing process. The NRC provides oversight of the licensee's implementation of its license requirements through its inspection activities.

The design basis threat for operating reactors provides reasonable hypothetical threats for radiological sabotage, to which licensees must be able to respond. In order to assure that this threat statement remains a valid basis for the design of physical protection systems, the staff routinely reviews and analyzes a range of intelligence information. Every 12 months the staff assesses the threat environment for that 12-month period and formally provides its conclusions to the Commission in a report. If significant information were received that called into question

the adequacy of the design basis threat statements, the staff would immediately notify the Commission. The NRC staff also continuously engages with the U.S. intelligence community so that it can immediately respond to credible threats to licensees.

Requirements for identifying anticipated threats, maintaining preparedness to address those threats, protecting onsite workers, and recommending actions to protect surrounding communities are integral to the regulations. The anticipated threats that licensees must be capable of responding to include natural phenomena and security events.

In the event of a credible threat to safe and secure operation of the facility, the licensee is required to notify the NRC Operations Center, which is staffed continuously. The NRC staff monitors the situation and the licensee's response to the threat. If conditions warrant, the NRC will activate its Incident Response Center and begin coordinating with other Federal and State agencies.

a) The same rulemaking, licensing, and inspection programs described above are applicable to nuclear power reactors undergoing decommissioning.

Questions for the Record
The Honorable David Vitter

QUESTION 9. **There are 12 sites where civilian nuclear power generating activities have permanently ceased and all that does, or will remain at these facilities is the spent fuel and reactor generated Greater-Than-Class C Wastes stored on site awaiting removal by the Department of Energy. After these facilities permanently ceased operations, each submitted a Permanently Defueled Emergency Plan to modify parts of the Emergency Plan based on the significantly reduced risks of a radiological event at a decommissioning plant. After these facilities were given approval to make the changes authorized under the Permanently Defueled Emergency Plan, has there been an event, emergency or threat including natural disasters or hostile acts that proved to be too significant or challenging to be handled by the NRC approved Permanently Defueled Emergency Plan?**

ANSWER.

There have been no events, emergencies, or threats, including natural disasters or hostile acts that have proved to be either too significant or challenging to be handled in accordance with the NRC-approved Permanently Defueled Emergency Plan. The radiological risks are greatly reduced at a decommissioning nuclear power plant and have a very low probability of causing an event that could have impacts offsite. The sites are required to maintain an NRC-approved security plan to ensure potential hostile threats will be safely and securely managed to protect the plant.

NSIR/DPR-ISG-02

INTERIM STAFF GUIDANCE

EMERGENCY PLANNING EXEMPTION REQUESTS

FOR DECOMMISSIONING NUCLEAR POWER PLANTS

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DRAFT

1.0 PURPOSE

The purpose of this interim staff guidance (ISG) is to provide guidance to U.S. Nuclear Regulatory Commission (NRC) staff in processing exemptions from the emergency preparedness (EP) requirements for nuclear power reactors that are undergoing the process of decommissioning. Licensees must follow the process outlined in 10 CFR 50.12 when applying for exemptions from EP regulations. Attachment 1 of this ISG should be used by the staff for reviewing the adequacy of the defueled onsite emergency plan submitted by a licensee. The staff should use this ISG until it is superceded or incorporated into other guidance or rulemaking.

The NRC issues guidance to describe and make available to the public methods that the NRC staff considers acceptable for use in implementing specific parts of the agency's regulations. The guidance is not a substitute for regulations, and compliance with it is not required. Methods that differ from those set forth in guidance may also be deemed acceptable if they conform to the regulations and provide the basis for licensing decisions.

2.0 SCOPE

This ISG reflects the changes made to sections 50.47(b) and 50.54(q) of Title 10 of the *Code of Federal Regulations* (10 CFR) and Appendix E to 10 CFR Part 50 issued on November 23, 2011 (76 *Federal Register* (FR) 72560). This guidance is only applicable to a nuclear power reactor that has notified the NRC that it has permanently ceased operation in accordance with 10 CFR 50.82(a)(1)(i), has certified permanent removal of fuel from the reactor vessel under 10 CFR 50.82(a)(1)(ii), is storing spent fuel in a spent fuel pool (SFP) and is not located on the site of an operating nuclear power reactor. The Office of Nuclear Materials Safeguards and Security Spent Fuel Project Office Interim Staff Guidance – 16, "Emergency Planning," provides the appropriate guidance for fuel stored in a dry cask storage facility.

3.0 BACKGROUND

The EP requirements in 10 CFR Part 50 that apply to licensees of operating nuclear power reactors also apply to decommissioning power reactor licensees because these licensees retain their part 50 operating licenses or part 52 combined licenses after permanent cessation of operations and removal of fuel from the reactor vessel. The staff recognizes that the risk of a large offsite radiological release at a decommissioning power reactor storing irradiated fuel in the SFP is lower than the risk of a large offsite radiological release from an operating power reactor and its SFP, based on the consideration of initiating reactor events associated with normal and abnormal operations, design-basis accidents, and certain beyond design-basis accidents applicable to a decommissioning site. For example, in NUREG-1738, "The Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," the NRC determined for spent fuel aged one year, a risk factor of a zirconium fire initiated by a seismic event at 2×10^{-7} to 2×10^{-6} for the plants studied. In contrast, at operating reactors additional risk-significant accidents for which EP is expected to provide dose savings are on the order of 1×10^{-5} per year. Because of the lower comparative risk from a decommissioning power reactor, licensees typically make a case for an exemption on the basis that the application of the regulation in the particular circumstance decommissioning plants is not necessary to achieve the underlying purpose of the rule.

In the 1990s, the staff developed a thermal-hydraulic criterion for determining when reductions in EP requirements at decommissioning plants could be permitted. The criterion was used on a

case-by-case basis to grant exemptions from certain EP requirements. The criterion was based on demonstrating that spent fuel stored in the SFP would sufficiently air-cool and would not reach the zirconium ignition temperature if the water in the pool were to be fully drained or there was at least ten hours to take action to recover SFP inventory and take ad hoc actions to protect the public. NUREG/CR-4982, "Severe Accidents in Spent Fuel Pools in Support of Generic Safety Issue 82", and NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR [boiling water reactor] and PWR [pressurized water reactor] Permanently Shutdown Nuclear Power Plants", provides temperatures associated with the self-initiation and propagation of zirconium fires.

In SECY-97-120, "Rulemaking Plan for Emergency Planning Requirements for Permanently Shutdown Nuclear Power Plant Sites 10 CFR Part 50.54(q) and (t); 10 CFR 50.47; and Appendix E to 10 CFR Part 50," the staff presented the Commission with a rulemaking plan to amend the EP requirements for permanently shutdown nuclear power plant (NPP) sites. SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning," subsequently included sample rule language for EP at decommissioning plants. Because of the uncertainties associated with the risk and time frame for zirconium fire vulnerability as stated in SECY-00-0145, the staff suspended its decommissioning rulemaking efforts until the associated technical issues could be satisfactorily resolved.

In January 2001, the NRC published NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," providing a technical basis for the decommissioning rulemaking for permanently shutdown nuclear power plants proposed in SECY-00-0145. NUREG-1738 contained the results of the staff's evaluation of the potential accident risk for a SFP at a decommissioning power reactor in the United States. Specifically, NUREG-1738 stated that fuel assembly geometry and rack configuration are plant specific, and both are subject to unpredictable changes after an earthquake or cask drop that drains the pool. Therefore, because a non-negligible decay heat source lasts many years and configurations ensuring sufficient air flow for cooling cannot be assured, the possibility of reaching the zirconium ignition temperature cannot be precluded on a generic basis.

In SECY-01-0100, "Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools," the staff concluded that there was no immediate safety concern or need for immediate regulatory action for existing decommissioning power reactor licensees that had been previously granted EP exemptions. These conclusions were based on a review of the site-specific conditions at each existing decommissioning plant's power reactor and the low probability of the beyond-design-basis conditions occurring that would be necessary to initiate a zirconium fire.

In a memorandum dated August 16, 2002, the staff notified the Commission that it had discontinued the integrated rulemaking for decommissioning power reactors and generic regulatory activities because of the apparent lack of future licensees that would benefit from such regulations at that time and the need to devote resources to security related issues due to the events of September 11, 2001. Additionally, the staff provided that if any operating power reactors were to shutdown permanently, decommissioning regulatory issues would continue to be addressed on an ad hoc basis through the exemption process in a manner based on the then-current practice.

Attachment 2 provides a listing of decommissioning power reactors and bases provided in support of reducing EP requirements, specifically the elimination of formal offsite EP requirements.

4.0 OVERVIEW OF EXISTING GUIDANCE

The NRC published NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants," in August 1997, providing recommendations on operationally-based regulations that could be partially or totally removed for decommissioning power reactor licensees without impacting public health and safety. It recommended that licensees apply for exemptions from the following offsite emergency planning requirements, after the fuel is no longer susceptible to substantial zircaloy oxidation and the fuel cladding will remain intact given the SFP is drained:

- The early public notification requirements (§50.47(b)(5) and Appendix E, section IV.D.3);
- The periodic dissemination of emergency planning information to the public (§50.47(b)(7) and Appendix E, section IV.E.8);
- Offsite emergency facilities and equipment such as the EOF, and the emergency news center (§50.47(b)(8), Appendix E, section IV.E.8);
- Offsite radiological assessment and monitoring capability, including field teams (§50.47(b)(9));
- Periodic offsite drills and exercises (§50.47(b)(14), Appendix E, section IV.F.3); and
- Licensee headquarters support personnel training (§50.47(b)(15), Appendix E, section IV.F.b.h).

NUREG-1738 identified a zirconium fire resulting from a substantial loss of water from the SFP as the only postulated scenario at a decommissioning plant that could result in a significant release. The scenarios that lead to this condition have very low probabilities of occurrence and are considered beyond design-basis accidents; however, the consequences of such accidents could lead to an offsite dose in excess of the U.S. Environmental Protection Agency's (EPA) protective action guidelines (PAGs). The risk associated with zirconium fire events decreases as decay time increases and decay heat decreases. In SECY-01-0100, the staff proposed maintaining a level of offsite EP consistent with the Commission's defense-in-depth philosophy while utilizing the risk insights of NUREG-1738.

As the spent fuel ages, the generation of decay heat decreases. After a certain amount of time, the overall risk of a zirconium fire becomes insignificant due to two factors: 1) the amount of time available for preventative and mitigating actions, and, 2) the increased probability that the fuel is air coolable. This lower risk supports the reduction of EP requirements as described in Table 1.

In SECY-01-0100, the staff proposed regulations for maintaining a level of offsite EP consistent with the Commission's defense-in-depth philosophy while utilizing the risk insights of NUREG-1738. The risk associated with a zirconium fire event is directly related to decay heat from the fuel (and therefore, the time since shutdown). NUREG-1738 conservatively estimated that greater than 100 hours would be available before SFPs lowered to within 3 feet of the top of the fuel for loss of cooling events when PWR fuel has decayed at least 60 days.

In June 2013, a draft study, entitled "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark 1 Boiling Water Reactor," was published for public

comment. The purpose of the consequence study was to determine if accelerated transfer of older, colder spent fuel from the SFP at a reference plant to dry cask storage significantly reduces risks to public health and safety. The specific reference plant used for the study was a General Electric Type 4 BWR with a Mark I containment.

The study states: "Past risk studies have shown that storage of spent fuel in a high-density configuration is safe and risk of a large release due to an accident is very low. This study's results are consistent with earlier research conclusions that spent fuel pools are robust structures that are likely to withstand severe earthquakes without leaking. The NRC continues to believe, based on this study and previous studies that spent fuel pools protect public health and safety."

The study also estimated that the likelihood of a radiological release from the SFP resulting from the selected severe seismic event analyzed in the study was on the order of one time in 10 million years or lower. The study analyzed two cases for each scenario: one where mitigation measures of 10 CFR 50.54(hh)(2) were credited, and one where they were not used or were unsuccessful. It showed that successful mitigation reduces the likelihood of a release and that the likelihood of a release was equally low for both high- and low-density loading in the SFP. The study did not consider the post-Fukushima mitigation measures required by Orders EA-12-049 (Mitigating Strategies Order) and EA-12-051 (Reliable Hardened Containment Vents Order)

Additionally, the NRC conducted research to assess the risk to the public and identify the dominant contributors to that risk for moving spent fuel to dry cask storage. NUREG-1864, "A Pilot Probabilistic Risk Assessment [PRA] of a Dry Cask Storage System at a Nuclear Power Plant," was published in March 2007. The staff analyzed risk by selecting a specific cask system at a specific BWR site, developed a comprehensive list of initiating events, and evaluated the risk associated with each initiating event. Initiating events considered included the dropping of the cask inside the secondary containment building during transfer operations, as well as external events during onsite storage (such as earthquakes, floods, high winds, lightning strikes, accidental aircraft crashes, and pipeline explosions). Potential cask failures from mechanical and thermal loads, including thermal loads caused by mis-loading events, were also modeled. In the event of a cask failure/breach, the fuel inventory available for release was based on 10 year old fuel. Weather conditions and the population distribution in the vicinity of the selected site were also considered.

The results of PRA studies are normally presented in measures such as the probability of a prompt fatality and the probability of a latent cancer fatality. The results of this study indicated that no prompt fatalities would be expected. The resulting calculated risk for a latent cancer fatality was extremely small (i.e., less than one in a trillion years). Due to the exceedingly low risk numbers calculated, the conclusion that should be reached is that cask storage systems provide a safe means to store spent nuclear fuel.

5.0 EVALUATION OF EXEMPTIONS TO EP REGULATIONS

Consistent with previous exemption requests informed by the most recent SFP studies, the NRC should not grant approval for the exemption of EP requirements for decommissioning power reactor licensees until site-specific analyses provide sufficient assurance that an offsite radiological release is not postulated to exceed the EPA PAGs at the site boundary, or that there is sufficient time to initiate appropriate mitigating actions by offsite agencies on an ad hoc basis to protect the health and safety of the public. The expected analysis will include the

amount of time that lapses from when the SFP drains and air flow passages are blocked to when the hottest fuel assembly reaches 900 degrees Celsius. The staff concluded in SECY-00-0145 that, because of the considerable time available to initiate and implement mitigative actions, or if necessary, protective actions, formal emergency plans for rapid initiation and implementation of protective actions are no longer needed. For SFPs, after one year of decay time, in the case of an event that could lead to a zirconium fire, licensees would have 10 to 12 hours, which can be considered by NRC staff to be a sufficient amount of time to implement appropriate mitigative measures, as well as, offsite protective actions, if necessary, without preplanning.

In addition to the SFP analysis, any accident analyses in the FSAR that is still applicable in the defueled condition of the plant, such as a fuel handling accident, should be reviewed and any accidents no longer bounded by previous analyses should be analyzed. Historically, exemption requests have included analyses of expended resin fires and direct radiation exposure due to a drained SFP.

The analyses and conclusions described in NUREG-1738 are predicated on the risk reduction measures identified in the study as Industry Decommissioning Commitments (IDC) and Staff Decommissioning Assumptions (SDA), listed in Attachment 2. The staff should ensure that the licensee has addressed these IDCs and SDAs in the final safety analysis report for the decommissioning site if they are storing fuel in a SFP. The staff should verify the licensee presents a determination that there is sufficient time, resources and personnel available to initiate mitigative actions that will prevent an offsite release that exceeds EPA PAGs. The determination must also include a spent fuel heat up analysis for a loss of inventory event leading to fuel uncoverery with obstructed air flow (adiabatic heat-up).

Table 1 depicts the potential exemption requests, based on the staff's experience, for the time period beginning approximately 12 months after the final reactor shutdown, when the only event that could lead to an offsite dose exceeding EPA PAGs is a zirconium fire and the licensee has sufficient time to initiate mitigating actions for the event. The licensee must provide an analysis which indicates that fuel in the SFP meets these conditions. Differences or deviations from Table 1, "Exemptions for Consideration," will be reviewed on a case-by-case basis.

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Table 1
EXEMPTIONS FOR CONSIDERATION

~~Strikethrough~~ text indicates requested exemptions to rule language.	
10 CFR 50.47 Emergency Plans	**Basis for Change**
(b) The onsite ~~and, except as provided in paragraph (d) of this section, offsite~~ emergency response plans for nuclear power reactors must meet the following standards:	In the Statement of Considerations for the Final Rule for EP requirements for ISFSIs and for MRS facilities (60 FR 32430; June 22, 1995), the Commission responded to comments concerning offsite emergency planning for ISFSIs or an MRS and concluded that, "the offsite consequences of potential accidents at an ISFSI or a MRS [monitor retrievable storage installation] would not warrant establishing Emergency Planning Zones." In a nuclear power reactor's permanently defueled state, the accident risks are more similar to an ISFSI or MRS than an operating nuclear power plant. The draft proposed rulemaking in SECY-00-0145 suggested that after at least one year of spent fuel decay time, the decommissioning licensee would be able to reduce its EP program to one similar to that required for an MRS under 10 CFR 72.32(b) and additional EP reductions would occur when: (1) approximately five years of spent fuel decay time has elapsed; or (2) a licensee has demonstrated that the decay heat level of spent fuel in the pool is low enough that the fuel would not be susceptible to a zirconium fire for all spent fuel configurations. The EP program would be similar to that required for an ISFSI under 10 CFR 72.32(a) when fuel stored in the SFP has more than five years of decay time and would not change substantially when all the fuel is transferred from the SFP to an onsite ISFSI. Exemptions from offsite EP requirements have been approved when the specific site analyses show that at least ten hours is available from a partial drain down event where cooling of the spent fuel is not effective until the hottest fuel assembly reaches 900°C. Because ten hours allows sufficient time to initiate mitigative actions to prevent a zirconium fire in the SFP or to initiate ad hoc offsite protective actions, offsite EP plans are not necessary for these permanently defueled nuclear power plant licensees.
(1) Primary responsibilities for emergency response by the nuclear facility licensee and by State and local organizations ~~within the Emergency Planning Zones~~ have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis.	See basis for 50.47(b).
(3) Arrangements for requesting and effectively using assistance resources have	Decommissioning power reactors present a low likelihood of any credible accident resulting in

Table 1
EXEMPTIONS FOR CONSIDERATION

been made, ~~arrangements to accommodate State and local staff at the licensee's Emergency Operations Facility have been made,~~ and other organizations capable of augmenting the planned response have been identified.	radiological releases requiring offsite protective measures because of the permanently shut down and defueled status of the reactor. An emergency operations facility would not be required. The "nuclear island" or "control room" or other location can provide for the communication and coordination with offsite organizations for the level of support required. Also see basis for 50.47(b).
(4) A standard emergency classification and action level scheme, the basis of which include facility system and effluent parameters, is in use by the nuclear facility licensee~~, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures~~.	EALs are to be consistent with Section 8 (if applicable) and Appendix C of NEI 99-01 Revision 6 endorsed by the NRC in a letter dated March 28, 2013. No offsite protective actions are anticipated to be necessary, so classification above the Alert level is no longer required. Also see basis for 50.47(b).
(5) Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow up messages to response organizations ~~and the public~~ has been established~~; and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established~~.	Per SECY-00-0145, after approximately 1 year of spent fuel decay time [and as supported by the licensee's SFP analysis], the staff believes an exception to the offsite EPA PAG standard is justified for a zirconium fire scenario considering the low likelihood of this event together with time available to take mitigative or protective actions between the initiating event and before the onset of a postulated fire. The spent fuel scoping study provides that depending on the size of the pool liner leak, releases could start anywhere from eight hours to several days after the leak starts, assuming that mitigation measures are unsuccessful. If 10 CFR 50.54(hh)(2) type of mitigation measures are successful, releases could only occur during the first several days after the fuel came out of the reactor. Therefore, offsite EP plans are not necessary for these permanently defueled nuclear power plant licensees. Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor, June, 2013
(6) Provisions exist for prompt communications among principal response organizations to emergency personnel ~~and to the public~~.	See basis for 50.47(b).
(7) ~~Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors),~~ [T]he principal points of contact with the news media for dissemination of information during an	See basis for 50.47(b).

Table 1
EXEMPTIONS FOR CONSIDERATION

emergency ~~(including the physical location or locations)~~ are established in advance, and procedures for coordinated dissemination of information to the public are established.	
(9) Adequate methods, systems, and equipment for assessing and monitoring actual or potential ~~offsite~~ consequences of a radiological emergency condition are in use.	See basis for 50.47(b)
(10) ~~A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and, as a supplement to these, the prophylactic use of potassium iodide (KI), as appropriate. Evacuation time estimates have been developed by applicants and licensees. Licensees shall update the evacuation time estimates on a periodic basis. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.~~	In the unlikely event of a SFP accident, the iodine isotopes which contribute to an off-site dose from an operating reactor accident are not present, so potassium iodide (KI) distribution off-site would no longer serve as an effective or necessary supplemental protective action. The Commission responded to comments in its Statement of Considerations for the Final Rule for emergency planning requirements for ISFSIs and MRS facilities (60 FR 32435), and concluded that, "the offsite consequences of potential accidents at an ISFSI or a MRS would not warrant establishing Emergency Planning Zones." Additionally, in the Statement of Considerations for the Final Rule for EP requirements for ISFSIs and for MRS facilities (60 FR 32430), the Commission responded to comments concerning site-specific emergency planning that includes evacuation of surrounding population for an ISFSI not at a reactor site, and concluded that, "The Commission does not agree that as a general matter emergency plans for an ISFSI must include evacuation planning." Also see basis for 50.47(b).
(c)(2) ~~Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries.~~ The size of the EPZs ~~also~~ may be determined on a case-by-case basis for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 MW thermal. ~~The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.~~	See basis for 50.47(b).

Table 1
EXEMPTIONS FOR CONSIDERATION

10 CFR Part 50, Appendix E, section IV	Basis for Change
1. The applicant's emergency plans shall contain, but not necessarily be limited to, information needed to demonstrate compliance with the elements set forth below, i.e., organization for coping with radiological emergencies, assessment actions, activation of emergency organization, notification procedures, emergency facilities and equipment, training, maintaining emergency preparedness, and recovery~~, and onsite protective actions during hostile action~~. In addition, the emergency response plans submitted by an applicant for a nuclear power reactor operating license under this Part, or for an early site permit (as applicable) or combined license under 10 CFR Part 52, shall contain information needed to demonstrate compliance with the standards described in § 50.47(b), and they will be evaluated against those standards.	The EP Final Rule published in the Federal Register (76 FR 72560; November 23, 2011) amended certain requirements in 10 CFR Part 50. Among the changes, the definition of "hostile action" was added as an act directed toward an NPP or its personnel. This definition is based on the definition of "hostile action" provided in NRC Bulletin 2005-02. NRC Bulletin 2005-02 was not applicable to nuclear power reactors that have permanently ceased operations and have certified that fuel has been removed from the reactor vessel. The NRC excluded non-power reactors (NPR) from the definition of "hostile action" at that time because an NPR is not a nuclear power plant and a regulatory basis had not been developed to support the inclusion of non-power reactors in that definition. Likewise, an SFP and an ISFSI are not nuclear power plants as defined in the NRC's regulations. The staff also considered the similarities between a decommissioning NPP and a non-power reactor to determine whether they should be included within the definition of "hostile action." NPRs pose lower radiological risks to the public from accidents than do power reactors because: (1) the core radionuclide inventories are lower as a result of their lower power levels and often shorter operating cycle lengths; and (2) NPRs have lower decay heat associated with a lower risk of core melt and fission product release in a loss-of-coolant accident. A decommissioning power reactor also has a low likelihood of a credible accident resulting in radiological releases requiring offsite protective measures. For all of these reasons, the staff concludes that a decommissioning power reactor is not a facility that falls within the definition of "hostile action."
2. ~~This nuclear power reactor license applicant shall also provide an analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, using the most recent U.S. Census Bureau data as of the date the applicant submits its application to the NRC.~~	See basis for 50.47(b)(10).
3. ~~Nuclear power reactor licensees shall use NRC approved evacuation time estimates (ETEs) and updates to the ETEs in the formulation of protective action recommendations and shall provide the ETEs and ETE updates to State and local~~	See basis for IV.2.

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~~governmental authorities for use in developing offsite protective action strategies.~~	
4. ~~Within 365 days of the later of the date of the availability of the most recent decennial census data from the U.S. Census Bureau or December 23, 2011, nuclear power reactor licensees shall develop an ETE analysis using this decennial data and submit it under § 50.4 to the NRC. These licensees shall submit this ETE analysis to the NRC at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies~~	See basis for IV.2.
5. ~~During the years between decennial censuses, nuclear power reactor licensees shall estimate EPZ permanent resident population changes once a year, but no later than 365 days from the date of the previous estimate, using the most recent U.S. Census Bureau annual resident population estimate and State/local government population data, if available. These licensees shall maintain these estimates so that they are available for NRC inspection during the period between decennial censuses and shall submit these estimates to the NRC with any updated ETE analysis.~~	See basis for IV.2.
6. ~~If at any time during the decennial period, the EPZ permanent resident population increases such that it causes the longest ETE value for the 2-mile zone or 5-mile zone, including all affected Emergency Response Planning Areas, or for the entire 10-mile EPZ to increase by 25 percent or 30 minutes, whichever is less, from the nuclear power reactor licensee's currently NRC approved or updated ETE, the licensee shall update the ETE analysis to reflect the impact of that population increase. The licensee shall submit the updated ETE analysis to the NRC under § 50.4 no later than 365 days after the licensee's determination that the criteria for updating the ETE have been met and at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies.~~	See basis for IV.2.

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10 CFR Part 50, Appendix E, section IV.A	**Basis for Change**
A.1. A description of the normal plant ~~operating~~ organization.	Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," states in part: "... there may be water-cooled nuclear power units for which fulfillment of some of the General Design Criteria may not be necessary or appropriate. For plants such as these, departures from the General Design Criteria must be identified and justified." In Appendix A, a nuclear power unit is defined as a nuclear power reactor and associated equipment necessary for electric power generation and includes those structures, systems, and components required to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. Based on the permanently shut down and defueled status of the reactor, a decommissioning reactor is not a facility that can be operated to generate electrical power. Therefore, it does not have a "plant operating organization."
A.3. ~~A description, by position and function to be performed, of the licensee's headquarters personnel who will be sent to the plant site to augment the onsite emergency organization.~~	The number of staff at decommissioning sites is generally small but is commensurate with the need to safely store spent fuel at the facility in a manner that is protective of public health and safety. Decommissioning sites typically have a level of emergency response that does not require response by headquarters personnel.
A. 4. Identification, by position and function to be performed, of persons within the licensee organization who will be responsible for making ~~offsite~~ dose projections, and a description of how these projections will be made and the results transmitted to State and local authorities, NRC, and other appropriate governmental entities.	Although, the likelihood of events that would result in doses in excess of the EPA PAGs to the public beyond the owner controlled area boundary based on the permanently shut down and defueled status of the reactor is extremely low, the licensee still must be able to determine if a radiological release is occurring. If a release is occurring, then the licensee staff should promptly communicate that information to offsite authorities for their consideration. The offsite organizations are responsible for deciding what, if any, protective actions should be taken.
A. 5. ~~Identification, by position and function to be performed, of other employees of the licensee with special qualifications for coping with emergency conditions that may arise. Other persons with special qualifications, such as consultants, who are not employees of the licensee and who may be called upon for assistance for emergencies shall also be identified. The special qualifications of these persons shall be described.~~	The number of staff at decommissioning sites is generally small but should be commensurate with the need to operate the facility in a manner that is protective of public health and safety.
A.7. ~~By June 23, 2014,~~ identification of~~, and a description of the~~ assistance expected from, appropriate State, local, and Federal agencies	Requiring a licensee for a decommissioning site to provide a description of the assistance expected from appropriate State, local, and Federal agencies with

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with responsibilities for coping with emergencies, ~~including hostile action at the site. For purposes of this appendix, "hostile action" is defined as an act directed toward a nuclear power plant or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, projectiles, vehicles, or other devices used to deliver destructive force.~~	responsibilities for coping with emergencies is an unnecessary burden on the licensee, in light of the low risk of an emergency necessitating offsite assistance. Requiring a licensee to identify and describe the assistance expected from appropriate State, local, and Federal agencies with responsibilities for coping with hostile action at the site is unnecessary because, as explained in section IV.1, a decommissioning power reactor licensee is exempt from requirements in Appendix E related to a "hostile action."
A.8. ~~Identification of the State and/or local officials responsible for planning for, ordering and controlling appropriate protective actions, including evacuations when necessary.~~	Offsite emergency measures are limited to support provided by local police, fire departments, and ambulance and hospital services as appropriate. Since EPA PAGs are not expected to be exceeded offsite, protective actions such as evacuation should not be required. Also see basis for 50.47(b)(10)
A.9. ~~By December 24, 2012, for nuclear power reactor licensees, a detailed analysis demonstrating that on-shift personnel assigned emergency plan implementation functions are not assigned responsibilities that would prevent the timely performance of their assigned functions as specified in the emergency plan.~~	The number of staff at decommissioning sites is generally small but should be commensurate with the need to operate the facility in a manner that is protective of public health and safety. Responsibilities should be well defined in the emergency plan and procedures, regularly tested through drills and exercises audited and inspected by the licensee and the NRC. The duties of the onshift personnel at a decommissioning reactor facility are not as complicated and diverse as those for an operating reactor. The staff considered the similarity between the staffing levels at a permanently shutdown and defueled reactor and staffing levels at NPRs. The minimal systems and equipment needed to maintain the spent nuclear fuel in the spent fuel pool or in a dry cask storage system in a safe condition requires minimal personnel and is governed by Technical Specifications. In the EP Final Rule, the NRC agreed that the staffing analysis requirement was not necessary for non-power reactor licensees due to the small staffing levels required to operate the facility. For all of these reasons, the staff concludes that a decommissioning NPP is exempt from the requirement of 10 CFR Part 50, Appendix E, Section IV.A.9.
10 CFR Part 50, Appendix E, section IV.B	**Basis for Change**
1. The means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as	EALs are to be consistent with Appendix 1 (if applicable) and Appendix C of NEI 99-01, Revision 6, "Methodology for Development of Emergency Action Levels." Also see basis for section IV.1.

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criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within ~~and outside~~ the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite ~~and offsite~~ monitoring. ~~By June 20, 2012, for nuclear power reactor licensees, these action levels must include hostile action that may adversely affect the nuclear power plant~~. The initial emergency action levels shall be discussed and agreed on by the applicant or licensee and State and local governmental authorities, and approved by the NRC. Thereafter, emergency action levels shall be reviewed with the State and local governmental authorities on an annual basis.	
10 CFR Part 50, Appendix E, section IV.C	
1. The entire spectrum of emergency conditions that involve the alerting or activating of progressively larger segments of the total emergency organization shall be described. The communication steps to be taken to alert or activate emergency personnel under each class of emergency shall be described. Emergency action levels (based not only on onsite ~~and offsite~~ radiation monitoring information but also on readings from a number of sensors that indicate a potential emergency, ~~such as the pressure in containment and the response of the Emergency Core Cooling System~~) for notification of offsite agencies shall be described. The existence, but not the details, of a message authentication scheme shall be noted for such agencies. The emergency classes defined shall include: (1) notification of unusual events, (2) alert, ~~(3) site area emergency, and (4) general emergency~~ of 10 CFR Part 50, Appendix E, IV.C.1. These classes are further discussed in NUREG-0654/FEMA-REP-1.	Containment parameters do not provide an indication of the conditions at a defueled facility and emergency core cooling systems are no longer required. Other indications such as SFP level or temperature can be used at sites where there is spent fuel in the SFPs. In the Statement of Considerations for the Final Rule for EP requirements for ISFSIs and for MRS facilities (60 FR 32430), the Commission responded to comments concerning a general emergency at an ISFSI and MRS, and concluded that, "...an essential element of a General Emergency is that a release can be reasonably expected to exceed EPA Protective Action Guidelines exposure levels off site for more than the immediate site area." The probability of a condition reaching the level above an emergency classification of alert is very low. In the event of an accident at a defueled facility that meets the conditions for relaxation of EP requirements, there will be time to take ad hoc measures to protect the public." As stated in NUREG-1738, for instances of small SFP leaks or loss of cooling scenarios, these events evolve very slowly and generally leave many days for recovery efforts. Offsite radiation monitoring will be performed as the need arises. Due to the decreased risks associated with defueled plants, offsite radiation monitoring systems are not required.

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	EALs should to be developed with the guidance provided in NEI 99-01, Revision 6.
2. ~~By June 20, 2012, nuclear power reactor~~ licensees shall establish and maintain the capability to assess, classify, and declare an emergency condition ~~within 15 minutes~~ after the availability of indications to plant operators that an emergency action level has been exceeded and shall promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. Licensees shall not construe these criteria as a grace period to attempt to restore plant conditions to avoid declaring an emergency action due to an emergency action level that has been exceeded. Licensees shall not construe these criteria as preventing implementation of response actions deemed by the licensee to be necessary ~~to protect public health and safety provided that any delay in declaration does not deny the State and local authorities the opportunity to implement measures necessary to protect the public health and safety.~~	In the Proposed Rule (74 FR 23254) to amend certain emergency planning requirements for 10 CFR Part 50, the NRC asked for public comment on whether the NRC should add requirements for non-power reactor licensees to assess, classify, and declare an emergency condition within 15 minutes and promptly declare an emergency condition. The NRC received several comments on these issues. The NRC believes there may be a need for the NRC to be aware of security related events early on so that an assessment can be made to consider the likelihood that the event is part of a larger coordinated attack. However, the NRC determined that further analysis and stakeholder interactions are needed prior to changing the requirements for non-power reactor licensees. Therefore, the NRC did not include requirements in the 2011 EP Final Rule for non-power reactor licensees to assess, classify, and declare an emergency condition within 15 minutes and promptly declare an emergency condition. The staff considered the similarity between a permanently defueled reactor and a non-power reactor for the low likelihood of any credible accident resulting in radiological releases requiring offsite protective measures.
10 CFR Part 50, Appendix E, section IV.D	**Basis for Change**
1. Administrative and physical means for notifying local, State, and Federal officials and agencies ~~and agreements reached with these officials and agencies for the prompt notification of the public and for public evacuation or other protective measures, should they become necessary,~~ shall be described. This description shall include identification ~~of the appropriate officials, by title and agency,~~ of the State and local government agencies ~~within the EPZs.~~	See basis for 50.47(b) and 50.47(b)(10).
2. ~~Provisions shall be described for yearly dissemination to the public within the plume exposure pathway EPZ of basic emergency planning information, such as the methods and times required for public notification and the protective actions planned if an accident occurs, general information as to the nature and effects of radiation, and a listing of local broadcast stations that will be used for dissemination of information during an emergency. Signs or other measures shall~~	See basis for section IV.D.1.

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~~also be used to disseminate to any transient population within the plume exposure pathway EPZ appropriate information that would be helpful if an accident occurs.~~	
3. A licensee shall have the capability to notify responsible State and local governmental agencies within ~~15~~-minutes after declaring an emergency. ~~The licensee shall demonstrate that the appropriate governmental authorities have the capability to make a public alerting and notification decision promptly on being informed by the licensee of an emergency condition. Prior to initial operation greater than 5 percent of rated thermal power of the first reactor at the site, each nuclear power reactor licensee shall demonstrate that administrative and physical means have been established for alerting and providing prompt instructions to the public with the plume exposure pathway EPZ. The design objective of the prompt public alert and notification system shall be to have the capability to essentially complete the initial alerting and notification of the public within the plume exposure pathway EPZ within about 15 minutes. The use of this alerting and notification capability will range from immediate alerting and notification of the public (within 15 minutes of the time that State and local officials are notified that a situation exists requiring urgent action) to the more likely events where there is substantial time available for the appropriate governmental authorities to make a judgment whether or not to activate the public alert and notification system. The alerting and notification capability shall additionally include administrative and physical means for a backup method of public alerting and notification capable of being used in the event the primary method of alerting and notification is unavailable during an emergency to alert or notify all or portions of the plume exposure pathway EPZ population. The backup method shall have the capability to alert and notify the public within the plume exposure pathway EPZ, but does not need to meet the 15 minute design objective for the primary prompt public alert and notification system. When there is a decision to activate the alert and notification system, the appropriate governmental authorities will~~	While the capability needs to exist for the notification of offsite government agencies within a specified time period, previous exemptions have allowed for extending the State and local government agencies' notification time up to 60 minutes based on the site-specific justification provided. A specific notification time should be provided and justified, as part of the exemption request. Also see basis for 50.47(b) and 50.47(b)(10).

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~~determine whether to activate the entire alert and notification system simultaneously or in a graduated or staged manner. The responsibility for activating such a public alert and notification system shall remain with the appropriate governmental authorities.~~	
4. ~~If FEMA has approved a nuclear power reactor site's alert and notification design report, including the backup alert and notification capability, as of December 23, 2011, then the backup alert and notification capability requirements in Section IV.D.3 must be implemented by December 24, 2012. If the alert and notification design report does not include a backup alert and notification capability or needs revision to ensure adequate backup alert and notification capability, then a revision of the alert and notification design report must be submitted to FEMA for review by June 24, 2013, and the FEMA-approved backup alert and notification means must be implemented within 365 days after FEMA approval. However, the total time period to implement a FEMA-approved backup alert and notification means must not exceed June 22, 2015.~~	See basis for section IV D.3. regarding the alert and notification system requirements.
10 CFR Part 50, Appendix E, section IV.E	**Basis for Change**
8.a.(i) A licensee ~~onsite technical support center and an emergency operations~~ facility from which effective direction can be given and effective control can be exercised during an emergency;	Due to the low probability of design-basis accidents or other credible events to exceed the EPA PAGs, the significantly reduced staff and the minimal expected offsite response required, offsite agency response will not be required at an emergency operations facility (EOF) and onsite actions may be directed from the control room or other location, without the requirements imposed on a Technical Support Center (TSC).
(ii) ~~For nuclear power reactor licensees, a licensee onsite operational support center;~~	NUREG-0696, "Functional Criteria for Emergency Response Facilities," provides that the operational support center (OSC) is an onsite area separate from the control room and the TSC where licensee operations support personnel will assemble in an emergency. For a defueled power plant, an OSC is no longer required to meet its original purpose of an assembly area for plant logistical support during an emergency. The OSC function can be incorporated into another facility.
b. ~~For a nuclear power reactor licensee's emergency operations facility required by paragraph 8.a of this section, either a facility located between 10 miles and 25 miles of the nuclear power reactor site(s), or a primary facility located less than 10 miles from the~~	See basis for 50.47(b)(3).

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~~nuclear power reactor site(s) and a backup facility located between 10 miles and 25 miles of the nuclear power reactor site(s). An emergency operations facility may serve more than one nuclear power reactor site. A licensee desiring to locate an emergency operations facility more than 25 miles from a nuclear power reactor site shall request prior Commission approval by submitting an application for an amendment to its license. For an emergency operations facility located more than 25 miles from a nuclear power reactor site, provisions must be made for locating NRC and offsite responders closer to the nuclear power reactor site so that NRC and offsite responders can interact face-to-face with emergency response personnel entering and leaving the nuclear power reactor site. Provisions for locating NRC and offsite responders closer to a nuclear power reactor site that is more than 25 miles from the emergency operations facility must include the following:~~ ~~(1) Space for members of an NRC site team and Federal, State, and local responders;~~ ~~(2) Additional space for conducting briefings with emergency response personnel;~~ ~~(3) Communication with other licensee and offsite emergency response facilities;~~ ~~(4) Access to plant data and radiological information; and~~ ~~(5) Access to copying equipment and office supplies;~~	
c. ~~By June 20, 2012, for a nuclear power reactor licensee's emergency operations facility required by paragraph 8.a of this section, a facility having the following capabilities:~~ ~~(1) The capability for obtaining and displaying plant data and radiological information for each reactor at a nuclear power reactor site and for each nuclear power reactor site that~~	See basis for 50.47(b)(3).

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~~the facility serves;~~ (2) ~~The capability to analyze plant technical information and provide technical briefings on event conditions and prognosis to licensee and offsite response organizations for each reactor at a nuclear power reactor site and for each nuclear power reactor site that the facility serves; and~~ (3) ~~The capability to support response to events occurring simultaneously at more than one nuclear power reactor site if the emergency operations facility serves more than one site; and~~	
d. ~~For nuclear power reactor licensees, an alternative facility (or facilities) that would be accessible even if the site is under threat of or experiencing hostile action, to function as a staging area for augmentation of emergency response staff and collectively having the following characteristics: the capability for communication with the emergency operations facility, control room, and plant security; the capability to perform offsite notifications; and the capability for engineering assessment activities, including damage control team planning and preparation, for use when onsite emergency facilities cannot be safely accessed during hostile action. The requirements in this paragraph 8.d must be implemented no later than December 23, 2014, with the exception of the capability for staging emergency response organization personnel at the alternative facility (or facilities) and the capability for communications with the emergency operations facility, control room, and plant security, which must be implemented no later than June 20, 2012.~~	See basis for section IV.1. regarding hostile action.
e. ~~A licensee shall not be subject to the requirements of paragraph 8.b of this section for an existing emergency operations facility approved as of December 23, 2011;~~	See basis for 50.47(b)(3).
9.a. Provisions for communications with contiguous State/local governments ~~within the plume exposure pathway EPZ~~. Such communication shall be tested monthly.	See basis for 50.47(b) and (b)(10). The State and the local governments in which the nuclear facility is located need to be informed of events and emergencies, so lines of communication must be maintained.

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9.c. Provision for communications among the ~~nuclear power reactor control room, the onsite technical support center, and the emergency operations facility; and among the~~ nuclear facility, the principal State and local emergency operations centers, ~~and the field assessment teams~~. Such communications systems shall be tested annually.	Because of the low probability of design-basis accidents or other credible events that would be expected exceed the EPA PAGs and the available time for event mitigation, there is no need for the TSC, EOF or field assessment teams. Also see justification for 50.47(b)(3). Communication with State and local EOCs is maintained to coordinate assistance on site if required.
9.d. Provisions for communications by the licensee with NRC Headquarters and the appropriate NRC Regional Office Operations Center from the ~~nuclear power reactor control room, the onsite technical support center, and the emergency operations~~ facility. Such communications shall be tested monthly.	The functions of the control room, EOF, TSC and OSC may be combined into one or more locations due to the smaller facility staff and the greatly reduced required interaction with State and local emergency response facilities. Also see basis for 50.47(b).
10 CFR Part 50, Appendix E, section IV.F	**Basis for Change**
1. The program to provide for: (a) The training of employees and exercising, by periodic drills, of radiation emergency plans to ensure that employees of the licensee are familiar with their specific emergency response duties, and (b) The participation in the training and drills by other persons whose assistance may be needed in the event of a radiation emergency shall be described. This shall include a description of specialized initial training and periodic retraining programs to be provided to each of the following categories of emergency personnel: i. Directors and/or coordinators of the plant emergency organization; ii. Personnel responsible for accident assessment, including control room shift personnel; iii. Radiological monitoring teams; iv. Fire control teams (fire brigades); v. Repair and damage control teams; vi. First aid and rescue teams; vii. Medical support personnel; viii. ~~Licensee's headquarters support~~	The number of staff at decommissioning sites is generally small but is commensurate with the need to safely store spent fuel at the facility in a manner that is protective of public health and safety. Decommissioning sites typically have a level of emergency response that does not require additional response by headquarters personnel. Therefore, the staff considers exempting licensee's headquarters personnel from training requirements reasonable.

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~~personnel;~~ ix. Security personnel. In addition, a radiological orientation training program shall be made available to local services personnel; e.g., local emergency services/~~Civil Defense~~, local law enforcement personnel~~, local news media persons~~.	
2. The plan shall describe provisions for the conduct of emergency preparedness exercises as follows: Exercises shall test the adequacy of timing and content of implementing procedures and methods, test emergency equipment and communications networks, ~~test the public alert and notification system,~~ and ensure that emergency organization personnel are familiar with their duties.	Because of the low probability of design-basis accidents or other credible events that would be expected to exceed the limits of EPA PAGs and the available time for event mitigation, the public alert and notification system will not be used and therefore requires no testing. Also see basis for 50.47(b)
a. ~~A full participation exercise which tests as much of the licensee, State, and local emergency plans as is reasonably achievable without mandatory public participation shall be conducted for each site at which a power reactor is located. Nuclear power reactor licensees shall submit exercise scenarios under § 50.4 at least 60 days before use in a full participation exercise required by this paragraph 2.a.~~ F.2.a.(i), (ii), and (iii) are not applicable.	Since the need for off-site emergency planning is relaxed due to the low probability of design-basis accidents or other credible events that would be expected to exceed the limits of EPA PAGs and the available time for event mitigation, no off-site emergency plans are in place to test. The intent of submitting exercise scenarios at power reactors is to check that licensees utilize different scenarios in order to prevent the preconditioning of responders at power reactors. For defueled sites, there are limited events that could occur and the previously routine progression to General Emergency in power reactor site scenarios is not applicable to a decommissioning site. The licensee is exempt from F.2.a.(i)-(iii) because the licensee is exempt from the umbrella provision of F.2.a.
b. Each licensee at each site shall conduct a subsequent exercise of its onsite emergency plan every 2 years. ~~Nuclear power reactor licensees shall submit exercise scenarios under § 50.4 at least 60 days before use in an exercise required by this paragraph 2.b. The exercise may be included in the full participation biennial exercise required by paragraph 2.c. of this section.~~ In addition, the licensee shall take actions necessary to ensure that adequate emergency response capabilities are maintained during the interval between biennial exercises by conducting drills, including at least one drill involving a combination of some of the principal functional	See basis for section IV.F.2.a. The low probability of design-basis accidents or other credible events that would exceed the EPA PAGs and the available time for event mitigation at a decommissioning site render TSCs, OSCs and EOFs unnecessary. The principal functions required by regulation can be performed at an onsite location that does not meet the requirements of the TSC, OSC or EOF.

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areas of the licensee's onsite emergency response capabilities. The principal functional areas of emergency response include activities such as management and coordination of emergency response, accident assessment, event classification, notification of offsite authorities, and assessment of the onsite ~~and offsite~~ impact of radiological releases~~, protective action recommendation development, protective action decision making, plant~~ system repair and mitigative action implementation. During these drills, activation of all of the licensee's emergency response facilities ~~(Technical Support Center (TSC), Operations Support Center (OSC), and the Emergency Operations Facility (EOF))~~ would not be necessary, licensees would have the opportunity to consider accident management strategies, supervised instruction would be permitted, operating staff in all participating facilities would have the opportunity to resolve problems (success paths) rather than have controllers intervene, and the drills may focus on the onsite exercise training objectives.	
c.~~ Offsite plans for each site shall be exercised biennially with full participation by each offsite authority having a role under the radiological response plan. Where the offsite authority has a role under a radiological response plan for more than one site, it shall fully participate in one exercise every two years and shall, at least, partially participate in other offsite plan exercises in this period. If two different licensees each have licensed facilities located either on the same site or on adjacent, contiguous sites, and share most of the elements defining co-located licensees, then each licensee shall:~~ (1)~~ Conduct an exercise biennially of its onsite emergency plan;~~ (2)~~ Participate quadrennially in an offsite biennial full or partial participation exercise;~~ (3)~~ Conduct emergency preparedness activities and interactions in the years between its participation in the offsite full or partial participation exercise with offsite authorities, to~~	See basis for section IV.F.2a.

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~~test and maintain interface among the affected State and local authorities and the licensee. Co-located licensees shall also participate in emergency preparedness activities and interaction with offsite authorities for the period between exercises;~~ (4) ~~Conduct a hostile action exercise of its onsite emergency plan in each exercise cycle; and~~ (5) ~~Participate in an offsite biennial full or partial participation hostile action exercise in alternating exercise cycles.~~	
d. ~~Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in the ingestion pathway portion of exercises at least once every exercise cycle. In States with more than one nuclear power reactor plume exposure pathway EPZ, the State should rotate this participation from site to site. Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in a hostile action exercise at least once every cycle and should fully participate in one hostile action exercise by December 31, 2015. States with more than one nuclear power reactor plume exposure pathway EPZ should rotate this participation from site to site.~~	See basis for section IV.2.
e. Licensees shall enable any State or local Government ~~located within the plume exposure pathway EPZ~~ to participate in the licensee's drills when requested by such State or local Government.	See basis for section IV.2.
f. Remedial exercises will be required if the emergency plan is not satisfactorily tested during the biennial exercise, such that NRC~~, in consultation with FEMA,~~ cannot (1) find reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency or (2) determine that the Emergency Response Organization (ERO) has maintained key skills specific to emergency response. ~~The extent of State and local participation in remedial exercises must be sufficient to show that appropriate corrective measures have been taken regarding the elements of the plan not properly tested in the previous exercises.~~	The U.S. Federal Emergency Management Agency (FEMA) is responsible for the evaluation of an offsite response exercise. No action is expected from State or local government organizations in response to an event at a decommissioning site other than firefighting, law enforcement and ambulance/medical services. Memoranda of understanding should be in place for those services. Offsite response organizations will continue to take ad hoc actions to protect the health and safety of the public as they would at any other industrial site.

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EXEMPTIONS FOR CONSIDERATION

i. Licensees shall use drill and exercise scenarios that provide reasonable assurance that anticipatory responses will not result from preconditioning of participants. ~~Such scenarios for nuclear power reactor licensees must include a wide spectrum of radiological releases and events, including hostile action.~~ Exercise and drill scenarios as appropriate must emphasize coordination among onsite and offsite response organizations.	For defueled sites, there are limited events that could occur and the previously routine progression to General Emergency in power reactor site scenarios is not applicable to a decommissioning site. Therefore the licensee is not expected to demonstrate response to a wide spectrum of events. Also see basis for section IV.1 regarding hostile action.
j. ~~The exercises conducted under paragraph 2 of this section by nuclear power reactor licensees must provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to implement the principal functional areas of emergency response identified in paragraph 2.b of this section. Each exercise must provide the opportunity for the ERO to demonstrate key skills specific to emergency response duties in the control room, TSC, OSC, EOF, and joint information center. Additionally, in each eight calendar year exercise cycle, nuclear power reactor licensees shall vary the content of scenarios during exercises conducted under paragraph 2 of this section to provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to respond to the following scenario elements: hostile action directed at the plant site, no radiological release or an unplanned minimal radiological release that does not require public protective actions, an initial classification of or rapid escalation to a Site Area Emergency or General Emergency, implementation of strategies, procedures, and guidance developed under § 50.54(hh)(2), and integration of offsite resources with onsite~~ justification. ~~The licensee shall maintain a record of exercises conducted during each eight year exercise cycle that documents the content of scenarios used to comply with the requirements of this paragraph. Each licensee shall conduct a hostile action exercise for each of its sites no later than December 31, 2015. The first eight-year exercise cycle for a site will begin in the calendar year in which the first hostile action exercise is conducted. For a site licensed under Part 52, the first eight-year exercise cycle begins in the calendar year of the initial exercise required by Section~~	See basis for section IV.F.2.

Table 1
EXEMPTIONS FOR CONSIDERATION

~~IV.F.2.a.~~	
10 CFR Part 50, Appendix E, section IV.I	**Basis for Change**
~~By June 20, 2012, for nuclear power reactor licensees, a range of protective actions to protect onsite personnel during hostile action must be developed to ensure the continued ability of the licensee to safely shut down the reactor and perform the functions of the licensee's emergency plan.~~	See basis for section IV.E.d.

References

1) 10 CFR 50.47, "Emergency Plans."

2) 10 CFR 50.54, "Conditions of Licenses."

3) 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities."

4) 10 CFR Part 72.32, "Emergency Plan"

5) U.S. Nuclear Regulatory Commission, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning," Commission Paper SECY-00-0145, June 28, 2000 Agencywide Document Access and Management System (ADAMS) Accession No. ML003721626.

6) U.S. Nuclear Regulatory Commission, "Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools" Commission Paper SECY-01-0100, ADAMS Accession No. ML011450420.

7) U.S. Nuclear Regulatory Commission, "Technical Study of Spent Fuel Accident Risk at Decommissioning Nuclear Power Plants" NUREG-1738 February 2001 ADAMS Accession No. ML010430066.

8) Memorandum from William Travers to Commission re: Status of Regulatory Exemptions for Decommissioning Plants", August, 2002 ADAMS Accession No. ML030550706.

9) U.S. Nuclear Regulatory Commission, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor" (Draft Report for Comment) June 2013, ADAMS Accession No. ML13133A132.

10) U.S. Nuclear Regulatory Commission, "A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants" NUREG/CR-6451 August 1997, ADAMS Accession No. ML082260098.

11) U.S. Nuclear Regulatory Commission, NUREG-1864, "A Pilot Probabilistic Risk Assessment of a Dry Cask Storage System at a Nuclear Power Plant" ADAMS Accession No. ML071340012.

12) U.S. Nuclear Regulatory Commission, Commission Paper SECY-97-120,"Rulemaking Plan for Emergency Planning Requirements for Permanently Shutdown Nuclear Power Plant Sites", July 1997, ADAMS Accession No. ML003752513.

13) NEI 99-01, Revision 6 (Draft) "Methodology for the Development of Emergency Action Levels for Non-Passive Reactors", November 2012, ADAMS Accession No. ML12326A805.

Attachment 1
GUIDANCE FOR EVALUATION OF DECOMMISSIONING EMERGENCY PLANS

The following guidance should be used for the review of Defueled Emergency Plans for sites undergoing decommissioning:

1.0 Emergency Response Equipment and Facilities

Applicable Regulation(s): 10 CFR 50.47(b)(8) and (9), Appendix E to 10 CFR Part 50, Section IV.E

1.1. Back ground and Discussion

Operating power reactor sites require separate facilities for functions of evaluation and coordination of activities associated with the emergency, technical support, plant operation, assembly of logistical support personnel, and dissemination of information. When a site enters decommissioning, most of the plant systems are no longer required for operation or for mitigation of an accident. Most of the design basis accidents are no longer credible. The staff required to support the site is also much smaller. Facility functions may also be combined, and therefore, physical locations may be eliminated.

1.2. Guidance

The emergency plan should describe the onsite equipment and facilities designated for use during emergencies. The plan should describe the principal and alternate locations from which emergency control and assessment activities will occur. At least one location should be habitable during any emergency.

The emergency plan should include the means for identifying a command center to be used in an emergency. The criteria for evacuating a command center and re-establishing control from an alternate location should also be described. The plan should identify one or more locations from which licensee emergency workers would be dispatched to perform radiation surveys, damage assessment, emergency repair, or other mitigating tasks.

The protective equipment and supplies available to emergency response personnel should be described. Types of equipment and supplies may include:

- individual respiratory equipment, including self-contained breathing apparatus
- protective clothing
- firefighting equipment and gear
- supplemental lighting
- medical supplies
- contamination control and decontamination equipment
- communications equipment
- radiation detection equipment, including radiation meters, air samplers, dosimeters
- hazardous material detection equipment
- potassium iodide

Attachment 1
GUIDANCE FOR EVALUATION OF DECOMMISSIONING EMERGENCY PLANS

The emergency plan should include criteria for issuing respiratory equipment, locations of emergency equipment and supplies, means for distributing these items and criteria for dispensing potassium iodide, if required.

The emergency plan should also include inventory lists indicating the emergency equipment and supplies provided at specified locations. The plan should describe the primary and alternate onsite and offsite communication systems that would be used to transmit and receive information throughout the emergency. A backup means of offsite communication to a commercial telephone should be provided for notification of emergencies and requests for assistance.

2.0 Staffing and Communication

Applicable Regulation(s): 10 CFR 50.47(b)(1), (2), (5) and (6), Appendix E to 10 CFR Part 50, Sections IV.A, C and D

2.1. Background and Discussion:

Table B-1 in NUREG-0654/FEMA-REP-1, Revision 1 describes the minimum emergency response staffing requirements for nuclear power plant licensed per 10 CFR Part 50 and 10 CFR Part 52. The staff recognizes that due to the limited number, lower possible frequency and relative magnitude of events at a defueled facility, fewer staff may be required during decommissioning. The major functional areas remain the same, but the major tasks are different and the time available to take mitigating actions changes significantly. Defueled Technical Specifications typically will define the onshift operating staff at a defueled decommissioning site as two positions: a certified fuel handler and an operator or technician. The major responsibility of the onshift staff, while there is fuel in the SFP, is to maintain SFP cooling. Performing the role of an Emergency Director should be within the qualifications and capabilities of the designated onshift staff member.

2.2. Guidance

2.2.1 Responsibilities

The emergency plan should describe the emergency organization to be activated onsite for possible events, and offsite augmentation and support. The plan should delineate the authorities and responsibilities of key positions and groups, and identify the communication chain for notifying and mobilizing personnel during normal and non-working hours. Personnel with the responsibility for event classification, onsite protective action decisions, and prompt notification of State and local government authorities and the NRC should be identified.

2.2.2 Decommissioning Facility Organization

The emergency plan should provide a brief description of the normal (day-to-day) facility organization and identify by position those with responsibility to declare an emergency and to initiate the appropriate response. Personnel responsible for maintaining the emergency plan and emergency response procedures should be identified.

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GUIDANCE FOR EVALUATION OF DECOMMISSIONING EMERGENCY PLANS

2.2.3 Onsite Emergency Response Organization

The emergency plan should identify the onsite emergency response organization for the facility, including during periods such as holidays, weekends, and extended periods when normal operations are not being conducted. Organizational charts and tables should be used when appropriate. If the organization is activated in phases, the plan should describe the base organization and each additional component that may be activated to augment the organization. Typically, a minimum staff to augment the minimum onshift staff is manned within an hour of declaration of an Alert with a goal of total augmentation within two hours. The plan should clearly state the minimum level of staffing needed to effectively implement the plan for each period or phase described.

2.2.4 Direction and Coordination

The emergency plan should designate the position of the person, and alternate(s), who has principal responsibility for implementing and directing the emergency response. This person's duties and authorities would include:

- control of the situation
- initial classification, escalation or termination of the emergency condition
- event notification
- coordination of the staff and offsite personnel who augment the staff
- communication with parties requesting information regarding the event
- onsite protective measure decision-making
- request of support from offsite agencies

The emergency plan should also describe this person's authority to delegate responsibilities and the individuals who may be delegated certain emergency responsibilities.

2.2.5 Onsite Staff Emergency Assignments

The emergency plan should specify the organizational group or groups assigned to the functional areas of emergency activity listed below. The plan should also describe strategies for staffing these positions if the emergency lasts for an extended period of time. The duties, authorities, and interface with other groups and offsite assistance should be described. The organizational groups should provide support in the following areas:

- facility systems operations,
- fire control,
- onsite protective measures, including personnel evacuation and accountability,
- search and rescue operations,
- first aid,
- communications,
- onsite radiological survey and assessment,
- personnel and facility decontamination,
- facility security and access control,
- facility repair and damage control,
- post-event assessment,

- record keeping,
- media contact, and
- criticality safety assessment

2.2.6 Emergency Response Records

The emergency plan should describe the assignment of responsibility for reporting and recording incidents of abnormal operation, equipment failure, and accidents that led to a facility emergency. Decommissioning records shall be maintained until the license is terminated as required by10 CFR 50.75(g). Records of an emergency or incident to be maintained should include the following:

- cause of the incident,
- personnel and equipment involved,
- extent of injury and damage (onsite and offsite) as a result of the incident,
- locations of contamination with the final decontamination survey results,
- corrective actions taken to terminate the emergency,
- actions taken or planned to prevent a recurrence of the incident,
- onsite and offsite assistance requested and received, and
- any program changes resulting from a critique of emergency response activities.

The emergency plan should provide a description of the records associated with emergency plan maintenance that will be kept. These should include the following:

- training and retraining (including lesson plans and test questions),
- drills, exercises, and related critiques,
- inventory and locations of emergency equipment and supplies,
- maintenance, surveillance, calibration, and testing of emergency equipment and supplies,
- letters of agreement with offsite support organizations,
- reviews and updates of the emergency plan submitted per 10 CFR Part 50.54(q), and
- notification of onsite personnel and offsite response organizations affected by an update of the plan or its implementing procedures

The emergency plan should include provisions for an annual review and audit of the emergency preparedness program to ensure the program remains adequate. Elements of the audit should include a review of the following:

- emergency plan and associated procedures,
- emergency response training activities,
- records of emergency facilities, equipment, and supplies,
- records associated with offsite response agencies interface (such as training and letters of agreement),
- exercises, drills, communications, and inventory checks, and
- activation of the emergency plan since the last audit

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GUIDANCE FOR EVALUATION OF DECOMMISSIONING EMERGENCY PLANS

2.2.7 Coordination with Offsite Response Organizations

The emergency plan should identify the principal State agency and other government (local, county, State, and Federal) agencies or organizations having authority for radiological or other hazardous material emergencies. The agencies' and/or organization's location and specific response capabilities in terms of personnel and resources should be described. The plan should include a description of the onsite and offsite services that support emergency response operations, including the following:

- decontamination facilities,
- medical treatment facilities,
- first aid personnel,
- fire fighters,
- law enforcement assistance, and
- ambulance services

2.2.8 Notification and Coordination

The emergency plan should describe the means used to activate the emergency response organization for each class of emergency on a 24-hours per day/7-days per week basis. The plan should describe the means provided to detect and notify the licensee's onshift staff of any abnormal conditions or of any danger to safe operations (e.g., a severe weather warning). The means to promptly notify State and local government authorities and the NRC should be described. The ability to request offsite assistance, including medical assistance for the treatment of contaminated injured onsite workers, should also be described. The plan should include the commitment to notify the NRC Operations Center immediately after notification of State and local government authorities but no later than one hour after an emergency is declared.

2.2.9 Information to be Communicated

The emergency plan should describe the type of information to be communicated to State and local government authorities and the NRC. The information should be clear, concise and should avoid technical terms and jargon. The types of information to be communicated should include the status of the facility, if a release of radioactive material is occurring or could occur, and dose rate projections. A standard reporting checklist should be included in the plan to facilitate timely notification for each postulated accident.

3.0 Mitigation of Consequences

Applicable Regulation(s): 10 CFR 50.47(b)(3), (8) and (10), Appendix E to 10 CFR Part 50, Section IV.B

3.1. Background and Discussion

Sites which hold spent fuel susceptible to zirconium fires have been exempted from some EP regulations based on their analysis showing the ability to perform actions to prevent such events or to take offsite protective actions were necessary. A site-specific SFP analysis should show that there is sufficient time from the loss of SFP inventory

until the onset of a zirconium fire to take the actions to mitigate the inventory loss and prevent a zirconium fire and to take offsite protective actions. Specifically, a time of at least ten hours from the loss of SFP inventory, without air cooling, to a temperature of 900 degrees C should be one conclusion from this site specific analysis. The emergency plan should describe the equipment, personnel, resources, such as water supplies, procedures and strategies in place for movement of any necessary portable equipment, initial and continuing training, that will be relied upon for prevention of a zirconium fire in the SFP. These mitigative strategies may have been developed as part of a response to or the result of NRC Order on Mitagative Strategies (EA-12-049). A time estimate for completing necessary actions to preclude the zirconium fire should be made.

3.2. Guidance

3.2.1 Limiting Actions

The emergency plan should describe the means and equipment provided for limiting the consequences of each type of accident identified in the plan. The plan should address the actions and systems in place to reduce the magnitude and/or reduce the effect of a radioactive or hazardous material release that has occurred. The plan should include actions to be taken to limit and mitigate the consequences to the public and workers. Means for limiting releases could include the following:

- sprinkler systems and other fire suppression systems
- fire detection systems
- firefighting capabilities
- filtration or holdup systems
- use of water sprays on airborne releases of radioactive material
- automatic shut-off of process or ventilation flow
- use of fire-resistant building materials

If portable equipment is used to prevent or mitigate events, the emergency plan should describe the procedures, storage and maintainability of that equipment.

Based upon the type of emergency, the emergency plan should describe the criteria for the shutdown of systems or the facility and any steps to be taken to ensure a safe, orderly shutdown of fuel handling operations and the approximate time required to complete the shutdown.

3.2.2 Onsite Protective Actions

The emergency plan should describe the nature of onsite protective actions, criteria for implementing those actions, the areas involved, and the procedures for notification to potentially affected persons. The plan should allow for timely relocation of onsite persons, effective use of protective equipment and supplies, and use of appropriate contamination control measures. The plan should describe the means for controlling and/or minimizing radiological exposures for personnel onsite, and any personnel expected to arrive onsite. The onsite exposure guidelines should be consistent with the EPA PAGs to be used in actions to control fires, stop releases, or protect the facilities. Exposure guidelines should be provided for:

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- search and rescue
- removing injured persons
- undertaking mitigating actions
- performing assessment actions
- providing onsite first aid
- performing personnel decontamination
- providing ambulance service or offsite medical treatment

The emergency plan should include methods for onsite personnel evacuation and accountability. This could include:

- criteria for ordering a site evacuation
- means and timely notification of onsite persons impacted
- provisions for determining and maintaining accountability of assembled and evacuated personnel, and for identifying and determining the locations of personnel that were not evacuated
- search and rescue
- locations of onsite and offsite assembly areas
- evacuation routes and means for transporting onsite personnel (e.g., privately owned vehicles, buses, company vehicles)
- monitoring of evacuees for contamination and control measures if contamination is found
- criteria for command center and assembly area evacuation and re-establishment at an alternate location
- means for evacuating and treating onsite injured personnel, including potentially contaminated personnel

The emergency plan should describe provisions for preventing further spread of radioactive materials and for minimizing personnel exposure from radioactive materials. The plan should specify action levels for decontaminating personnel. The plan should describe provisions for determining the doses and dose commitments from external radiation exposure and internally deposited radioactive material received by emergency response personnel, including personnel from offsite emergency response organizations (e.g. fire, medical, police).

The emergency plan should describe arrangements made for hospital and medical services, both primary and backup, and their capabilities to evaluate and treat contaminated, injured persons, and injuries involving radiation, radioactive materials, and other hazardous materials used in conjunction with radioactive materials. The medical facility description should include capabilities to control any contamination that may be associated with the physical injuries. The plan should specify how injured personnel who are potentially contaminated will be transported to offsite medical facilities. The plan should describe how chemicals or hazardous materials stored onsite may impact transporting injured personnel. The commitment to provide ambulance and hospital personnel with health physics support should be included.

3.2.3 Assessment of Releases

The emergency plan should discuss the actions to be taken to determine the extent of the problem and to decide what corrective actions may be required for each class of emergency. This should include the types and methods of onsite and offsite sampling and monitoring in case of a release of radioactive or other hazardous material. The provisions for projection of offsite radiation exposures should be described.

4.0 Emergency Action Levels

Applicable Regulation(s): 10 CFR 50.47(b)(4), Appendix E to 10 CFR Part 50, Section IV.B, 10 CFR 72.32.a.

4.1. Background and Discussion

Recognition Category Permanently Defueled (PD) of the Nuclear Energy Institute (NEI) document NEI 99-01 Revision 6, "Methodology for Development of Emergency Action Levels," provides a stand-alone set of initiating conditions (ICs) and emergency action levels (EALs) for a permanently defueled NPP to consider for use in developing a site-specific emergency classification scheme. For development, it was assumed that the plant had operated under a 10 CFR Part 50 license and that the operating company has permanently ceased plant operations. Further, the licensee intends to store the spent fuel within the plant for some period of time. When in a permanently defueled condition, the licensee will typically receive approval from the NRC for exemption from specific emergency planning requirements. These exemptions reflect the lower radiological source term and risks associated with spent fuel pool storage relative to an operating power reactor. Source terms and accident analyses associated with plausible accidents are documented in the station's Final Safety Analysis Report (FSAR), as updated. As a result, each licensee will need to develop a site-specific emergency classification scheme using the NRC-approved exemptions, revised source terms, and revised accident analyses as documented in the station's FSAR.

Recognition Category PD uses the same emergency classification levels (ECLs) as operating reactors; however, the source term and accident analyses typically limit the ECLs to an Unusual Event and Alert. The Unusual Event ICs provide for an increased awareness of abnormal conditions while the Alert ICs are specific to actual or potential impacts to spent fuel. The source terms and release motive forces associated with a permanently defueled plant would not be sufficient to require declaration of a Site Area Emergency or General Emergency unless a zirconium fire occurs.

A permanently defueled station is essentially a spent fuel storage facility with the spent fuel stored in a pool of water that serves as both a cooling medium (i.e., removal of decay heat) and a shield from direct radiation. These primary functions of the spent fuel storage pool are the focus of the Recognition Category PD ICs and EALs. Radiological effluent IC and EALs were included to provide a basis for classifying events that cannot be readily classified based on an observable event or plant conditions alone.

Appropriate ICs and EALs from the other Recognition Categories of NEI 99-01 were modified and included in Recognition Category PD to address a spectrum of the events that may affect a spent fuel pool. The Recognition Category PD ICs and EALs reflect

the relevant guidance in this document (e.g., the importance of avoiding both over-classification and under-classification). Nonetheless, each licensee will need to develop its emergency classification scheme using the NRC-approved exemptions, and the source terms and accident analyses specific to the licensee. Security-related events will also need to be considered and documented in the licensee Physical Security Plan and written implementing procedures.

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR Part 50 emergency plan to fulfill the requirements of 10 CFR 72.32 for a stand-alone Independent Spent Fuel Storage Installation (ISFSI). The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR Part 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR 72.32 emergency plan (as described in NUREG-1567) are subsumed within the classification scheme for a 10 CFR 50.47 emergency plan.

The generic ICs and EALs for an ISFSI are presented in NEI 99-01, ISFSI ICs/EALs. IC E-HU1 covers the spectrum of credible natural and man-made events included within the scope of an ISFSI design. This IC is not applicable to installations or facilities that may process and/or repackage spent fuel (e.g., a Monitored Retrievable Storage Facility (MRS) or an ISFSI at a spent fuel processing facility). In addition, appropriate aspects of IC HU1 and IC HA1 should also be included to address security events directed against an ISFSI.

4.2. Guidance

4.2.1 Unusual Event

The emergency plan should identify events which could lead to initiation of an Unusual Event. Initiating events may include:

- release of gaseous or liquid radioactivity greater than 2 times the (site-specific effluent release controlling document) limits for 60 minutes or longer
- unplanned rise in plant radiation levels
- unplanned spent fuel pool temperature rise
- confirmed security condition or threat
- hazardous event affecting safety system equipment necessary for spent fuel cooling
- other conditions exist which in the judgment of the Emergency Director warrant declaration of an Unusual Event

4.2.2 Alert

The emergency plan should identify events which could lead to initiation of an Alert. Initiating events may include:

- release of gaseous or liquid radioactivity resulting in offsite dose greater than 10 mrem total effective dose equivalent (TEDE) or 50 mrem thyroid committed dose equivalent (CDE)
- unplanned rise in plant radiation levels that impedes plant access required to maintain spent fuel integrity

- hostile action within the Owner Controlled Area or airborne attack threat within 30 minutes
- other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert

4.2.3 Independent Spent Fuel Storage Installation

If the licensee elects to transfer the spent fuel and store it in an ISFSI, the emergency plan should also identify events for the ISFSI which could lead to initiation of an Unusual Event. Initiating events may include:

- Damage to a loaded cask confinement boundary

5.0 Exercises

The emergency plan should describe the provisions for periodic drills and exercises. Communications checks with offsite agencies,and radiological/health physics, medical, and fire drills should be performed at the interval established by 10 CFR 72.32(a) or (b). The biennial onsite exercise should test the effectiveness of the personnel, plan and procedures, and readiness of facilities, equipment, supplies and instrumentation. Offsite responses organizations should be invited to participate, however, participation is not required. The plan should describe the responsibility for developing the exercise accident scenario, requirements for non-participating observers to evaluate the effectiveness of the exercise, the need for a critique of the exercise, and if deficiencies are found, how they will be corrected.

6.0 Assistance

The emergency plan should describe provisions and arrangements for assistance from offsite response organizations during and after an emergency. The plan should indicate the location of local assistance with respect to the facility. Exposure guidelines should be clearly communicated to offsite emergency response personnel. The plan should identify the services to be performed, means of communication and notification, and types of agreements that are in place for the following:

- medical treatment facilities,
- first aid personnel and/or ambulance service,
- fire fighters, and
- local law enforcement assistance/documented memorandum of agreements (specific details may be Safeguards Information.

The emergency plan should describe the measures that will be taken to ensure that offsite response organizations maintain an awareness of their respective roles in an emergency and have the necessary equipment, supplies and periodic training to carry out their emergency response functions. Any provisions to suspend security or safeguards measures for site access during an emergency should be described.

The licensee should offer to meet at least annually with each offsite response organization providing onsite support as identified in the licensee's emergency plan, to review items of mutual interest, including relevant changes to the emergency plan. The

licensee should discuss the emergency action level scheme, notification procedures, and overall response coordination process during these meetings.

Attachment 2
PREVIOUSLY APPROVED LICENSING ACTIONS

Licensee	Date Operations Ceased	Date Exemption Issued	Basis for Exemption
Humbolt Bay	7/2/76	4/29/87	The staff evaluated offsite radiological consequences of potential accidents involving the fuel stored in the spent fuel pool including a fuel handling accident, a non-mechanistic heavy load drop, and a seismically- or otherwise-induced rearrangement of the stored fuel assemblies. Other hypothetical accident scenarios considered by the staff were a non-mechanistic expulsion of all pool water to the atmosphere, a spent fuel rupture, and uncontrolled release of all contents of the liquid radwaste tanks to the discharge canal. The staff concluded that all atmospheric releases were well below EPA PAGs.
La Crosse	4/30/87	7/8/88	The staff evaluated the offsite consequences of potential accidents to the fuel stored in the spent fuel pool. The analysis assumed all fuel rods damaged with no iodine filters operating, and no fuel pool water missing. In this scenario, the doses at the exclusion area boundary would be less than 25% of the 10 CFR Part 100 paragraph 11 guideline values, i.e., much less than 75 rem for the thyroid and 6 rem for whole-body dose. The above dose values are the acceptance criteria value from the NRC Standard Review Plan (NUREG-800) Section 15.7.5 on spent fuel cask drop accidents. Similarly, the calculated doses are well below EPA PAGs.
Fort St. Vrain	8/18/89	12/31/90	Analyzed radiological consequences of potential accidents involving a fuel handling accident (i.e., dropped fuel shipping cask) provided doses offsite less than EPA PAGs.
Rancho Seco	6/7/89	2/22/91	Analyzed radiological consequences of potential accidents involving a fuel handling accident (i.e., dropped fuel shipping cask) provide doses offsite less than EPA PAGs.

Attachment 2
PREVIOUSLY APPROVED LICENSING ACTIONS

Licensee	Date Operations Ceased	Date Exemption Issued	Basis for Exemption
Yankee Rowe	10/1/91	10/30/92	Analyzed radiological consequences of potential accidents involving a fuel handling accident (i.e., dropped fuel shipping cask) provide doses offsite less than EPA PAGs.
Trojan	11/2/92	9/30/93	Analyzed radiological consequences of potential accidents involving a fuel handling accident (i.e., dropped fuel shipping cask) provide doses offsite less than EPA PAGs. The staff concluded that in view of the low likelihood of a seismic event > 0.5g and the time elapsed since shutdown of the facility, and the configuration of the fuel in the spent fuel pool, that there would be sufficient time after a postulated loss of water and before the initiation of a cladding fire for the licensee to implement actions to preclude heat up of the spent fuel.

Attachment 2
PREVIOUSLY APPROVED LICENSING ACTIONS

Licensee	Date Operations Ceased	Date Exemption Issued	Basis for Exemption
Haddam Neck	7/22/96	8/28/98	The staff evaluated: 1. Release of activity from combustible ion exchanger resin and fuel handling accidents would not exceed EPA PAGs. 2. For gamma radiation due to a loss of spent fuel pool level, it would take 2.6 days to exceed EPA PAGs. 3. For a bounding scenario where the fuel is totally uncovered, the decay heat would not heat up higher than 565 degrees Celsius (C); therefore the cladding would stay intact. The staff concluded that the postulated doses to the general public from any reasonably conceivable accident would not exceed EPA PAGs and, for the loss of fuel pool level, the length of time available gives confidence that mitigative actions could be taken and provides confidence that additional offsite measures could be taken without planning.
Maine Yankee	12/6/96	9/3/98	The staff evaluated: 1. A fire involving resin and gamma radiation due to a loss of spent fuel pool level not exceeding EPA PAGs. 2. A bounding scenario where the fuel is totally uncovered and no natural circulation flow path exists. The staff calculated that it would take ~10 hours to heat up to 900 degrees C. The staff concluded that the postulated doses to the general public from any reasonably conceivable accident would not exceed EPA PAGs and, for the bounding accident, the length of time available gives confidence that mitigative actions and, if necessary, offsite measures for the public could be taken without preplanning.

Attachment 2
PREVIOUSLY APPROVED LICENSING ACTIONS

Licensee	Date Operations Ceased	Date Exemption Issued	Basis for Exemption
Big Rock Point	8/29/97	9/30/98	The staff evaluated: 1. Gap release of activity from a fuel handling accident and heavy load drops on spent fuel not exceeding EPA PAGs. 2. A fire involving resin and gamma radiation due a loss of spent fuel pool level not exceeding EPA PAGs. 3. A bounding scenario where the fuel is totally uncovered and no natural circulation flow path exists. The staff calculated that it would take ~14 hours to heat up to 900 degrees C. The staff concluded that the postulated doses to the general public from any reasonably conceivable accident would not exceed EPA PAGs and, for the bounding accident, the length of time available gives confidence that mitigative actions and, if necessary, offsite measures for the public could be taken without preplanning.
Zion	2/13/98	8/31/99	The staff concluded that there were no design basis accidents or other credible events that would result in a radiological dose beyond the exclusion area boundary that would exceed EPA PAGs. For a bounding scenario where the fuel is totally uncovered, the decay heat would not heat up higher than 482 degrees C; therefore the cladding would stay intact.

Attachment 3
Industry Decommissioning Commitments and Staff Decommissioning Assumptions

Industry Decommissioning Commitments (IDCs)

IDC #1 Cask drop analyses will be performed or single failure-proof cranes will be in use for handling of heavy loads (i.e., phase II of NUREG-0612 will be implemented).

IDC #2 Procedures and training of personnel will be in place to ensure that onsite and offsite resources can be brought to bear during an event.

IDC #3 Procedures will be in place to establish communication between onsite and offsite organizations during severe weather and seismic events.

IDC #4 An offsite resource plan will be developed which will include access to portable pumps and emergency power to supplement onsite resources. The plan would principally identify organizations or suppliers where offsite resources could be obtained in a timely manner.

IDC #5 Spent fuel pool instrumentation will include readouts and alarms in the control room (or where personnel are stationed) for spent fuel pool temperature, water level, and area radiation levels.

IDC #6 Spent fuel pool seals that could cause leakage leading to fuel uncovery in the event of seal failure shall be self-limiting to leakage or otherwise engineered so that drainage cannot occur.

IDC #7 Procedures or administrative controls to reduce the likelihood of rapid draindown events will include: (1) prohibitions on the use of pumps that lack adequate siphon protection or (2) controls for pump suction and discharge points. The functionality of anti-siphon devices will be periodically verified.

IDC #8 An onsite restoration plan will be in place to provide repair of the spent fuel pool cooling systems or to provide access for makeup water to the spent fuel pool. The plan will provide for remote alignment of the makeup source to the spent fuel pool without requiring entry to the refuel floor.

IDC #9 Procedures will be in place to control spent fuel pool operations that have the potential to rapidly decrease spent fuel pool inventory. These administrative controls may require additional operations or management review, management physical presence for designated operations or administrative limitations such as restrictions on heavy load movements.

IDC #10 Routine testing of the alternative fuel pool makeup system components will be performed and administrative controls for equipment out of service will be implemented to provide added assurance that the components would be available, if needed.

Attachment 3
Industry Decommissioning Commitments and Staff Decommissioning Assumptions

Staff Decommissioning Assumptions (SDAs)

SDA #1 Licensee's SFP cooling design will be at least as capable as that assumed in the risk assessment, including instrumentation. Licensees will have at least one motor-driven and one diesel-driven fire pump capable of delivering inventory to the SFP:

Makeup pump: 20-30 gallons per minute (gpm)
Firewater pump: 100-200 gpm
Fire engine: 100-250 gpm (100 gpm, for 1 1/2-in hose, 250 gpm for 2 1/2-in. hose)

SDA #2 Walk-downs of SFP systems will be performed at least once per shift by the operators. Procedures will be developed for and employed by the operators to provide guidance on the capability and availability of onsite and offsite inventory makeup sources and time available to initiate these sources for various loss of cooling or inventory events.

SDA #3 Control room instrumentation that monitors SFP temperature and water level will directly measure the parameters involved. Level instrumentation will provide alarms at levels associated with calling in offsite resources and with declaring an emergency.

SDA #4 Licensee determines that there are no drain paths in the SFP that could lower the pool level (by draining, suction, or pumping) more than 15 feet below the normal pool operating level.

SDA #5 Load drop consequence analyses will be performed for facilities with non-single failure-proof systems. The analyses and any mitigative actions necessary to preclude catastrophic damage to the SFP that would lead to a rapid pool draining would be sufficient to demonstrate that there is high confidence in the facilities ability to withstand a heavy load drop.

SDA #6 Each decommissioning plant will successfully complete the seismic checklist provided in Appendix 2B to NUREG-1738. If the checklist cannot be successfully completed, the decommissioning plant will perform a plant specific seismic risk assessment of the SFP and demonstrate that SFP seismically induced structural failure and rapid loss of inventory is less than the generic bounding estimates provided in NUREG-1738 ($<1 \times 10^{-5}$ per year including non-seismic events).

SDA #7 Licensees will maintain a program to provide surveillance and monitoring of Boraflex in high-density spent fuel racks until such time as spent fuel is no longer stored in these high-density racks.

Senator BOXER. Thank you.

Now we turn to Hon. Don Mosier.

STATEMENT OF DON MOSIER, COUNCIL MEMBER, CITY OF DEL MAR, CALIFORNIA

Mr. MOSIER. Thank you, Chairman Boxer, Senator Vitter and members of the committee.

Del Mar is 32 miles down wind of San Onofre, which I am going to call SONGS. I mention down wind because that is the prevailing winds and if anything goes wrong at San Onofre, we are one of the cities that will be impacted. There are 8 million people who live within a 50-mile radius of SONGS and the entire San Diego area is downwind of this reactor.

We were initially pleased when the defective steam generators caused the closure of San Onofre but upon closer examination, we now realize the risk has been diminished very little because every fuel rod ever used at San Onofre is still onsite. That is over 4,000 tons of radioactive waste.

The spent fuel pools at San Onofre were designed to hold over 1,600 fuel rods but they are already overcrowded with more than 2,600 fuel rods. These fuel rods are of high burn up uranium, twice as radioactive as the original fuel rods used at the plant. When the spent fuel pool was designed they were designed to hold the old style rods.

This lead already to significant public safety risk and that is what I am concerned about, the risk to our public. In 2007, one of the Boraflex neutron absorbing panels of the spent fuel pools degenerated leading to a situation the NRC called highly critical which means there was almost a spent fuel pool fire. This was because of the overcrowding and the highly radioactive fuel rods.

Eight million people are depending on the NRC to oversee this plant and yet we have already had a number of incidents. This is only one of them.

There are numerous challenges to moving rapidly to dry cask storage, which would be much safer, but this high burn-up fuel has never been stored safely in dry cask and there is no current design that assures 20 years of storage. In fact with the level of fuel at San Onofre, it is likely it will take the full 60 years decommissioning period to store all this fuel.

Obviously we would like to get that fuel offsite. San Onofre is located eight miles from a major fault. It is right next to InterState 5. If there were an earthquake or a terrorist attack, this is a very vulnerable site. As long as the fuel is still in spent fuel pools, it is very vulnerable to earthquakes and terrorist attacks.

The city of Del Mar also believes that State and local officials should be involved in the regulatory process. If I could disagree with my colleagues at the NRC, the NRC oversight of the decommissioning process is really very weak. They do not have the ability to say stop, change your process, it is not good. All they can do is approve whatever the utility submits.

I am very much in support of the new Senate bill introduced by Senators Boxer, Markey and Sanders because we do need more input in this critical process. These public participation panels are

great for exchanging information but they have no regulatory authority whatsoever. That is a problem.

Again, it is the safety of the eight million people living in southern California that is our concern. History has shown that we cannot trust the NRC to insure the safety of our citizens.

Thank you.

[The prepared statement of Mr. Mosier follows:]

City of Del Mar

TESTIMONY OF DR. DONALD MOSIER, CITY OF DEL MAR COUNCILMEMBER

Senator Boxer, Senator Vitter, Members of the Committee:

The shutdown of the Unit 2 and 3 nuclear reactors at San Onofre Nuclear Generating Station (SONGS) on June 7, 2013 was viewed a victory for the City of Del Mar as well as nearby cities from Los Angeles to San Diego, all of which had been concerned with the safety of their citizens. The declaration of victory was premature, however, since we now realize that storage and disposal of the radioactive waste at SONGS during the decommissioning process has numerous challenges, and that the risk of a nuclear accident that would impact the more than 8 million residents within a 50-mile radius is only slightly diminished. Here are some of the challenges:

1. All fuel rods since SONGS began operation in 1968 are still on site. They account for more than 4,000 tons of radioactive waste with almost 90 times more radioactivity than released in the Chernobyl disaster. Much of this radioactive waste is in spent fuel pools, not safer dry cask storage.
2. The two spent fuel pools at SONGS were designed to hold 1,600 spent fuel assemblies, but currently hold over 2,600. Overcrowding and storage of high burn up fuel assemblies has already caused problems; for example, in 2007, South California Edison (SCE) reported to the NRC that Boraflex neutron absorbing panels at the SONGS Units 2 and 3 spent nuclear fuel pools had deteriorated to the point where it was doubtful they could prevent criticality that could lead to a fuel rod fire as happened at Fukushima.
3. The switch to high burn up nuclear fuel with higher uranium concentrations results in fuel assemblies that generate more heat and must remain in spent fuel pools for longer times before transfer to dry cask storage. How much longer is unknown.
4. The higher heat and radioactivity of high burn up fuel assemblies may lead to degradation of metal cladding during dry cask storage, and no current dry casks have been demonstrated to be suitable for storage of high burn up fuel for 20 years or more. Safe dry cask storage is not assured without significant design improvements.
5. Onsite storage at SONGS continues the risk of earthquakes from nearby faults (see Figure 1), accelerated corrosion from the salt air environment, and terrorist attacks on the softer targets of spent fuel pools. The twin dome containment vessels are no longer protective.

In short, SONGS is a terrible site for a semi-permanent nuclear waste repository projected to last for 60 years or more. When fuel assemblies can be moved to safe dry cask storage and when those casks can be safely transported to waste repositories are critical questions that need answers as soon as possible. The Department of Energy needs to use funds collected from ratepayers to sponsor research into these questions.

The City of Del Mar believes that local and state governments need more input into decommissioning procedures. The NRC essentially leaves it up to SCE, with only token input from the utility-appointed Community Engagement Panel. The concept that all of the challenges facing safe decommissioning take place in the absence of any meaningful federal, state, or local regulation is mindboggling. Security and evacuation plans are already being dismantled by SCE without notification of any authorities. The safety of our citizens is the highest responsibility of elected officials, yet SCE has made 8 million citizens less safe without any public comment.

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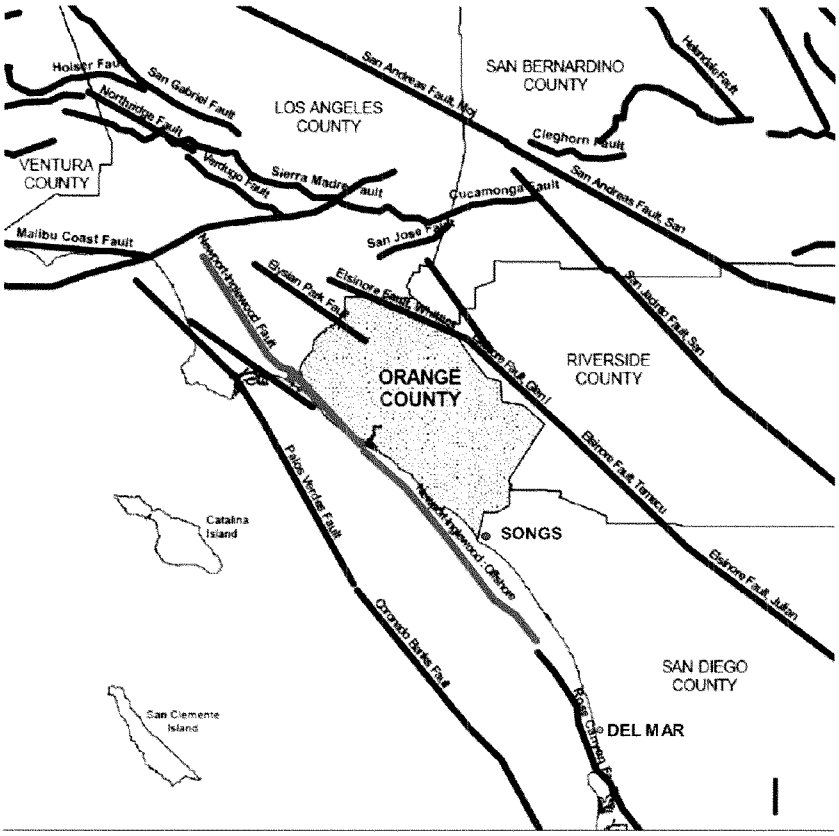

Figure 1. The City of Del Mar is 32 miles downwind of SONGS. This map shows the major earthquake faults in southern California, including the active Newport-Inglewood fault that is about 8 miles offshore from SONGS. The SONGS site is leased from the Department of Defense Camp Pendleton Base, and is to be restored to green field conditions when decommissioning is completed.

City of Del Mar

June 9, 2014

Response to Senator Tom Carper's Follow-Up Questions from the Environment and Public Works Committee Hearing of May 14, 2014

Questions Posed:

1. **I understand that Southern California Edison has created a community advisory group comprised of 18 local community leaders of diverse backgrounds. This panel is chartered to foster education and involvement of the surrounding communities in the decommissioning of the San Onfre Nuclear Power Plant. Do you see value in this type of community engagement and would you encourage other licensees facing decommissioning to establish the same type of community advisory groups?**

2. **Are there any lessons learned (positive and negative) that other communities and licensees may take away from your experiences so far dealing with the SONGS' Community Engagement Panel?**

3. **Do you believe a defueled reactor poses essentially the same off-site radiological emergency risk profile as an operating reactor? Why?**

Responses by Dr. Donald Mosier, Councilmember, City of Del Mar, to Senator Carper:

1. Southern California Edison has appointed a Citizen Engagement Panel that has had three meetings to discuss the details of the decommissioning of San Onofre Nuclear Power Plant. This is a positive step to share information with the public and to discuss the technical details that may need to be resolved before safe long-term storage of high burn-up fuel can be accomplished. Although this body had no regulatory authority, its public meetings do serve to an important educational role about the process of decommissioning and allows interested parties to comment regarding their concerns. More transparency is always good.

2. The 18-member panel represents a diverse set of experience and expertise and it is too soon to judge whether a robust consensus can be reached on each step of the decommissioning process. Only 1 of 18 members represents local activists who have been engaged in discussing safety issues at San Onofre Nuclear Generating Station over the past several years, and elected officials who have been concerned seem to have been excluded from the panel, so a more balanced representation with a few more well-educated critics would be better. For example, there is no one with expertise in radiation exposure and health consequences on the panel, yet this one area of great public concern.

3. A spent fuel assembly pool fire poses a substantial radiological risk to nearby communities that is of the same order of magnitude as a core meltdown at an operating reactor. This risk is increased by the overcrowding of spent fuel pools and the higher proportion of high burn-up fuel assemblies that generate more heat, and the vulnerability that any disruption of cooling water (whether by earthquakes or terrorist attacks) entails. More fuel assemblies in pools mean more radioactive release following any accident. Operating reactors have containment domes to limit release; spent fuel pools are open to the atmosphere.

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Senator BOXER. Thank you very much.

Now we turn to Commissioner Christopher Recchia from Vermont.

STATEMENT OF CHRISTOPHER RECCHIA, COMMISSIONER, VERMONT PUBLIC SERVICE DEPARTMENT

Mr. RECCHIA. Thank you, Chairman Boxer and Ranking Member Vitter.

I particularly want to thank Senator Sanders for his leadership on the Vermont Yankee issues and also for the bills that were introduced yesterday.

I really appreciate the opportunity to be here today to discuss with you Vermont's observations about the closing and decommissioning process and lessons learned so far and hopeful expeditious decommissioning of the Vermont Yankee Nuclear Power Station.

I say hopeful because I think it is in everyone's interest to decommission this plant quickly and by decommissioning get to the technical points that Mr. Weber mentioned, I mean the decontamination and dismantlement of the facility in order to create a green field, in order to get that property back into economic use. Personally, in my lifetime, I would like to see that happen, not within 60 years.

Left to rely on the NRC structure alone, Vermont really has precious little control over how and when decommissioning occurs and very little influence over how the NRC and Entergy, the owners of the plant, choose to proceed. I believe this needs to change and have some very specific and relatively reasonable suggestions on how to move that forward.

Quickly, a brief history on the Vermont Yankee station. We willingly hosted the plant for 40 years during its original license term from 1972 to 2012. It was only when the NRC and Entergy sought to renew that license that we felt we needed to oppose that and yet it was done over Vermont's objections.

Our belief then and now was that the plant had served its purpose, was at the end of its useful life and that our energy future rested elsewhere. The State needed to be a partner in the initial licensing of that facility and should have been a partner in any extension.

In 2011, under the leadership of Governor Peter Shumlin and overwhelming support of Vermonters, we adopted a comprehensive energy plan for Vermont that calls for 90 percent renewables by 2050 across all sectors—electricity, thermal energy and transportation.

We have our first statewide efficiency utility that has worked to save $1 billion in energy costs for Vermonters since its inception. Its parent company is now working in DC to try and accomplish the same for the District.

We have made sure to put our renewable energy commitment into practice. I want to emphasize this point. Since March 2012 after the original license of the plant was completed, Vermont has received and taken no electricity from the Vermont Yankee Nuclear Power Station.

In August 2013, Entergy announced that they were closing and we did work to reach an agreement with them on how to proceed.

I am pleased with that agreement. It is for the benefit of Vermonters but nonetheless we were a little hamstrung in the ability to negotiate that agreement.

There were things we were not able to agree on, things that NRC has allowed nuclear power plants to do in the past that Entergy wanted to retain the rights to do. In short, I would say Vermont was not well served by NRC's past decisions and current approach to decommissioning as an underpinning of these negotiations.

We essentially negotiated with one hand tied behind our backs but I think we did the best we could for Vermonters.

As a result of that experience, the Vermont delegation, the Governor and the Attorney General did meet with Chairman MacFarlane to say is there a way that we could move this forward better? We got a response but in essence, it really focuses on the idea that there are opportunities to comment as Mr. Weber pointed out.

One critical point I want to emphasize is this. The PSDAR that is the foundation of any decommissioning plan is developed by the owner of the plant and is sent to the NRC but the NRC does not have to act on that. In most cases, it does not. There is no review or approval by the NRC. As a result, 90 days passes and then the plant can proceed.

Yes, there is public hearing, there is public input, but there is no responsiveness summary or any action needed by the NRC to response to comments that might be received. I really know of no other regulatory structure in which something of that significance is not analyzed and responded to.

We are not suggesting that you change the authority of the NRC or give States more rights, if you will, over the process other than have a meaningful role in the participation of it, other than making sure that the NRC is responsive to the comments received.

Chairman BOXER. Sir, I think I am going to have to stop you.

Mr. RECCHIA. With that, I thank you very much.

[The prepared statement of Mr. Recchia follows:]

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TESTIMONY OF CHRISTOPHER RECCHIA
COMMISSIONER
VERMONT PUBLIC SERVICE DEPARTMENT
BEFORE THE U.S. SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
"NUCLEAR REACTOR DECOMMISSIONING: STAKEHOLDER VIEWS"
MAY 14, 2014

Good Morning. Thank you Chairman Boxer, Ranking Member Vitter and members of the Committee, for the opportunity to be here today to discuss Vermont's observations regarding nuclear decommissioning in general, and the lessons we've learned so far in our specific work on the upcoming shutdown, and hopeful expeditious decommissioning, of the Vermont Yankee Nuclear Power Station in Vernon, Vermont.

I say "hopeful" because I believe it is in everyone's interest to see the plant decommissioned promptly now that the decision to close the plant has been made. It is particularly important to Vermonters that the site not remain mothballed for decades to come when our economy is better served by a quick cleanup. But, left to rely on the existing NRC structure, Vermont has precious little control over how and when decommissioning occurs, and very little influence over how the NRC and Entergy, the owner of the plant, choose to proceed.

This needs to change, and my testimony today suggests several very reasonable and measured steps to ensure Vermont, and other states similarly situated, have a meaningful role in the NRC process going forward, and that the NRC is directed to take certain steps to move the process in the right direction. I want to take a moment to acknowledge and thank Senator Sanders for his leadership in Vermont Yankee issues over many decades and his efforts to engage NRC constructively on these issues. More help is needed from Congress to ensure states'

rights are advanced and protected.

Brief History and Status of the Vermont Yankee Situation

Vermont willingly hosted the plant for the 40 years that its original license authorized, beginning with operation in 1972 until the term of the original license ended in 2012. As we neared the end of this period, the NRC granted the owner, Entergy, a 20-year renewal over Vermont's objection. Our belief was, then and now, that the plant had served its purpose, was at the end of its useful life, and that our energy future rested elsewhere. The State was a needed partner in the initial licensing of the plant and should have been a needed partner for any license extension.

In 2011, under the leadership of Governor Peter Shumlin, and with overwhelming support of Vermonters, we adopted a Comprehensive Energy Plan with the goal of obtaining 90% of all of Vermont's energy needs from renewables. Nuclear power is not renewable. We have also implemented the first statewide Energy Efficiency Utility that, since its inception in 1999, has saved Vermonters over a billion dollars in energy costs. The parent company of this utility, Vermont Energy Investment Corporation, is now helping Washington, DC achieve similar results. We also made sure to put our commitment to this renewable energy future into practice – since March of 2012, Vermont has purchased no power from the VY Station.

In August of 2013, Entergy announced the closure of the plant, effective at the end of 2014. We reached a Settlement Agreement and Memorandum of Understanding (MOU) in December of last year to enable us to support a Certificate of Public Good (a state-required license) for continued operation through this period. While we are pleased with the agreement reached under the circumstances, our ability to negotiate this agreement, and the necessity to do so for the benefit of Vermonters, was hampered by the NRC's limitations on a state's involvement in decommissioning, and the lack of responsiveness by the NRC to state concerns at VY and elsewhere. In short, Vermont was not served well by the NRC's past decisions and current approach to decommissioning as an underpinning of these negotiations. We negotiated with one hand tied behind our backs, and did the best we could for Vermonters.

Moving Forward

As a result of this most recent experience, the Vermont delegation, along with Vermont Attorney General William Sorrell and Governor Peter Shumlin, wrote to and met with NRC Chairman Macfarlane (February 11, 2014 meeting; March 4, 2014 letter – Exhibit 1) to discuss the need for improvement. In a May 5, 2014 response (Exhibit 2), Chairman Macfarlane relays that states are free to comment at two occasions: when the Post Shutdown Decommissioning Activities Report (PSDAR) is submitted at the beginning of the process, and when a License Termination Plan (LTP) is submitted at the end – which can be many decades later.

What the NRC fails to mention in this letter is that it is under no obligation to respond to state concerns or comments, provides no opportunity for public participation through the NRC's independent hearing process, and indeed with respect to the PSDAR, does not even have to take any formal action on that report. With this approach, the NRC has demonstrated it prefers not to address, let alone resolve, issues of concern to states or local communities.

We acknowledge and accept that Congress gave the NRC sole responsibility for regulating radiological health, safety and security at commercial nuclear power plants under the Atomic Energy Act of 1954. However, that does not mean it should do so in a vacuum. Decommissioning also involves a host of issues (many of which are economic and entirely unrelated to radiological safety) that greatly affect local communities. The PSDAR is a facility-generated report that guides all further decommissioning at a given facility. I know of no other regulatory agency – from a local zoning board to state or federal agencies – that claims it is not required to make an affirmative decision on a plan of this magnitude, complete with its reasoning explained, and a responsiveness summary addressing comments received. This is particularly important with the increasing number of merchant facilities that also have no public utility oversight. Yet "no reply" is how the NRC chooses to address its responsibilities in the review of a PSDAR, and based on the Macfarlane letter, apparently the NRC intends to continue to shirk such decision-making into the future.

This is why legislation is so critical and so logical a step. It is necessary simply to provide a process whereby states, tribes and local communities can have a meaningful role in review of the PSDAR and provide comments to the NRC, and to require the NRC to formally make a decision on the document, with consideration given to comments received.

This step is long overdue. The current statutory and regulatory system is outdated. It is a system that might have made sense when nuclear power plants were solely owned by utilities, since a state's inherent authority over utilities and rate regulation would have given states a strong role in post-closure decisions. With the switch to merchant generators, states have been left without a say and without a federal agency willing to take its regulatory role into the 21st century in an open and responsive way. It is hard to believe this is how Congress expected this to unfold, and Congress should act now to correct this.

Examples of NRC Abuse of Discretion

There are many examples where the NRC has not acted in the best interest of the citizens of the United States, but I'll mention only two here: NRC's willingness to exempt plants from rules the NRC duly promulgated, and the NRC's current direction on waste management – as indicated by its discussion of spent nuclear fuel treatment in its Waste Confidence Rule and accompanying Draft Generic Environmental Impact Statement (DGEIS) – a position it is pursuing without regard to clear and compelling information to the contrary.

Exemptions:

The NRC would tell you it is only concerned with radiological health, safety and security at commercial nuclear power facilities, and this has always been its mission since 1954. One could reasonably assume then that all its rules and regulations are adopted with this single purpose in mind. Why then does the NRC routinely exempt facilities from the rules it promulgated and upon which the states and their citizenry rely? The NRC historically and routinely "exempts" nuclear power plants from applicable regulatory requirements whenever the

industry claims there would be no safety risk from doing so. Such broad-sweeping exemptions, often granted without any public input, upsets the expectations of other interested parties, such as states and local governments, which rely upon the NRC to adhere to applicable regulations. If regulations "on the books" are really not needed for radiological health, safety or security, then those rules should be amended or repealed under a formal rulemaking process consistent with the Administrative Procedures Act (APA), not simply held inapplicable whenever the NRC chooses to grant an exemption.

Two specific examples of improper exemptions that are particularly problematic for states include:

a. Exemptions to Emergency Preparedness requirements after a plant has shutdown.

This is particularly inappropriate for plants that still have fuel remaining in their spent fuel pools. I have attached detailed comments on the Interim Guidance (Exhibit 3) where the NRC staff recommendation is to allow elimination of the Emergency Planning Zone (EPZ) for all licensed reactors once the last reactor fuel has been moved to the storage pool and cooled for approximately 15 months. The assumed basis for these proposed exemptions is that spent nuclear fuel remaining in the pool presents virtually equivalent off-site emergency risks as that in dry cask – that is to say (according to the NRC), none. This defies logic. Leaving aside the many scientific articles refuting that claim, the NRC staff themselves, in other documents, while claiming that all of the risks are at acceptable levels, acknowledge that spent fuel in pools is more risky than fuel stored in dry casks. This is an example of where the NRC does not consistently develop or apply its rationale. Changes to existing rules need to undergo the rigor of formal rulemaking so that this poorly supported reasoning can be fully vetted. Once the NRC has determined, by *rule*, that particular safety requirements are essential, it should not be allowed to create wholesale exemptions from those requirements, in a manner that public participation and the protections of the APA are unavailable.

b. Exemptions to the requirement that Nuclear Decommissioning Trust (NDT) funds be used solely for "decommissioning."

The money in most NDTs is ratepayer money. Vermont Yankee's NDT, for instance, consists 100% of ratepayer contributions (plus accrued interest) from before Entergy purchased the plant. Since owning the plant in 2002, Entergy has put not one dime into that trust fund, and by agreement they were not obligated to. However, under non-NRC contracts, trust fund agreements, and applicable Vermont Public Service Board orders, Vermont ratepayers have a direct interest in that fund. The NRC should not be granting waivers or exemptions that allow these decommissioning trust funds to be raided for activities the operator should otherwise be planning to fund – things ranging from spent fuel management to maintenance of an EPZ after closure. Plants, especially merchant plants, should be obligated to provide funds during their operating period that ensure these activities are fully funded post-closure. States have a legitimate interest in the expenditures of funds for at least two reasons: (1) premature and non-decommissioning related expenditures from the funds will delay, if not prevent, achieving the level of funding needed for timely decommissioning; and (2) in many situations, such as with Vermont Yankee, state ratepayers have a direct interest in the funds that remain in the NDT after decommissioning. NRC should not be allowed to routinely grant exemptions, and especially not without state involvement and response to legitimate concerns. NRC should also expressly recognize that the operator may need other approvals (such as from the state) to use funds for non-decommissioning purposes according to trust fund agreements or other non-NRC obligations, and that NRC approval does not relieve a plant owner from these responsibilities. The NRC needs to acknowledge these limitations in granting access to the trust funds upon the request of the closed or closing plant.

Spent Fuel Management

Finally, all of these concerns about decommissioning and a role for the states and communities are inextricably linked to decisions about Spent Fuel Management (SFM). Without opining on the wisdom of the US Government taking responsibility for this aspect of the industry's liability, problems that must be addressed include the management of fuel during

operation and upon closure for as long as the fuel is on site. The NRC has not shown a willingness to address spent fuel management in a manner that is responsive to states' interests. Our goal is to restore that site to useful economic purposes as quickly and cost-effectively as possible. Right now, Vermont Yankee has about 3,879 fuel rod assemblies in its spent fuel pool (originally designed to hold about 350). The facility has 13 dry casks on site, room for 36, and will need 58 casks in all. For perspective, the Fukushima Reactor 4 pool had 1,533 assemblies in it at the time of the presumed hydrogen explosion that damaged the pool. Important matters to accomplish legislatively include:

- Move SNF out of the pool on a regular basis during operations;
- Upon closure – move remaining fuel out within 5 to 7 years thereafter;
- Ensure funding of SNF movement during operation; and
- Encourage prompt DOE Reimbursement

For merchant facilities, the NRC – as overseer of the fuel management – needs to ensure funds are available from facilities. States need a role in the management of SNF after closure, as demonstrated by the NRC's incomprehensible Waste Confidence Rule which relies on a DGEIS that concludes fuel is equally as safe in the spent fuel pools as in dry casks (Exhibit 4). Ironically, one of the reasons stated for this conclusion is that the Emergency Response Plans and EPZs in place (now proposed, as discussed above, to be generically eliminated by exemption) help protect the public when fuel is stored in a pool. Regardless of the presence or absence of an EPZ, common sense tells us a passive system is less risky than an active one.

Conclusion

The increasing numbers of closing nuclear plants, along with the fact that many are merchant facilities, require the NRC to be a vigilant protector of nuclear health, safety and security at commercial nuclear power plants in the U.S. The lack of affirmative decisions on important decommissioning documents, along with lack of responsiveness and reaction to state interests, speak to the need for a meaningful role of states in NRC processes as these plants come in for decommissioning. Exemptions to rules should be rare, not routine, and wherever generic changes to rules are warranted, they should be done by rulemaking, not waivers. Spent Nuclear

Fuel should be moved to dry cask storage regularly throughout the life of a plant, so that it does not build up in the pools, and all moved to dry cask within a short period of time after closure. Until that is done, an effective EPZ must be maintained. Expenses for all these truly operational matters should be covered during plant operation, with costs related to spent fuel management and storage reimbursed promptly and regularly by DOE in fulfillment of its obligations.

If closed nuclear facilities create radiation hazards or if decommissioning ends up costing more than the plant owner has provided, the host state may have to bear both the financial and the public safety burden. The issues I have raised today are fundamental issues of states' rights. Since the states are required to continue to house the nuclear plant and its wastes until current problems are resolved – which is not foreseeable – states must be allowed to play a full and effective role in the post-shutdown process. Without the legislation, the states are left with a problem they did not create and with imposed circumstances they cannot influence.

Thank you very much for the opportunity to be here today and to share these thoughts with you. I am happy to answer any questions you may have now, or in the future, as you consider these important issues.

Respectfully submitted,

Christopher Recchia
Commissioner

Congress of the United States
Washington, DC 20515

March 4, 2014

The Hon. Allison M. Macfarlane, Chair
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chair Macfarlane:

Thank you for taking the time to meet with us on February 11th regarding Vermont's interest in safe, expeditious decommissioning of the Vermont Yankee Nuclear Power Station and nuclear decommissioning matters in general.

As we discussed, the current NRC rules were designed to address rate-regulated plants, and merchant plants like Vermont Yankee present unique challenges to both the NRC and the states in which they are located. As a result, it is important that states have a meaningful role in various aspects related to post-closure and decommissioning choices made by merchant facilities, including: (1) how decommissioning funds are established and maintained; (2) how it is determined that sufficient funds exist to commence and complete decontamination and dismantlement; and (3) how funds are expended. Because adequate funding is key to safety over the long term, fund availability for spent fuel management is also an important consideration for merchant facilities that are closed or closing. As Entergy nears closure of its Vermont Yankee facility, the best place for this engagement to start is by enabling participation in the review and finalization of the PSDAR. For other merchant facilities, this state involvement should start even sooner.

We ask that the NRC look for ways in which states can have a meaningful role in decommissioning decisions, and urge you to do all you can to ensure that such a role for states is promptly established. The need is not unique to Vermont, though we are perhaps facing these issues sooner than others. We are committed to working constructively with you, but equally committed to ensuring this need is addressed. As we offered, Governor Shumlin, through the National Governors Association, and Attorney General Sorrell, through the National Association of Attorneys General, are willing to assist in gaining support for rule changes at the NRC necessary to accomplish this goal. Similarly, the Vermont delegation is equally committed to finding a path for state engagement.

We look forward to working with you constructively to address these concerns. Again, thank you for your time and attention to these issues.

Sincerely,

PATRICK LEAHY
Senator

BERNARD SANDERS
Senator

PETER WELCH
Member of Congress

PETER SHUMLIN
Governor

WILLIAM H. SORRELL
Attorney General

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

CHAIRMAN

May 5, 2014

Governor Peter Shumlin
109 State Street, Pavilion
Montpelier, VT 05609

Dear Governor Shumlin:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your February 11, 2014, letter and the March 4, 2014, letter from you and your colleagues of the Vermont congressional delegation, Vermont Governor Peter Shumlin, and Vermont Attorney General William Sorrell. These letters urge us to provide host States and other interested parties a larger role in the decommissioning process for commercial nuclear power reactors. We share your view that States and local communities have a strong interest in the decommissioning of nuclear power plants within their boundaries.

Under the Atomic Energy Act of 1954, as amended, the NRC has sole responsibility for regulating radiological health, safety, and security at commercial nuclear power plants. This includes oversight for the establishment of funding for radiological decommissioning. The objective of decommissioning is to remove a nuclear facility safely from service and reduce the residual radioactivity to levels that meet NRC requirements to protect the public and support license termination. The NRC has approved alternative decommissioning strategies which have been evaluated to be protective of public health and safety. It is up to the licensee to choose which of these options (or combinations of options) it will use for decommissioning.
The NRC's regulations require that adequate funding for decommissioning be established regardless of whether the licensee is a utility or a merchant operator. Since 1982, the NRC has overseen the successful decommissioning of 11 nuclear power plants, including 7 since we established our license termination regulations in 1996 and 1997. The NRC continually assesses the lessons learned in its decommissioning process to identify appropriate program improvements.

Other decommissioning activities that may take place after the licensee has demonstrated to the NRC that the radiological criteria for license termination have been met, and after the license has been terminated, are outside the jurisdiction or oversight of the NRC. For example, after the radiological decommissioning is complete, the NRC does not define the end state of site restoration to "greenfield" conditions.

Commercial nuclear reactor radiological decommissioning is a multi-year activity that includes an extensive decommissioning planning process and reliance on natural radioactive decay to reduce the level of radioactivity and volume of radioactive waste generated during decommissioning at the facility. Also, prior to being able to safely transfer spent fuel from the spent fuel pool to dry cask storage, the fuel needs several years to cool to comply with safety limits for the dry casks. "SAFSTOR," a process whereby a nuclear facility is placed and maintained in a condition that allows it to be safely secured, monitored and stored, relies on natural radioactive decay to reduce the radiation dose rates for workers by up to 98 percent and to reduce radioactive waste requiring disposal as waste volumes are expected to be as little as 10 percent of the original volume at plant shutdown. During the first years after shutdown, the nuclear power plant is transitioned for decommissioning. Continuing NRC inspections provide

further assurance that the facility is being managed by the licensee with public health and safety foremost in mind until the license is terminated.

Our regulations provide opportunities for interested parties to communicate their views to the NRC and the licensee regarding radiological decommissioning. NRC regulations provide the public an opportunity to comment when a licensee submits the Post-Shutdown Decommissioning Activities Report (PSDAR and a License Termination Plan (LTP which is reviewed as a license amendment request. In addition, the NRC conducts public meetings in the vicinity of the facility following licensee submission of its PSDAR and LTP and there is an opportunity for a hearing regarding the LTP. We strongly encourage licensees to continue the industry practice of communicating with States, local communities, and other interested parties by sponsoring citizen advisory groups.

States often play a significant role in nuclear facility decommissioning beyond the NRC's responsibility for radiological safety and security, particularly on matters relating to socio-economic impacts, including the funding of additional activities, and State-specific remediation standards. For example, regarding a licensee's decommissioning trust funds, the NRC has jurisdiction over a portion of these funds that are designated for radiological decommissioning of the nuclear facility. Recognizing that the decommissioning of power reactor sites may also be subject to regulation over non-radiological hazards by other Federal or State government agencies, it is incumbent upon the licensee to properly allocate funding for the entire decommissioning process, including both Federal and State requirements. Furthermore, it is imperative for the licensee to have an adequate and accurate reporting process in place to ensure that all regulatory bodies, Federal and State alike, are well informed of the status of a licensee's financial ability to comply with regulatory requirements and to complete the various stages of decommissioning in a timely manner.

In the case of the Vermont Yankee Nuclear Power Station, the NRC is aware that the Vermont Department of Public Service, the Vermont Agency of Natural Resources, and the licensee have entered into a Memorandum of Understanding that we understand will address a number of the State's concerns. These include the development of site restoration standards for the period of time after radiological decommissioning has been completed, and the funding for and timing of ultimate site restoration; a right of first refusal for Vermont to purchase the Vermont Yankee property; and funding for local economic transition and development.

NRC's regulatory opportunities for public involvement in the radiological decommissioning process, combined with independent State action to address directly with the plant owners issues of interest within the State's authority, provide an opportunity for State involvement in the closure and decommissioning of the Vermont Yankee Nuclear Power Station and other nuclear power plants.

I hope this response clarifies the statutory responsibilities of the NRC and current opportunities for States and other interested parties to participate in nuclear power plant decommissioning. If you need any additional information, please contact me or Mark Satorius, Executive Director for Operations, at (301) 415-1700.

Sincerely,

Allison M. Macfarlane

Identical letter sent to:

The Honorable Bernard Sanders
United States Senate
Washington, DC 20510

The Honorable Patrick Leahy
United States Senate
Washington, DC 20510

The Honorable Peter Welch
United States House of Representatives
Washington, DC 20515

Governor Peter Shumlin
109 State Street, Pavilion
Montpelier, VT 05609

Attorney General William Sorrell
109 State Street
Montpelier, VT 05609

VERMONT
PUBLIC SERVICE DEPARTMENT

DEPARTMENT OF PUBLIC SAFETY
DIVISION OF EMERGENCY MANAGEMENT
AND HOMELAND SECURITY

112 State Street
Montpelier, Vermont 05620

103 South Main Street
Waterbury, Vermont 05671

April 10, 2014

COMMENTS OF THE VERMONT DEPARTMENT OF PUBLIC SERVICE AND THE VERMONT DIVISION OF EMERGENCY MANAGEMENT AND HOMELAND SECURITY ON DRAFT INTERIM STAFF GUIDANCE (ISG) NSIR/DPR-ISG-02, "EMERGENCY PLANNING EXEMPTION REQUESTS FOR DECOMMISSIONING NUCLEAR POWER PLANTS"

Introduction

The proposed Interim Staff Guidance on Emergency Planning Exemption Requests For Decommissioning Nuclear Power Plants ("Proposal" or "Interim Guidance") is flawed both in terms of the fundamental concepts underlying it as well as the bases provided for the Proposal. The Proposal creates a process by which the owners of decommissioned nuclear facilities will be allowed to avoid their responsibilities to the communities and states where they are located. The Proposal also essentially eliminates any thorough or effective public participation. The Vermont Department of Public Service and the Vermont Division of Emergency Management and Homeland Security oppose the Interim Guidance and urge the Staff to withdraw the Proposal and initiate a process for full public participation and direct Commission involvement to explore the implications more thoroughly than is allowed through the current written comments process.

The State of Vermont has a particular interest in the Interim Guidance because it will allow substantial reductions in overall post-accident mitigation measures for reactors that are permanently shutdown and, as of the end of 2014, Vermont Yankee will be permanently shutdown. If this Interim Guidance is put into effect, Vermont and its citizens face the threat of inadequate post-accident emergency planning following plant shutdown.

The Proposal Undermines NRC Safety Regulations

A number of the responsibilities related to emergency planning were recently enacted after a full rulemaking proceeding. *See* 76 Fed. Reg. 72560 (November 23, 2011) ("The requirements enhance the ability of licensees in preparing to take and taking certain EP and protective measures in the event of a radiological emergency; address, in part, security issues identified after the terrorist events of September 11, 2001; clarify regulations to effect consistent emergency plan implementation among licensees; and modify certain EP requirements to be more effective and efficient"). The Interim Guidance, however, would allow a wide range of "exemptions" from NRC safety regulations that have been duly promulgated through procedures established under the Administrative Procedure Act and NRC regulations. *See* 10 C.F.R. §§ 50.47(b), 50.54(q), Part 50 Appendix E. What Staff proposes is to substitute these safety regulations with widespread ad hoc waivers of safety requirements in a process which does not permit meaningful public participation even though the result will be to seriously compromise public safety. *See Brodsky v. NRC*, 578 F.3d 175 (2d Cir. 2009). If the NRC believes that safety regulations need to be amended, it should propose those amendments through the normal process, not grant widespread exemptions.

The Proposal Relies On Faulty and Unsupported Assumptions

The Interim Guidance begins with the faulty premise that an accident involving a spent fuel pool is substantially less severe than a reactor accident and thus it is permissible to reduce emergency planning requirements when a reactor is shutdown permanently. This premise ignores NUREG/CR-6451, which noted a high estimate for a full pool release as an economic cost of $566 billion, not including health effects and 143,000 latent fatalities. Travis et al., *A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear*

Power Plants, NUREG/CR-6451 (1997) ("NUREG/CR-6451"), at 4-2. The high estimate in that study also found condemnation of 2,790 square miles of land—roughly a 50 mile by 50 mile square of total desolation. *Id.* The Draft Generic Environmental Impact Statement for Waste Confidence ("DGEIS") characterizes NUREG/CR-6451 as providing "reasonable bounding estimates for offsite consequences for the most severe accidents." DGEIS at B-11. Even the Consequence Study cited often in the Interim Guidance included possible spent fuel pool accidents with enormous economic and health impacts. *See* Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor (Oct. 2013) (ML13256A342). It found that an average area of 9,400 square miles would be rendered uninhabitable, with 4.1 million people being displaced over the long-term. Consequence Study at 162 (Table 33) and 232 (Table 62).

The Interim Guidance also assumes that following a spent fuel pool there will be ample time to do emergency planning as the accident is unfolding. This assumption is problematic for two reasons. First, it ignores the real possibility that the accident may have been triggered by a destabilizing event such as an earthquake—the sole accident initiator analyzed in the Consequence Study—or a malevolent act, either of which would likely create a chaotic post-accident environment.

Second, while it may be reasonable to assume that there will be adequate time to respond to an accident involving dry cask storage of nuclear fuel, it is not reasonable to make that assumption for decommissioned plants where fuel is still stored in pools. The Interim Guidance assumes that spent fuel pools can be repaired and refilled within 10 hours of an incident. But if, as noted above, the triggering event is an earthquake or a malevolent act, it could well take much longer than 10 hours to repair and refill a pool. This at the very least requires delaying any

exemptions from emergency planning requirements until after a decommissioned reactor has moved all of its fuel from its spent fuel pool into dry cask storage.

The Proposal also assumes, by implication, that there will be a robust and effective NRC oversight and enforcement program that will assure that any unforeseen problems will be dealt with adequately should they arise. But this assumption is refuted by a long history of failures to manage and control nuclear wastes. In addition to the most obvious example of Fukushima, there are even more recent examples of the breakdown in safety involving nuclear wastes at the Hanford Reservation in Hanford, Washington and at the Waste Isolation Pilot Project ("WIPP") in New Mexico. These recent events, discussed in detail below, demonstrate why the Interim Guidance should not assume that NRC regulations will avoid significant problems in the future or will ensure that any problems are addressed appropriately.

The Proposal Ignores Important Additional Considerations

The Proposal is written as though spent fuel will remain at a reactor site for only a relatively brief time. However, as the ongoing Waste Confidence proceeding finally acknowledges, and as the United States Court of Appeals for the District of Columbia Circuit has ruled (*New York v. NRC*, 681 F.3d 471 (D.C. Cir. 2012)), NRC has no basis for such an assumption and must consider the real possibility that wastes will remain at reactor sites indefinitely. That reality requires NRC to evaluate this Proposal—to allow reactor owners to substantially dismantle their programs for off-site emergency planning—in light of a potential for decades upon decades or longer of spent fuel storage at reactor sites. While the spent fuel may be less vulnerable to fire, it is actually more vulnerable to leakage from its storage containers, as the history of radiation releases from high level waste facilities demonstrates.

In the last few months, there have been breakdowns in safety involving nuclear wastes at

Hanford and at WIPP. Both of these facilities have taken steps in recent years to "assure" that nuclear waste stored there was safe and secure and that releases of such waste would not occur. Both were operated under the watchful eye of the Department of Energy, which has a robust and dedicated staff devoted to the utmost nuclear safety. Nonetheless, just in 2014, information has come to light that demonstrates that even the best intentions and best regulations and the best people cannot assure that serious problems will not occur.

On March 21, 2014, the Washington Department of Ecology issued an Administrative Order in Docket 10156 against the United States Department of Energy because of serious leaks of radioactive materials from storage at the Hanford facility. The Administrative Order found the following violations:

> **Violation 1 - Failure to stop the flow of hazardous waste into secondary containment.**
> *40 CFR 265.196(a) requires the owner or operator of the tank to immediately stop the flow of hazardous waste into the secondary containment system.*
> As of the date of this Order, USDOE and WRPS have not stopped the flow of waste into the secondary containment of 241-AY-102.
>
> **Violation 2 - Failure to inspect the tank to determine the cause of the release.**
> *40 CFR 265.196(a) requires the owner or operator of the tank to inspect the tank to determine the cause of the release.*
> As of the date of this Order, USDOE and WRPS have not inspected the tank to determine the cause of the release. USDOE states in the revised Pumping Plan that Tank 241-AY-102 will have to be emptied to determine the cause of the release. USDOE has not emptied the tank and has submitted a plan according to which waste removal will not be authorized, nor a removal schedule determined, before March 4, 2016. The revised plan does not demonstrate that an initial pumping date sometime after March 4, 2016 is the earliest practicable time to begin waste removal.
>
> **Violation 3 - Failure to remove, at the earliest practicable time, as much of the waste as is necessary to prevent further release of hazardous waste to the environment and to allow inspection and repair of the tank to be performed.**
> *Where the release is from the tank system, as it is here, 40 CFR 265.196(b) provides that "the owner or operator must, within 24 hours after detection of the leak or, if the owner or operator demonstrates that that is not possible, at the earliest practicable time remove as much of the waste as is necessary to prevent further release of hazardous waste to the environment and to allow inspection and*

> *repair of the tank system to be performed."*
> As of the date of this Order, USDOE and WRPS have failed to remove, or take any actions to begin removing, as much of the waste as is necessary to prevent further release to the environment and to allow for inspection and repair of the tank system to be performed. USDOE states in its revised Pumping Plan that removing the contents of the tank will not be authorized before March 4, 2016. USDOE has not demonstrated that March 4, 2016, or later would be the "earliest practicable time" to begin removing the waste.
>
> **Violation 4 - Failure to remove all released materials from the secondary containment system within 24 hours or in as timely a manner as is possible to prevent harm to human health and the environment.**
> *40 CFR 40 CFR 265.196(b)(2) requires that, if the release was to a secondary containment system, all released materials must be removed within 24 hours or in as timely a manner as is possible to prevent harm to human health and the environment.*
> As of the date of this Order, USDOE and WRPS have failed to remove any of the released materials from the secondary containment. The revised plan indicates that the released materials will be removed only after waste is removed from the primary tank.

Administrative Order at 6-7 (emphasis in original).

The problems at Hanford are not new and these are just the latest failures of the Hanford facility to contain the high level waste stored there. *See, e.g.*, R. Alvarez, *Reducing the Risks of High-Level Radioactive Wastes at Hanford* (Science and Global Security 2005) at 13:43–86. The Interim Guidance does not address either the previous or current failures of Hanford or use that experience as a cautionary tale regarding predictions about how well nuclear waste will remain contained at reactor sites for decades upon decades or longer. Rather, it asserts and assumes that because NRC regulates the storage and handling of such wastes, no serious problems will arise that will require full compliance with emergency planning requirements.

A second recent example of a failure of nuclear waste handling even though great efforts were made to assure that nothing would go wrong is the release of radiation from WIPP only 15 years after it began operations. The EPA has reported the following about a February 2014 release of radiation from the WIPP facility :

> According to the U.S. Department of Energy (DOE), at about 11:30 p.m. (MT) on February 14, 2014, airborne radiation was detected by an underground air monitor at the DOE's Waste Isolation Pilot Plant (WIPP). The source of the radiation is believed to be one or more radioactive waste containers that were breached by an undetermined event that occurred in the underground repository. However, an investigation in the underground is necessary and currently underway to determine the true cause of the release.

EPA, *Radiological Event at the WIPP*, http://www.epa.gov/rpdweb00/news/wipp-news.html#wippradevent; *see also* Jeff Tollefson, *Radiation Levels Fall after Nuclear Waste Leak in New Mexico* (Feb. 26, 2014), http://www.scientificamerican.com/article/radiation-levels-fall-after-nuclear-waste-leak-in-new-mexico. This currently unexplained radiation leak underscores the inherent uncertainties in handling high level nuclear wastes.

Related to implications of long term spent fuel storage being ignored in the Interim Guidance is the additional complexity created by the increasing use of high-burnup fuel. When that fuel is spent, it presents special problems that significantly increase the chance of radiation releases from spent fuel storage and make the movement of high-burnup spent fuel from container to container much more dangerous.

The Interim Guidance essentially ignores the potential environmental impacts of the use of high-burnup fuel and its storage in spent fuel pools. Recent studies and analyses demonstrate that the potential magnitude of the incremental impact of storage of spent high-burnup fuel in spent fuel pools is much greater than the Proposal assumes.

For example, the danger of a criticality accident in a spent fuel pool is dismissed because NRC regulations require plant operators to maintain adequate boron levels to absorb neutrons and prevent criticality:

> Licensees are required to demonstrate that some margin to criticality is maintained for a variety of abnormal conditions, including fuel-handling accidents involving a dropped fuel assembly. The environmental impacts are small, therefore, because criticality accidents in spent fuel pools are prevented.

DGEIS at 4-70. New evidence shows that when high-burnup fuels are used and placed in the spent fuel pools at certain reactors, it can create special problems that interfere with boron control. R. Alvarez, *The Storage and Disposal Challenges of High Burnup Spent Power Reactor Fuel* (Jan. 3, 2014) ("Alvarez 2014") at 9-11. As the NRC has acknowledged, high-burnup fuel is likely to remain in spent fuel pools for much longer than the 5 years of normal fuel and possibly as long as 20 years. DGEIS at 2-25. However, that extended time in the pool—combined with the much larger inventory of radionuclides in the high-burnup fuel—places additional demands that require the use of neutron-absorbing panels in the spent fuel pools. Alvarez 2014 at 6-11. Those panels are subject to deterioration causing a loss of neutron absorption ability and the release of particles into the spent fuel pool. *Id.* at 10. While one can attempt to address this by adding more boron to the water in the spent fuel pool at pressurized water reactors, the boron reacts with the concrete used for the walls of the pools and causes it to be more susceptible to leaks. *Id.* at 11. High-burnup fuel thus requires enhanced chemistry controls and more neutron-absorbing panels. *Id.* But the pools are already densely packed, and the additional equipment in the pools restricts water and air circulation, making the pools more vulnerable to systemic failures from an inability to remove the increased decay heat from high-burnup fuels. *Id.*

NRC contractors, the Electric Power Research Institute, and the National Academy of Scientists have all raised concerns about high-burnup fuel. Alvarez 2014 at 2-3. The NRC itself has also recognized that there is inadequate information on the structural integrity of high-burnup fuels after 20 years. *See* NRC Division of Spent Fuel Storage and Transportation Interim Staff Guidance-24, Revision 0 (Issue: The Use of a Demonstration Program as Confirmation of Integrity for Continued Storage of High Burnup Fuel Beyond 20 Years) (ML13056A516).

The proposed Interim Guidance never discusses the lack of critical knowledge about high-burnup fuel that is essential for determining whether its presence in spent fuel pools creates problems substantially more serious than normal spent fuel. It never considers that high-burnup fuel continues to be generated and placed in spent fuel pools even though the work to determine whether it can ever be safely removed from the pools has yet to be completed. These uncertainties make the current proposal to increase the opportunity for exemption from emergency planning requirements premature at best. Such a proposal should at least include a bounding calculation that considers the consequences if the ongoing research confirms the worst concerns about high-burnup fuel. The Technical Study of Spent Nuclear Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, NUREG–1738 (2001) (ML010430066), is used by Staff as the primary reference for the conclusion regarding spent fuel pool fires during the 60 years following the operating life of the reactor. DGEIS at xxix and F-14. (The DGEIS relies on, and essentially incorporates, this 2001 study for its analysis of the risk and consequences of a spent fuel pool fire.) New evidence, which post-dates the 2001 NUREG-1738 study that Staff cites, demonstrates that this 60 year period could include more than 20 years of high-burnup fuel storage in the spent fuel pool, by which time deterioration of fuel cladding could occur and movement of the high-burnup spent fuel from the pool to dry casks could be problematic.

The Proposal Will Result In Reducing Safety Margins

The Interim Guidance seeks to remove emergency planning even though the impact of emergency planning on accident consequences from spent fuel was a significant consideration in the Consequence Study. *See* Consequence Study at Appendix A (providing an extended discussion of the Staff's reliance on emergency planning to justify lower post-accident consequences in the event of spent fuel pool failure). Moreover, as noted above, the Interim

Guidance ignores that the triggering event for a radiological release could well create a chaotic post-accident environment that would substantially disable a quick and effective response.

Conclusion

The proposed Interim Guidance is a poorly justified and premature effort to allow owners of shutdown reactors to avoid maintaining a high level of emergency preparedness to mitigate the consequences of the severe risks created by the continued presence of spent nuclear fuel at reactor sites. It is particularly problematic that the Interim Guidance does not address the common sense idea of refusing to grant exemptions from emergency planning requirements until after a decommissioned reactor has moved all of its fuel from its spent fuel pool into dry cask storage. Staff should withdraw the Proposal, engage fully with all interested stakeholders in a real dialogue—not just a notice and comment period—and develop a record that fully explores all of the implications of leaving spent fuel at reactor sites. The Staff should make particular efforts to reach out to local communities and host states, such as Vermont, before exempting decommissioned reactors from otherwise applicable regulations. This is especially important in light of the enormous financial burdens that will be placed on local communities and states for emergency planning that should be provided by the companies that are creating the risks.

Respectfully,

/s/ Christopher Recchia
Christopher Recchia
Commissioner
Anthony Z. Roisman
Of Counsel
Vermont Department of Public Service
112 State Street
Montpelier, Vermont 05602

/s/ Joe Flynn
Joe Flynn
Director
Vermont Division of Emergency
Management and Homeland Security
103 South Main Street
Waterbury, VT 05671

April 24, 2014

VIA ELECTRONIC MAIL

Andy Imboden, Branch Chief
Communications, Planning, and Rulemaking
Waste Confidence Directorate
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: Need for a supplemental waste confidence DGEIS (Docket NRC-2012-0246)

Dear Mr. Imboden:

Through this letter, the State of Vermont, the State of Connecticut, and the Commonwealth of Massachusetts formally request that the NRC Staff prepare a supplemental Waste Confidence Draft Generic Environmental Impact Statement ("DGEIS") in light of recent information and events. The current DGEIS contains many assumptions, including:

1. That high-burnup spent fuel does not present unique problems for long term storage of spent nuclear fuel.

2. That the consequences of a severe spent fuel pool accident are appropriately bounded, including the off-site economic impacts and the time needed for off-site decontamination.

3. That NRC oversight will avoid adverse environmental impacts from unforeseen safety problems and will ensure the development of new technologies when needed.

While Vermont, Connecticut, Massachusetts, and others have already presented extensive comments criticizing these assumptions, this letter provides new and significant information that is not addressed by the DGEIS. Because this information—which was not available before the December 20, 2013 deadline for commenting on the DGEIS—is both new and significant, the NRC Staff is obligated to evaluate it and issue a supplemental DGEIS for public comment.

In *Marsh v. Oregon Natural Resources Counsel*, 490 U.S. 360 (1989), the U.S. Supreme Court held that federal regulations "impose a duty on all federal agencies to prepare supplements to either draft or final EIS's if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 490 U.S. at 372 (quotation omitted). When there remains a major federal action to occur and "the new information is sufficient to show that the remaining action will affect the quality of the human environment in a significant manner or to a significant extent not already considered, a supplemental EIS must be prepared." *Id.* at 374 (quotation omitted). In these situations, it does not suffice to address the new information in the final impact statement. Rather, a supplemental EIS is needed to serve NEPA's action-forcing purpose in two important respects. *See Baltimore*

Gas & Electric Co. v. Natural Resources Defense Council, Inc., 462 U.S. 87, 97 (1983); *Weinberger v. Catholic Action of Hawaii/Peace Education Project*, 454 U.S. 139, 143 (1981). First, a supplemental EIS is needed to ensure the agency can "carefully consider" all available information before making its decision. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). Second, a supplemental EIS is needed so that "the relevant information will be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision." *Id.*

The NRC has incorporated these well-established principles in the regulations applicable to all environmental impact statements:

> (a) The NRC staff will prepare a supplement to a draft environmental impact statement for which a notice of availability has been published in the FEDERAL REGISTER as provided in § 51.117, if:
>
> ***
>
> (2) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

10 C.F.R. § 51.72(a)(2). The NRC has held that it must prepare a supplemental draft EIS when the new information "present[s] a seriously different picture of the environmental impact of the proposed project from what was previously envisioned." *In re Union Elec. Co.*, CLI-11-05, 74 N.R.C. 141, 167-68 (2011) (quotations and alteration marks omitted).

The new evidence presented here meets that standard. The current DGEIS does not address important information that has arisen since the date of its publication.

I. New and Significant Information on the Problems of High-Burnup Fuel

The DGEIS says little about the potential environmental impacts of high-burnup fuel and its storage in spent fuel pools. And what the DGEIS does say is refuted by recent studies and analyses of the impact of storing high-burnup fuel in spent fuel pools.

For example, the DGEIS dismisses the danger of a criticality accident in a spent fuel pool because NRC regulations require plant operators to maintain adequate boron levels to absorb neutrons and prevent criticality:

> Licensees are required to demonstrate that some margin to criticality is maintained for a variety of abnormal conditions, including fuel-handling accidents involving a dropped fuel assembly. The environmental impacts are small, therefore, because criticality accidents in spent fuel pools are prevented.

DGEIS at 4-70. New evidence shows that when high-burnup fuels are used and placed in the spent fuel pools at certain reactors, it can create special problems that interfere with boron control. Ex. 1 (R. Alvarez *The Storage and Disposal Challenges of High Burnup Spent Power Reactor Fuel* (Jan. 3, 2014)) at 9-11. As the DGEIS acknowledges, high-burnup fuel is likely to

remain in spent fuel pools for much longer than the 5 years of normal fuel and possibly as long as 20 years. DGEIS at 2-25. However, that extended time in the pool—combined with the much larger inventory of radionuclides in the high-burnup fuel—places additional demands that require the use of neutron-absorbing panels in the spent fuel pools. Ex. 1 at 6-11. Those panels are subject to deterioration causing a loss of neutron absorption ability and the release of particles into the spent fuel pool. *Id.* at 10. While one can attempt to address this by adding more boron to the water in the spent fuel pool at pressurized water reactors, the boron reacts with the concrete used for the walls of the pools and causes it to be more susceptible to leaks. *Id.* at 11. High-burnup fuel thus requires enhanced chemistry controls and more neutron-absorbing panels. *Id.* But the pools are already densely packed, and the additional equipment in the pools restricts water and air circulation, making the pools more vulnerable to systemic failures from an inability to remove the increased decay heat from high-burnup fuels. *Id.*

NRC contractors, the Electric Power Research Institute ("EPRI"), and the National Academy of Scientists have all raised concerns about high-burnup fuel. Ex. 1 at 2-3. The NRC itself has also recognized that there is inadequate information on the structural integrity of high-burnup fuels after 20 years. Ex. 2 (NRC Division of Spent Fuel Storage and Transportation Interim Staff Guidance-24, Revision 0 (Issue: The Use of a Demonstration Program as Confirmation of Integrity for Continued Storage of High Burnup Fuel Beyond 20 Years) (ML13056A516)). The NRC is allowing the continued use of high-burnup fuel, even though the NRC recognizes that further studies are needed to determine whether high-burnup fuel can be safely moved from a spent fuel pool to dry cask storage. Ex. 2. While the DGEIS lists some of these references, it never discusses whether high-burnup fuel creates more serious problems than normal spent fuel. The attached Exhibit 1 provides new information that the NRC must now address in a supplemental DGEIS.

In particular, the supplemental DGEIS must, at a minimum, provide a required bounding calculation that considers the consequences of high-burnup fuel. Instead, the DGEIS relies on The Technical Study of Spent Nuclear Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, NUREG–1738 (2001) (ML010430066). The DGEIS cites that 2001 study as the primary reference for its conclusion regarding spent fuel pool fires during a period of 60 years beyond the operating life of the reactor. DGEIS at xxix, F-14. But that 60 year period could include more than 20 years of high-burnup fuel storage in the spent fuel pool. Recent analyses, such as Exhibit 1, make clear that by that time there could be significant deterioration of fuel cladding, making movement of high-burnup fuel from the pool to dry casks problematic. The DGEIS does not take the NEPA-required "hard look" at this or any of the other special problems created by high-burnup fuel.

The DGEIS's conclusion that spent fuel pool storage is environmentally safe also ignores known facts about high-burnup fuel. For example, the DGEIS indicates that the NRC "is aware of concerns regarding potential detrimental effects of hydride reorientation on cladding behavior (e.g., reduced ductility). Reduced ductility, which makes the cladding more brittle, increases the difficulty of keeping spent fuel assemblies intact during handling and transportation." *Id.* at B-13. But the DGEIS contains no discussion of how this recognized "difficulty" affects transferring this fuel from spent fuel pools to dry cask storage, and contains only a cursory discussion of the problems with moving high-burnup fuel from one dry cask to another. *Id.*

Finally, because of the special problems created by high-burnup fuel and the uncertainties inherent in its current use, the DGEIS fails to consider the alternative of prohibiting the further generation of high-burnup fuel until the unresolved safety problems with its use have been addressed. That alternative would have the advantage of allowing the movement of spent fuel from spent fuel pools to dry casks sooner, allowing for a reduction of the crowding of the spent fuel pools and reducing both the risk and the consequences of a severe spent fuel pool accident.

II. New and Significant Information on Spent Fuel Pool Accident Consequences

The DGEIS asserts that earlier studies of spent fuel pool accident consequences, like NUREG-1738, were too conservative. DGEIS at F-4 to F-5. New and significant information, including recent analyses of the Fukushima accident, makes clear that those studies in fact underestimated the real potential adverse impacts of a severe spent fuel pool accident.

The NRC has stated that a central part of the input for the DGEIS is the Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor (October 2013) ("Consequences Study") and the related COMSECY-13-0300. *See e.g.*, Ex. 3 (NRC Slides for 8-22-13 Meeting with Commissioners re: Tier 3 Issues, Slide 4 ("Schedules are aligned to improve the public's ability to understand the relationships between the Tier 3 issue, the SFPS, ongoing Waste Confidence activities, and related policy issues.")). Both of those documents address whether expedited transfer of spent fuel to dry cask storage would be preferable to using spent fuel pools for 60 years after reactor operation ceases. Central to those analyses, and to the accident analysis in Appendix F of the DGEIS, is the MELCOR Accident Consequence Code Systems-2 ("MACCS2") code.

The New York Attorney General's Office has submitted comments explaining in detail some of the flaws underlying the inputs used by the MACCS2 code. *See* International Safety Research, Inc., Review of Waste Confidence Generic Environmental Impact Statement, ISR Report 13014-01-02, 20 December 2013 ("ISR Report"). Since the time of the ISR Report, additional information makes clear that the post-accident situation is much longer and the cleanup following the accident is much more difficult than is assumed in the DGEIS.

In particular, the real world experience of the Fukushima accident is far different than what the DGEIS assumes, in terms of (1) the problems created by the need to decontaminate a large area; (2) the time and money required for cleanup; and (3) the lost economic revenue when a large area is rendered unusable for a much longer time than was assumed in the DGEIS. *See* Ex. 4 (David McNeil, *Squelching Efforts to Measure Fukushima Meltdown* (NY Times March 16, 2014)) (explaining how the actual damage caused by Fukushima may be much greater than reported by Japan and that just removal of contaminated dirt—not its ultimate disposal—will cost at least $50 billion); Ex. 5 (*Fukushima operator restarts water decontamination system* (AFP March 24, 2014)) ("The embattled firm [TEPCO] said two of three lines that clean the toxic water were running again as of Monday afternoon. A third line remained offline while workers tried to fix a filter defect which had prevented proper decontamination. . . . TEPCO is struggling to handle a huge—and growing—volume of contaminated water at the tsunami-damaged plant. There are about 436,000 cubic metres of contaminated water stored at the site in

about 1,200 purpose-built tanks."); Ex. 6 (*Contaminated water still troubles Fukushima* (Press TV March 11, 2014)) ("The radioactive water at Japan's crippled nuclear power plant remains the biggest problem, hampering the cleanup process three years after the disaster, officials say. On Monday, officials at Japan's crippled Fukushima nuclear power plant said the contaminated water accumulated at the facility was hampering the cleanup process."); Ex. 7 (*Fukushima water decontamination might be suspended indefinitely* (Rt.com March 20, 2014)); *see also* D. Lochbaum et. al., *Fukushima—The Story of a Nuclear Disaster* (New Press 2014).

This recently disclosed information about Fukushima contrasts sharply with the DGEIS. For instance, the DGEIS assumes that the total economic cost of a full release of radiation from a spent fuel pool would be around $55 billion. DGEIS at F-4. As noted above, one recent analysis of Fukushima has estimated that it would cost that much money just to remove the contaminated soil, which is only one of many costly steps in the process of radiological decontamination. *See* Ex. 4. This requires the NRC to issue a supplemental DGEIS that incorporates this information, which is more in line with a previous NRC study that noted a high estimate for a full pool release as an economic cost of $566 billion, not including health effects and 143,000 latent fatalities. Ex. 8 (Travis et al., *A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants*, NUREG/CR-6451 (1997)) at 4-2. The DGEIS notes that NUREG/CR-6451 provides "reasonable bounding estimates for offsite consequences for the most severe accidents," DGEIS at B-11—a conclusion that is reinforced by recent analyses of Fukushima—but then fails to apply those estimates in its offsite consequences analysis. In light of the recent studies and analyses of Fukushima, the NRC must issue a supplemental DGEIS addressing these analyses and addressing previous studies borne out by the new and significant information about Fukushima. *See id.*; Ex. 9 (Alvarez et al., *Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States* (Science and Global Security, 11:1–51, 2003)); *see also* U.S. Senate Committee on Environment and Public Works, Subcommittee on Clean Air and Nuclear Safety, "Oversight Hearing: NRC's Implementation of the Fukushima Near-Term Task Force Recommendations and other Actions to Enhance and Maintain Nuclear Safety" (SD-406) (Jan. 30, 2014) (Chair Macfarlane at 1:28:10: "There was no evidence that a Fukushima-type accident would have been completely avoided in the US. . . . We did not, prior to the Fukushima accident, expect or analyze for more than one reactor at a site to have an accident. That was not planned for. . . . And the operating experience that we've gained during the Fukushima accident is significant."; Chair MacFarlane at 1:51:54: "Passive systems are certainly better than active systems—systems that have to be activated. So those passive systems are certainly an improvement.").

In addition to these recent analyses of the Fukushima accident, new and significant information from the NRC Staff also calls into question the DGEIS's underlying assumption that spent fuel pool accidents can be analyzed generically. In particular, the NRC Staff—after the close of the comment period for the DGEIS—issued a draft guidance document that specifically recommends requiring a "site-specific analysis" of spent fuel pool accidents before the NRC can exempt decommissioned plants from emergency planning requirements. Ex. 10 (Interim Staff Guidance on Emergency Planning Exemption Requests For Decommissioning Nuclear Power Plants, NSIR/DPR-ISG-02 (January 10, 2014)) at 6. A supplemental DGEIS is required to provide the public with an opportunity to comment on why the NRC would allow a generic analysis in the DGEIS when site-specific analysis is required elsewhere.

III. New and Significant Information on the Failure of Institutional Controls

When the Commission abandoned the attempt to predict when, if ever, a permanent waste repository would come into existence, one Commissioner observed that "this is a particularly difficult time to be in the prediction business." Comments of Commissioner Svinicki on SECY - 09-0090 Final Update of the Commission's Waste Confidence Decision (Sept. 24, 2009). Despite this warning, the current DGEIS includes a number of assumptions about what will happen decades, centuries, or even millennia into the future. *See, e.g.*, DGEIS at 4-76 to 4-79 & B-15 to B-17. One of those predictions—that institutional controls will provide vigorous regulation and enforcement of safety measures—cannot withstand scrutiny in light of recent events. In particular, the most recent examples of the breakdown in safety involving nuclear wastes occurred at the Hanford Reservation in Hanford, Washington and at the Waste Isolation Pilot Project ("WIPP") in New Mexico. These recent events—discussed in detail below and not considered in the DGEIS—demonstrate why the DGEIS should not assume that NRC regulations will avoid significant problems in the future and ensure that any problems are addressed appropriately. If there is one over-arching lesson from Fukushima, it is that things can go terribly wrong. The following events are further proof of that truth.

First, the Hanford Reservation in Hanford, Washington, despite extensive oversight and numerous measures to avoid releases of radioactive waste, continues to leak radioactive materials. On March 21, 2014—well after the close of the comment period for the DGEIS—the Washington Department of Ecology issued an Administrative Order in Docket 10156 against the United States Department of Energy because of serious leaks of radioactive materials from storage. Ex. 11. The Administrative Order found the following violations:

> **Violation 1 - Failure to stop the flow of hazardous waste into secondary containment.**
> *40 CFR 265.196(a) requires the owner or operator of the tank to immediately stop the flow of hazardous waste into the secondary containment system.*
> As of the date of this Order, USDOE and WRPS have not stopped the flow of waste into the secondary containment of 241-AY-102.
>
> **Violation 2 - Failure to inspect the tank to determine the cause of the release.**
> *40 CFR 265.196(a) requires the owner or operator of the tank to inspect the tank to determine the cause of the release.*
> As of the date of this Order, USDOE and WRPS have not inspected the tank to determine the cause of the release. USDOE states in the revised Pumping Plan that Tank 241-AY-102 will have to be emptied to determine the cause of the release. USDOE has not emptied the tank and has submitted a plan according to which waste removal will not be authorized, nor a removal schedule determined, before March 4, 2016. The revised plan does not demonstrate that an initial pumping date sometime after March 4, 2016 is the earliest practicable time to begin waste removal.
>
> **Violation 3 - Failure to remove, at the earliest practicable time, as much of the waste as is necessary to prevent further release of hazardous waste to the environment and to allow inspection and repair of the tank to be performed.**

> *Where the release is from the tank system, as it is here, 40 CFR 265.196(b) provides that "the owner or operator must, within 24 hours after detection of the leak or, if the owner or operator demonstrates that that is not possible, at the earliest practicable time remove as much of the waste as is necessary to prevent further release of hazardous waste to the environment and to allow inspection and repair of the tank system to be performed."*
> As of the date of this Order, USDOE and WRPS have failed to remove, or take any actions to begin removing, as much of the waste as is necessary to prevent further release to the environment and to allow for inspection and repair of the tank system to be performed. USDOE states in its revised Pumping Plan that removing the contents of the tank will not be authorized before March 4, 2016. USDOE has not demonstrated that March 4, 2016, or later would be the "earliest practicable time" to begin removing the waste.
>
> **Violation 4 - Failure to remove all released materials from the secondary containment system within 24 hours or in as timely a manner as is possible to prevent harm to human health and the environment.**
> *40 CFR 40 CFR 265.196(b)(2) requires that, if the release was to a secondary containment system, all released materials must be removed within 24 hours or in as timely a manner as is possible to prevent harm to human health and the environment.*
> As of the date of this Order, USDOE and WRPS have failed to remove any of the released materials from the secondary containment. The revised plan indicates that the released materials will be removed only after waste is removed from the primary tank.

Ex. 11 at 6-7 (emphasis in original).

The DGEIS does not address the current failures at Hanford or explain how future storage of nuclear waste will be more successful than it is today. The recent events at Hanford provide new and significant information that undermines the DGEIS's assumption that the NRC's regulation of spent fuel storage will avoid serious failures to contain radiation in the future. A supplemental DGEIS must address the recent Administrative Order, as well as the context of past failures to contain high level waste at Hanford. *See, e.g.*, Ex. 12 (R. Alvarez, *Reducing the Risks of High-Level Radioactive Wastes at Hanford* (Science and Global Security 2005) at 13:43–86).

Second, there is new and significant information about a February 2014 release of radiation from the WIPP facility in New Mexico:

> According to the U.S. Department of Energy (DOE), at about 11:30 p.m. (MT) on February 14, 2014, airborne radiation was detected by an underground air monitor at the DOE's Waste Isolation Pilot Plant (WIPP). The source of the radiation is believed to be one or more radioactive waste containers that were breached by an undetermined event that occurred in the underground repository. However, an investigation in the underground is necessary and currently underway to determine the true cause of the release.

Ex. 13 (EPA, *Radiological Event at the WIPP*, http://www.epa.gov/rpdweb00/news/wipp-news.html#wippradevent); *see also* Exs. 14-18 (attachments to Exhibit 13); Ex. 19 (Jeff Tollefson, *Radiation Levels Fall after Nuclear Waste Leak in New Mexico* (Feb. 26, 2014), http://www.scientificamerican.com/article/radiation-levels-fall-after-nuclear-waste-leak-in-new-mexico). This currently unexplained radiation leak underscores the inherent uncertainties in handling high level nuclear wastes—uncertainties that are ignored in the DGEIS.

The WIPP radiation leak occurred 9 days after another accident at the WIPP involving a fire inside the mine. Although it appears radiation was not released during that fire, a DOE investigation of this event found "the root cause of this accident to be the failure of Nuclear Waste Partnership LLC (NWP) and the previous management and operations (M&O) contractor to adequately recognize and mitigate the hazard regarding an underground fire. This includes recognition and removal of the buildup of combustibles through inspections and periodic preventative maintenance (e.g., cleaning), and the decision to deactivate the automatic onboard fire suppression system." Ex. 20 (Accident Investigation Report, Underground Salt Haul Truck Fire at the Waste Isolation Pilot Plant February 5, 2014 (March 2014)) at ES-3. The Accident Investigation Report includes a long list of deficiencies in the operation of this disposal facility and recommends substantial corrective actions. *Id.* at 92-97. The Report also notes that these problems arose despite the clearly stated mission of the Carlsbad Field Office of DOE to store radioactive waste safely through protection measures "put into operation at all levels (site, facility, task, and activity) by requiring and routinely verifying that work is conducted following" all applicable protocols. *Id.* at 64. NRC regulations contain similar protocols and statements, and the recent incidents at the WIPP make clear that where nuclear wastes are concerned, even the best intentions do not prevent serious accidents.

The recent Hanford and WIPP incidents are particularly relevant to the DGEIS in light of the NRC's Office of Inspector General's conclusion that the "NRC's approach for oversight of licensees' management of active component aging is not focused or coordinated" and lacks "mechanisms for systematic and continual monitoring, collecting, and trending of age-related data for active components." Ex. 21 (Audit of NRC's Oversight of Active Component Aging, OIG-14-A-02 (Oct. 28, 2013)) at ii. That same office had previously found deficiencies in NRC's follow-up to assure that licensees fulfill commitments they have made to assure adequate protection of the public health and safety. Ex. 22 (Audit of NRC's Management of Licensee Commitments OIG-A-17 (Sept. 19, 2011)). These reports make clear that NRC regulation can be subject to the same kinds of institutional deficiencies that led to the incidents at the WIPP.

The fact that the NRC and DOE have had problems managing nuclear waste is not a reflection of failures of these agencies—to the contrary, it shows that even with competent and committed staff and leadership, things can go wrong. That is the history of nuclear waste storage, and it is what the NRC must assume going forward, particularly when attempting—as the DGEIS does—to forecast decades, centuries, or even millennia into the future. Or as it is written on the face of the National Archives, "What is past, is prologue." Given this history, highlighted by the new and significant information on the Hanford and WIPP incidents, the DGEIS should not assume that future oversight and future technical developments will eliminate future problems. When it comes to handling nuclear waste, history demonstrates that optimistic assumptions about containment—such as those in the DGEIS—do not become realities.

For the above reasons, the State of Vermont, the State of Connecticut, and the Commonwealth of Massachusetts respectfully request that the NRC Staff prepare a supplemental waste confidence DGEIS in light of recent information and events. Thank you for your consideration of this request.

Sincerely,

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VERMONT
PUBLIC SERVICE DEPARTMENT

June 23, 2014

The Honorable Barbara Boxer, Chairman
The Honorable David Vitter, Ranking Member
United States Senate Committee on Environment and Public Works
410 Dirksen Senate Office Building
Washington, DC 20510

Re: Responses to questions submitted by Senator Tom Carper following the Nuclear Reactor Decommissioning: Stakeholder Views hearing held May 14, 2014

Dear Senators Boxer and Vitter:

Thank you for your letter of June 9, 2014, and the opportunity to respond to the questions submitted by Senator Tom Carper (reiterated below). I am pleased to provide the following answers for the hearing record:

Question 1: *I understand that Southern California Edison has created a community advisory group comprised of 18 local community leaders of diverse backgrounds. This panel is chartered to foster education and involvement of the surrounding communities in the decommissioning of the San Onofre Nuclear Power Plant. Do you see value in this type of community engagement and would you encourage other licensees facing decommissioning to establish the same type of community advisory groups?*

Answer 1:

I do agree this type of panel is valuable as a means to gather and share information about the decommissioning process. In Vermont, we had a "Vermont State Nuclear Citizen's Advisory Panel" established in 2002 made up of state agency heads as well as legislative representatives, designed to address nuclear issues generally. Upon the announcement of the closing of Vermont Yankee Nuclear Power Station last August, the General Assembly of Vermont just amended that statute to recreate it in the form of a "Decommissioning Citizens Advisory Panel "(Statute Attached) to specifically address issues of decommissioning at Vermont Yankee. The panel was expanded from 7 to 23 members – still with state agency representation - but more significantly it added citizen participation ranging from the host community, to the regional planning agency, to representatives from neighboring effected states (MA and NH) as well as to employees at the plant itself.

Though the panel has not been fully constituted nor met since the statutory change in May, we are looking forward to a first meeting toward the end of the Summer. I believe such panels are important to provide a forum by which citizens can understand the decommissioning process, investigate issues citizens are concerned about, and receive and respond to questions about the decommissioning process.

I think it is important that such panels be independent of the licensee (although licensee membership on the panel and financial support from the licensee is appropriate), and that they be administratively supported by either a state agency (as in our case) or some other independent local or regional group. Licensees should pay for the panels and plan for such expenses during operation. (This is not formally the case in Vermont, which is supported financially and administratively by my Department, although we hope to receive financial support from Entergy, the licensee of the VY station.)

It is generally understood such panels have no regulatory role and cannot review and approve decommissioning plans, yet I think their involvement in receiving and disseminating information, and providing a forum for other citizens to ask questions and receive answers, is crucial to a successful transition for a community (local and state) from having an operating nuclear power station to a closed plant and toward achieving the goal of greenfielding that site or making it available for subsequent use.

Question 2: *Do you believe a defueled reactor poses essentially the same off-site radiological emergency risk profile as an operating reactor? Why?*

Answer 2:

As long a spent fuel remains in the pool, I think it presents a different, but significant, risk of an off-site radiological emergency equal in magnitude to the risk posed by an operating reactor. If water drains from the pool and rods are uncovered for an extended period of time, they are at risk of causing the fuel rod cladding to catch fire (a zirconium fire), and release much radiological material in the process, which of course would travel off site. Even though "hotter" fuel is in the reactor core – there is much less of it than is in the pools at most operating and closed or closing plants.

The National Academies' National Research Council investigated the issue in a 2006 study[1] that covered the risk of a zirconium fire caused by terrorism, earthquake, or another major breach of the pools by accident. That study concluded that the risk was real, but federal regulators do not believe it to be an issue worth protecting against.

The NRC staff has recommended the NRC approve a generic exemption to licensees wishing to abandon their off-site obligations to communities after the last reactor fuel is the pool for 15.5 months. The NRC seems inclined to agree, as they recently ruled there is no need to expedite transfer of fuel from spent fuel pools to dry cask – believing either option to be equally protective (Chair Macfarlane dissented).

The conclusion that protection of fuel in the spent fuel pool is adequate and eliminates off-site risks is based on the NRC staff analysis of an above design earthquake, and assumes water could be re-introduced to the fuel pool within 10 hours of any event. This does not take into account natural or man-made catastrophes that could render the pool incapable of retaining water or render the operator

[1] http://www.nap.edu/catalog.php?record_id=11263

incapable of providing water to the pool. It is not inconceivable that a pool structural failure or malevolent act might make that so, yet NRC did not evaluate such risks.

Until, at a minimum, fuel is moved into dry cask storage and ideally moved to a permanent repository, off-site radiological risks remain – as should off-site radiological emergency response capability. In short, the difference in protection is one of a passive system (dry cask storage) versus one of an active system requiring human vigilance. Arrogance and over confidence are two of our species worst attributes, of which we are reminded time and again. I do not think the two systems are equivalent, and they should not be treated as such.

Correction to May 14, 2014 Testimony:

I wish to take this opportunity to correct something in my original testimony related to fuel rod assembly storage in the Vermont Yankee spent fuel pool. In my testimony I stated the VY fuel pool has about 3,879 assemblies and that the pool was originally designed to hold about 350. Upon further analysis and assessment, the correct numbers are that 2,627 assemblies are in the pool, 884 are in dry cask, and the pool was originally designed to hold 600 assemblies. I very much regret this error, but it does not change my conclusion that the pool is holding much more spent fuel than it was originally designed to accommodate.

Thank you again very much for the opportunity to testify and to provide these answers to Senator Carper's questions. Please feel free to contact me if any additional information or clarification is required.

Respectfully submitted,

Christopher Recchia
Commissioner

Sec. E.233 18 V.S.A. chapter 34 is amended to read:

CHAPTER 34. NUCLEAR DECOMMISSIONING CITIZENS ADVISORY PANEL

§ 1700. CREATION; MEMBERSHIP; OFFICERS; QUORUM

(a) There is created a ~~nuclear advisory panel~~ Nuclear Decommissioning Citizens Advisory Panel which shall consist of the following:

(1) the ~~secretary of human services~~ Secretary of Human Services, ex officio, or designee;

(2) the ~~secretary of natural resources~~ Secretary of Natural Resources, ex officio, or designee;

(3) the ~~commissioner of public service~~ Commissioner of Public Service, ex officio, or ~~his or her~~ designee;

(4) the Secretary of Commerce and Community Development, ex officio, or designee;

(5) one member of ~~an energy committee of the Vermont house of representatives~~ the House Committee on Natural Resources and Energy, chosen by the ~~speaker~~ Speaker of the ~~house~~ House;

~~(5)~~(6) one member of ~~an energy committee of the Vermont senate~~ the Senate Committee on Natural Resources and Energy, chosen by the ~~committee~~ Committee on ~~committees~~ Committees; ~~and~~

(7) one representative of the Windham Regional Commission or designee, selected by the Regional Commission;

(8) one representative of the Town of Vernon or designee, selected by the legislative body of that town;

~~(6)~~(9) ~~two~~ six members of the public, two each selected by the ~~governor~~ Governor, the Speaker of the House, and the President Pro Tempore of the Senate. Under this subdivision, each appointing authority initially shall appoint a member for a three-year term and a member for a four-year term. Subsequent appointments under this subdivision shall be for terms of four years;

(10) two representatives of the Vermont Yankee Nuclear Power Station (VYNPS or Station) selected by the owner of the Station;

(11) a representative of the International Brotherhood of Electric Workers (IBEW) selected by the IBEW who shall be a present or former employee at the VYNPS;

(12) one member who will represent collectively the Towns of Chesterfield, Hinsdale, Richmond, Swanzey, and Winchester, New Hampshire, when selected by the Governor of New Hampshire at the invitation of the Commissioner of Public Service; and

(13) one member who will represent collectively the Towns of Bernardston, Colrain, Gill, Greenfield, Leyden, Northfield, and Warwick, Massachusetts, when selected by the Governor of Massachusetts at the invitation of the Commissioner of Public Service.

(b) Ex officio members shall serve for the duration of their time in office or until a successor has been appointed. Members of the ~~general assembly~~ General Assembly shall be appointed for two years or until their successors are appointed, beginning on or before January 15 in the first year of the biennium. Representatives designated by ex officio members shall serve at the direction of the designating authority.

(c) The ~~commissioner of public service~~ Commissioner of Public Service shall serve as ~~chairperson~~ the Chair until the Panel elects a Chair or Co-Chairs under subsection (d) of this section.

(d) The Panel annually shall elect a Chair or Co-Chairs, and a Vice Chair, for one-year terms commencing with its first meeting following the effective date of this section.

(e) A majority of the Panel's members ~~of the panel~~ shall constitute a quorum. The ~~panel~~ Panel shall act only by vote of a majority of its entire membership and only at meetings called by the ~~chairperson~~ Chair or a Co-Chair or by any ~~three~~ five of the members. The person or persons calling the meeting shall provide adequate notice to all its members.

~~(e)~~(f) Members of the panel~~, except for~~ who are not ex officio members ~~and except for legislative members while the general assembly is in session~~, employees of the State of Vermont, representatives of the VYNPS, or members representing towns outside Vermont, and who are not otherwise compensated or reimbursed for their attendance shall be entitled to ~~$30.00~~ $50.00 per diem and their necessary and actual expenses. Funds for this purpose shall come from the monies collected under 30 V.S.A. § 22 for the purpose of maintaining the ~~public service board~~ Department of Public Service. Legislative members shall not be entitled to a per diem under this section for meetings while the General Assembly is in session.

~~(f)~~(g) The ~~department of public service~~ Commissioner of Public Service shall:

(1) manage the provision of administrative support to the Panel, including scheduling meetings and securing meeting locations, providing public notice of meetings, producing minutes of meetings, and assisting in the compilation and production of the Panel's annual report described in section 1701 of this title;

(2) keep the ~~panel~~ Panel informed of the status of matters within the jurisdiction of the ~~panel~~ Panel;

~~(2)~~(3) notify members of the ~~panel~~ Panel in a timely manner upon receipt of information relating to matters within the jurisdiction of the ~~panel~~ Panel; ~~and~~

~~(3)~~(4) upon request, provide to all members of the ~~panel~~ Panel all relevant information within the ~~department's~~ control of the Department of Public Service relating to subjects within the scope of the duties of the ~~panel~~ Panel;

(5) provide workshops or training for Panel members as may be appropriate; and

(6) hire experts, contract for services, and provide for materials and other reasonable and necessary expenses of the Panel as the Commissioner may consider appropriate on request of the Panel from time to time. Funds for this purpose shall come from the monies collected under 30 V.S.A. § 22 for the purpose of maintaining the Department of Public Service and such other sources as may be or become available.

§ 1701. DUTIES

The Panel shall serve in an advisory capacity only and shall not have authority to direct decommissioning of the VYNPS. The duties of the ~~panel~~ Panel shall be:

(1) To hold a minimum of ~~three~~ four public meetings each year for the purpose of discussing issues relating to the ~~present and future use of nuclear power and to~~ decommissioning of the VYNPS. The Panel may hold additional meetings.

(2) To advise the ~~governor~~ Governor, the ~~general assembly~~ General Assembly, ~~and~~ the agencies of the ~~state thereon~~ State, and the public on issues related to the decommissioning of the VYNPS, with a written report being provided annually to the ~~governor~~ Governor and to the energy committees of the ~~general assembly;~~ General Assembly. The provisions of 2 V.S.A. § 20(d) (expiration of reports) shall not apply to this report.

~~(2) To define the responsibilities of state agencies for assuring the safety and health of the public as the result of the operation of a fixed nuclear facility and to assess the ability of state and local governments to meet this responsibility in terms of both technical expertise and financial support;~~

(3) ~~To discuss proposed changes in operations or specific problems that arise in the operation of a fixed nuclear facility, and to prepare and present technical data to serve as a basis for establishing the state's position on such changes or problems;~~ To serve as a conduit for public information and education on and to encourage community involvement in matters related to the decommissioning of the VYNPS and to receive written reports and presentations on the decommissioning of the Station at its regular meetings.

(4) ~~To maintain communications with the operators of any fixed nuclear facility, including the receipt of written reports and presentations to the panel at its regular meetings;~~ To periodically receive reports on the Decommissioning Trust Fund and other funds associated with decommissioning of or site restoration at the VYNPS, including fund balances, expenditures made, and reimbursements received.

(5) ~~To develop awareness in the state and in the state government of the potential liabilities, benefits, or repercussions of nuclear power generation in the state in comparison to other electrical energy sources; and~~ To receive reports regarding the decommissioning plans for the VYNPS, including any

site assessments and post-shutdown decommissioning assessment reports; provide a forum for receiving public comment on these plans and reports; and to provide comment on these plans and reports as the Panel may consider appropriate to State agencies and the owner of the VYNPS and in the annual report described in subdivision (2) of this section

~~(6) To review the current status of state relations with the Nuclear Regulatory Commission and to seek some agreement on federal and state regulatory efforts~~.

§ 1702. ASSISTANCE

~~Staff services for the committee shall be furnished by the department of public service, the agency of human services, the agency of environmental conservation, and the office of the attorney general~~ The Department of Public Service, the Agency of Human Services, and the Agency of Natural Resources shall furnish administrative support to the Panel, with assistance from the owners of the VYNPS as the Commissioner of Public Service may consider appropriate.

Sec. E.233.1 DECOMMISSIONING ADVISORY PANEL; ASSESSMENT OF CHARGE

(a) After providing an opportunity for public comment, the Nuclear Decommissioning Citizens Advisory Panel created under 18 V.S.A. chapter 34 shall assess whether further changes to the Panel's membership or duties as amended by this act are appropriate and shall include recommendations on such further changes in the annual report to the Governor and energy committees of the General Assembly under 18 V.S.A. § 1701(2) to be filed on or before January 15, 2015.

Senator BOXER. Thank you very much. We put all of your full statements into the record.

We will turn our attention to Mr. Geoffrey Fettus, Senior Attorney with the Natural Resources Defense Council. Welcome.

STATEMENT OF GEOFFREY FETTUS, SENIOR ATTORNEY, NATURAL RESOURCES DEFENSE COUNCIL

Mr. FETTUS. Chairman Boxer, Ranking Member Vitter and members of the committee, thank you so much for having us. I will endeavor to be concise.

With the gradual drumbeat of retiring reactors in the past few years for various aging, safety and economic reasons, it is timely for the committee to take up this matter and press ahead in addressing these regulatory issues that we have before us, as you see from the table. The bills introduced yesterday were a constructive and useful start.

I will get right to the point. Chairman Boxer's home State of California also hosts the Humboldt Bay Reactor. Originally, that facility cost about $22 million to build and the decommissioning manager said about $382 million has been spent on decommissioning as of last May 2013. We expect far more than $1 billion to be spent before it is all done.

This is a 63 megawatt reactor not dissimilar in size from the small modular reactors currently envisioned by some industry proponents. Like Humboldt Bay, if it turns out as now seems likely, other reactors may close before the expiration of their operating licenses and the owners could let them sit like radioactive, industrial relics for 30 to 60 years or even longer while interest accrues in the reactor's decommissioning accounts.

Some States have expressed concern over this process as you have just heard. Further, there could be disagreements over these important issues: the extent of and safest treatment for the contamination left onsite; the firm's plans for safely removing the reactor vessels; the ultimate destinations and transport routes for dismantled debris; and the health and environmental limits for the release of sites and license termination, including the time window as noted above. All of these have been contested.

I have advocated before this committee and your colleagues in the Senate Energy and Natural Resources Committee for meaningful State regulatory roles in the waste context and I do so here in the decommissioning context as well.

I actually do think States should have meaningful regulatory authority just as they do for other environmental pollutants.

Our primary concerns today with the decommissioning process are two very simple ones: ensuring the rules apply for as long as necessary to be sufficiently protective and our primary concern goes directly to the most significant area of danger which is spent fuel which is, as all the committee members know, dangerous and highly toxic.

For the purpose of this hearing, spent fuel remains dangerous while it is in over-packed pools that weren't necessarily designed for the length of time they have been in use. We recommend barring such exemptions for as long as the spent fuel remains in the

pools. We are gratified to see that a bill has been introduced to do exactly that.

The other major consideration, considering the time we have, is adequate funding. We were very informed by the recent GAO report that called into question NRC's formula and whether or not it will reliably estimate adequate decommissioning costs.

With the Humboldt Bay example, respectfully, while we have done 11 reactors, that is actually not a tremendous amount of experience compared to the amount of experience we have in operating reactors and operating a whole host of other industrial facilities.

We see this as a relatively new issue that we hope to have a lot of information generated from the process going forward in Vermont and the process that is going to go forward at San Onofre and other locations.

Put bluntly, NRDC is concerned that the States and their taxpayers could be placed in the position where they may flip significant portions of the bill and the burdens to decommission and decontaminate and restore reactor sites into greater resources.

We should avoid such a fate and the bills introduced yesterday are a constructive start. This is an evolving issue and we thank the committee for holding this hearing.

I look forward to your questions.

[The prepared statement of Mr. Fettus follows:]

Statement of

Geoffrey H. Fettus
Senior Attorney
Natural Resources Defense Council, Inc.

on

Nuclear Reactor Decommissioning: Stakeholder Views

Before the
Committee on Environment & Public Works
United States Senate
Washington, D.C.

May 14, 2014

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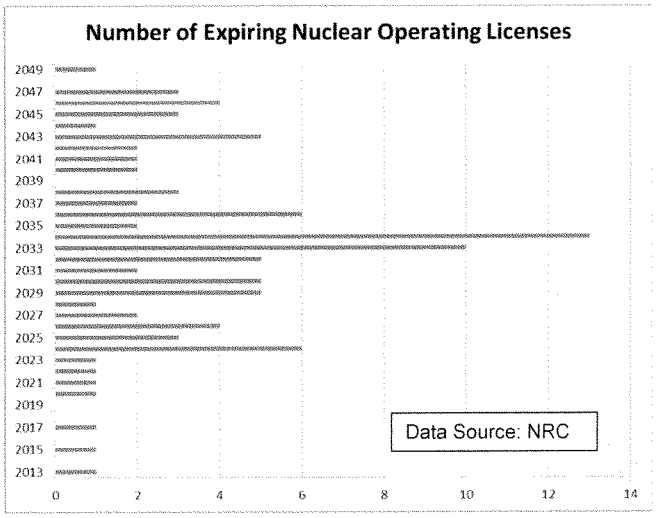
Introduction
Chairman Boxer and Ranking Member Vitter, and members of the Committee, thank you for providing the Natural Resources Defense Council, Inc. (NRDC) this opportunity to present our views at this oversight hearing on the decommissioning of nuclear power plants.

NRDC is a national, non-profit organization of scientists, lawyers, and environmental specialists, dedicated to protecting public health and the environment. Founded in 1970, NRDC serves more than one million members, supporters and environmental activists with offices in New York, Washington, Los Angeles, San Francisco, Chicago, Montana and Beijing. NRDC has worked on nuclear issues for over four decades, and continues to be engaged in shaping U.S. law and policy on the nuclear fuel cycle.

Summary of Comments
For the first three decades of the atomic age, federal and industry attention to nuclear matters was almost entirely directed at nuclear weapons production and commercial nuclear power generation. Disposal of spent nuclear fuel and the mounting radioactive by-products of nuclear weapons production, and the eventual decommissioning of commercial and defense facilities, were hardly on the radar screen.

It was not until the 1980s that serious interest, effort and money was devoted to the task of decommissioning and properly disposing of nuclear power plants themselves. The still ongoing spate of commercial nuclear reactor relicensing that commenced in the 1990s and has extended the life of most our domestic reactor fleet from 40 to 60 years unfortunately relieved some of the pressure to address the adequacy of industry plans and federal requirements for decommissioning. Indeed, it was only a few years ago that NRDC believed this topic would most urgently need addressing prior to the year 2030, as that date marks the period when the U.S. reactors that have received twenty-year license extensions—probably most of them by then—will begin reaching the sixty-year mark and presumably be shut down and eventually decommissioned, as illustrated in the chart below.



But with the gradual drumbeat of retiring reactors in the past few years for varied aging, safety and economic reasons prior to the end of their licenses–SONGS in Southern California, the Kewaunee reactor in Wisconsin, Vermont Yankee in Vermont, and Crystal River in Florida – it is now timely for this Committee to take up the matter of decommissioning and press ahead on addressing some significant safety and regulatory flaws. In any event, between 2014 and 2050, nearly all of the current fleet of U.S. power reactors is slated for retirement unless there is another round of twenty year extensions, a prospect NRDC views with considerable skepticism and concern for public safety.

Just a top line examination of decommissioning reveals a host of serious issues and challenges. And, unfortunately, we do not have consensus among the Nuclear Regulatory Commission (NRC), industry, states and the public on the relative adequacy and protectiveness of existing requirements. Only a few large commercial power reactors have been decommissioned over the past two decades in the United States, and therefore our experience with the process is comparatively limited.

Moreover, it is apparent certain challenges will present themselves in each instance of decommissioning. In 2012 the *New York Times* reported the owners of 20 of the nation's aging nuclear reactors, including some whose licenses expire soon, have not saved nearly enough money for prompt and proper dismantling.[1] The Times noted that, if it turns out the reactors must

[1] See "As Reactors Age, the Money to Close Them Lags," Matthew L. Wald, March 20, 2012, found online at http://www.nytimes.com/2012/03/21/science/earth/as-nuclear-reactors-age-funds-to-close-them-

close before expiration of their operating licenses, the owners intend to let them sit like radioactive industrial relics for 20 to 60 years or even longer while interest accrues in the reactors' decommissioning accounts. States such as New York and Vermont have at various times expressed concern over this prospect. Further, there can be disagreements over the extent of and safest treatment for the contamination left onsite; there are no firm plans for safely removing each plant; ultimate destinations and transport routes for dismantled debris has not been identified for each plant; and the health and environmental limits for release of sites and license termination, including the time window noted above, have been contested. And that's just a first cut at the list of decommissioning issues and challenges.

Nearly two decades ago, Dr. Martin J. Pasqualetti, a professor of geography in the School of Geographical Sciences and Urban Planning at Arizona State University in Tempe, Arizona, and one of the first analysts to grapple with decommissioning's challenges, wisely observed this about the NRC's basic definition of decommissioning – "to remove nuclear facilities safely from service and to reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of license – masks a huge and never-ending duty involving not only technical but social problems."[2] We commend the Committee for holding this hearing and beginning a review of the adequacy of our federal decommissioning requirements. I will touch on what we feel are the two top line matters for this hearing – relaxing the rules on decommissioned reactors and the adequacy of funding.

The Decommissioning Process

In 2011 the NRC updated its planning process for decommissioning power reactors and nuclear material production and utilization facilities, and permits essentially three options. First, there is the decontamination (DECON) option, where all reactor and associated structures and components contaminated with radioactivity are either cleaned or removed and shipped to a licensed radioactive dump site, and the reactor location is returned to unrestricted use with all dispatch. The second option, we understand by far the most likely in most instances, is the safe storage (SAFSTOR) option, where the reactor is defueled but all associated parts of the facility are left in place for up to six decades for later decontamination. Finally, there is still an entombment (ENTOMB) option, where the facility is basically covered over and left forever, a final option we do not expect to see domestically. An extreme and challenging example of a version of the entombing option, at the contaminated Chernobyl Reactor in Ukraine, was recently well described in mixed media presentation by the New York Times.[3] The ENTOMB

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[2] See, *Decommissioning Nuclear Power Plants,* Martin J. Pasqueletti, in *Controlling the Atom in the 21st Century*, ed. O'Very, Paine, Reicher, 1994, Westview Press at 316.

[3] *See Chernobyl, Capping A Catastrophe*, Henry Fountain, Photographs by William Daniels, The New York Times, April 27, 2014, online at http://www.nytimes.com/interactive/2014/04/27/science/chernobyl-capping-a-

option was available in the United States for some of the early, small reactors that did not operate at high power levels or for extended periods so as to develop much of a radioactive footprint.

The decommissioning process includes a Post Shutdown Decommissioning Activities Report (PSDAR), a listing of the tasks, schedule and estimated budget. The Final Status Survey Report (FSSR) is an inventory of the radioactively decontaminated pieces of the plant that require special handling. And the License Termination Plan (LTP) is the final document, and it presents the planned final state of the site and potential future uses (essentially, the extent of the cleanup and the manner in which any contamination will be left on site). The PSDAR, FSSR, and LTP are submitted by owners to the NRC and become publicly available. Detailed treatments of this process are found in the NRC's Decommissioning Planning, Final Rule.[4]

The process described above presents a host of sometimes conflicting policy goals. Nearly twenty years ago Dr. Pasqualetti identified eight fundamental decommissioning policy considerations that could, in some instances, work in opposition to one another:

- Minimizing radiological hazards for workers (health and safety);
- Minimizing radiological hazards for the general public (health, safety and long term environmental impacts);
- Leaving a cleared and decontaminated site for future non-nuclear purposes (land use, health and safety);
- Ensuring that decommissioning costs are as low as reasonable and practicable (economic);
- Maximizing economic benefits of operations, including those to stockholders, by operating power plants as long as possible (economics);
- Securing sufficient decommissioning funding (economics, ethics); and
- Meeting legal requirements (law).

With the operating reactor experience of the last two decades, and especially the last two years, NRDC also suggests a clarification as to how one might consider maximizing economic benefit in light of the safety considerations attendant to reactor aging. Keeping an aging reactor operating for financial reasons not only raises safety concern but the financial consideration of appropriate investment to ensure safe operations. In any event, we find those eight considerations a useful frame for considering current deficiencies in decommissioning power reactors.

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[4] 76 Fed. Reg. 35512 (June 17, 2011), found online athttp://pbadupws.nrc.gov/docs/ML1127/ML11272A154.pdf.

Consideration # 1 – The Rules No Longer Apply
Our primary concern with the decommissioning process is that both regulatory requirements and the agency's oversight regime are significantly scaled back when nuclear power reactors cease operation. Such waivers have been granted and are being sought even in the event that sizable quantities of spent nuclear fuel are left in pools for potentially decades.

The nuclear fuel cycle has a number of significant environmental and public safety impacts (not covered in this hearing). But chief among nuclear power's environmental impacts, in addition to severe nuclear accidents, is nuclear waste – specifically, the production of spent nuclear fuel. 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]

And regarding these serious health consequences from exposure, 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 Yucca Mountain Standards, Nat'l Research Council, *Technical Bases for Yucca Mountain Standards*, 18-19 (1995).

As NRDC has noted before this Committee and your colleagues in the Energy & Natural Resources Committee, there is no evidence that continued reliance on densely packed wet storage should be accepted as adequate in light of the health, safety and security risks that spent fuel pools pose.[7] This is true regardless of the local seismicity, population density, or other environmental factors that might create concern with the current storage configuration. NRDC and our colleagues at the Union of Concerned Scientists and many others noted President Obama's Blue Ribbon Commission for America's Nuclear Future was negligent in not recommending Congress statutorily direct movement of spent fuel from wet pools to hardened dry casks as soon as practical, *i.e.*, as soon as spent fuel has cooled sufficiently to permit safe dry

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[5] National Institutes of Health, Fact Sheet: http://www.nlm.nih.gov/medlineplus/radiationexposure.html (last visited December 9, 2013).

[6] *See* Environmental Radiation Protection Standards for Yucca Mountain, Nevada, 64 Fed. Reg. 46,976, 46,978 (Aug. 27, 1999).

[7] "Any event that results in the breach of a spent fuel pool or a dry cask, whether accidental or intentional, has the potential to release radioactive material to the environment" – National Academy of Sciences, Safety & Security of Spent Fuel Storage, 2006.

cask storage, generally about five to seven years following discharge from the reactor. We again urge Congress to act on this issue in comprehensive legislation or even in a stand-alone bill.

Illustrating the importance of this point, in a May 2, 2014 letter sent to NRC Chairman Allison Macfarlane, Senator Edward J. Markey (D-Mass.), this Committtee's Chairman Barbara Boxer (D-Calif.), and Senators Bernard Sanders (I-Vt.), Patrick Leahy (D-Vt.) and Kirsten Gillibrand (D-N.Y.) called on the NRC to halt the policy of issuing exemptions to emergency response regulations to decommissioning nuclear reactors which house decades-worth of spent nuclear fuel.[8]

The Senators noted the exemptions for compliance with the emergency response regulations – such as those that require evacuation zones and siren systems to warn of problems – have been granted to all of the ten reactor licensees that have requested them in the past. Moreover, the Senators pointed out licensees of reactors that are or will soon begin the decommissioning process (including San Onofre in California and Vermont Yankee) have already submitted a wide range of exemption requests from emergency response, security and other regulations to the NRC. Indeed, now Dominion's Kewaunee plant seeks the same set of waivers and this week a spokesman for the plant stated "[w]hat we are looking for is a waiver for requirements that really no longer are applicable."[9]

While industry suggests the requirements are no longer applicable, at the same time under its ongoing review of the long-term environmental and safety impacts of spent nuclear fuel (the Waste Confidence Generic EIS currently under review), NRC suggests spent nuclear fuel can be stored safely for at least 60 years beyond the licensed life of a nuclear power plant, but bases its

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[8] *See*, NSIR/DPR-ISG-02, *Interim Staff Guidance, Emergency Planning Exemption Requests For Decommissioning Nuclear Power Plants,* at 4. "The purpose of this interim staff guidance (ISG) is to provide guidance to U.S. Nuclear Regulatory Commission (NRC) staff in processing exemptions from the emergency preparedness (EP) requirements for nuclear power reactors that are undergoing the process of decommissioning … In the 1990s, the staff developed a thermal-hydraulic criterion for determining when reductions in EP requirements at decommissioning plants could be permitted. The criterion was used on a case-by-case basis to grant exemptions from certain EP requirements. The criterion was based on demonstrating that spent fuel stored in the SFP would sufficiently air-cool and would not reach the zirconium ignition temperature if the water in the pool were to be fully drained or there was at least ten hours to take action to recover SFP inventory and take ad hoc actions to protect the public. NUREG/CR-4982, "Severe Accidents in Spent Fuel Pools in Support of Generic Safety Issue 82", and NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR [boiling water reactor] and PWR [pressurized water reactor] Permanently Shutdown Nuclear Power Plants", provides temperatures associated with the self-initiation and propagation of zirconium fires." Online at http://pbadupws.nrc.gov/docs/ML1330/ML13304B442.pdf.

[9] Closed Kewaunee nuclear plant seeks relaxed safety standard; 5 US senators oppose change; Associated Press, Star Tribune, May 9, 2014 *see* at http://www.startribune.com/politics/national/258626001.html#undefined.

determination in significant measure on the assertion that emergency preparedness and security regulations remain in place during decommissioning.

Such is clearly not the case. Waivers from a protective regulatory regime, including relaxing the fifty mile Emergency Planning Zone, are inappropriate while spent nuclear fuel remains stored in densely packed pools. We concur with the Senators' and their letter cited above that accidents or attacks on spent fuel pools could trigger a spent fuel fire or explosive dispersal of radionuclides that would put neighboring populations at risk of experiencing harmful levels of exposure to radioactivity and potentially widespread economic damage from land contamination.

With those observations in mind, NRDC urges the Committee to write legislative language for a pilot project to address the total stranded spent fuel at closed reactor sites (currently 13 sites and soon to be more), where spent nuclear fuel would be stored in dry casks within one or more hardened buildings similar to the Ahaus facility in Germany. Potential volunteer sites that have in the past demonstrated "consent" to host spent nuclear fuel are operating commercial reactors. The utility of using existing commercial operating reactor sites rather than burdening new areas with spent nuclear fuel should be apparent: existing sites require far less new infrastructure, already have the capacity for fuel management and transportation and have the consent necessary for hosting nuclear facilities. And by keeping consolidated, interim-stored spent nuclear fuel under the guardianship of the nuclear industry that produced the waste in the first instance, Congress ensures careful progress continues with the repository program because all parties will know that it is necessary.

And while a diminished safety regime for spent fuel pools is a primary concern, there are other problematic manifestations of a relaxed regulatory scheme. For example, aging management measures adopted to support the 20 year renewal of reactor operating licenses apply during the period of extended reactor operation—but not during the potentially six decades of spent fuel pool storage that can ensue under the SAFSTOR option.[10] Our colleague David Lochbaum at the Union of Concerned Scientists detailed many and more of these concerns late last year in the comments to the NRC on the Draft Waste Confidence Generic EIS.[11]

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[10] NRC Inspection Manual Chapters 0350, "Oversight of Reactor Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns," and 0351, "Implementation of The Reactor Oversight Process at Reactor Facilities in an Extended Shutdown Condition for Reasons Other Than Significant Performance Problems," cover nuclear power reactors that have been shut down for lengthy periods, but which are expected to eventually resume operations. These manual chapters do not apply to permanently shut down reactors. Further, a review of the Inspection Manual Chapters and associated NRC Inspection Procedures identified only one procedure applicable to permanently shut down nuclear power reactors (NRC 1997a). It focused on spent fuel pools. This sole procedure was developed in response to the 1994 event at Dresden Unit 1. According to NRC, it is "estimated to require 32 onsite inspection hours semi-annually." (NRC 1997a), *Spent Fuel Pool Safety at Permanently Shutdown Reactors*, Inspection Manual Inspection Procedure 60801, found online at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspectionprocedure/ip60801.pdf.

[11] See *Critique of the Analysis of Safety and Environmental Risks Posed by Spent Fuel Pool Leaks in the NRC's Draft Waste Confidence Generic Environmental Impact Statement*, December 13, 2013,

Another example of a relaxed regulatory scheme concerns NRC's reliance on a volunteer, industry-run groundwater monitoring program. In the agency's ongoing "Waste Confidence" proceeding, NRC states "[l]icensees that have implemented a groundwater monitoring program consistent with the Nuclear Energy Institute Groundwater Protection Initiative are considered to have an adequate program for the purposes of the Decommissioning Planning Rule.[12] Therefore, based on results from a one-time, voluntary, industry created initiative at currently operating plants, NRC apparently considers the voluntary groundwater monitoring program to be adequate over the entire 60-year short-term storage period at shutdown plants. NRC should rethink this policy and alter it with all dispatch. The industry's Groundwater Protection Initiative is a voluntary measure that is currently not being routinely inspected by the NRC at either operating or permanently shut down nuclear power plants. As such, crediting a non-mandatory, non-inspected program with detecting and correcting leaks during the 60-year storage period is simply not credible, and not supported by the industry's failure to prevent leaks of tritium to groundwater from its existing reactors.

Consideration #2 Is the Funding Adequate?
Four nuclear power reactors (Crystal River 3 in Florida, Kewaunee in Wisconsin, and San Onofre Units 2 and 3 in California) permanently shut down over the last two years and the owner of another reactor (Vermont Yankee in Vermont) announced it would permanently shut down in the fourth quarter of this year.

Decommissioning, a painstaking and complicated process that by any measure can take decades, carries with it cost projections from $400 million to $1 billion per reactor.[13] The Times reported last year that Entergy Corporation is at least $90 million short of a projected $560 million cost of dismantling Vermont Yankee. But in a positive development, late last year Vermont's Governor Shumlin and Entergy, Vermont Yankee's operator, announced an agreement that, among other matters, sets a path for decommissioning Vermont Yankee as promptly as funds in the Nuclear Decommissioning Trust allow, rather than delaying decommissioning under SAFSTOR guidelines.[14] Entergy VY also committed in the agreement to prepare a site assessment and cost study by the end of this year. I have no doubt the testimony of the State today will shed more light on these developments.

Declaration of David Lochbaum, online at http://www.cleanenergy.org/wp-content/uploads/LochbaumDeclaration.pdf.

[12] NRC Waste Confidence Generic Environmental Impact Statement, NUREG-2157, Draft Report for Comment, at 3-19, 3-20.

[13] "As Reactors Age, the Money to Close Them Lags," Matthew L. Wald, March 20, 2012, link in note 1.

[14] "Governor Shumlin, Attorney General Sorrell, and Entergy VY Announce End to Current Disputes and Path to Decommissioning and Site Restoration of Vermont Yankee Without Undue Delay After 2014 Closure," http://www.entergy.com/news_room/newsrelease.aspx?NR_ID=2825.

In any event, NRDC has concerns that current decommissioning funding mechanisms will prove insufficient to fully decommission the power reactors due to come off line in the next several years. The United States Government Accountability Office (GAO) issued a report where its top line findings were:[15]

- "NRC's formula may not reliably estimate adequate decommissioning costs. According to NRC, the formula was intended to estimate the "bulk" of the decommissioning funds needed, but the term "bulk" is undefined, making it unclear how NRC can determine if the formula is performing as intended. In addition, GAO compared NRC's formula estimates for 12 reactors with these reactors' more detailed site-specific cost estimates calculated for the same period. GAO found that for 5 of the 12 reactors, the NRC formula captured 57 to 76 percent of the costs reflected in each reactor's site-specific estimate; the other 7 captured 84 to 103 percent.

- The results of more than one-third of the fund balance reviews that NRC staff performed from April 2008 to October 2010 to verify that the amounts in the 2-year reports match year-end bank statements were not always clearly or consistently documented. As an example of inconsistent results, some reviewers provided general information, such as "no problem," while others provided more detail about both the balance in the year-end bank statement and the 2-year report. As of October 2011, NRC did not have written procedures describing the steps that staff should take for conducting these reviews, which likely contributed to NRC staff not always documenting the results of the reviews clearly or consistently.

- NRC has not reviewed licensees' compliance with the investment standards the agency has set for decommissioning trust funds. These standards specify, among other things, that fund investments may not be made in any reactor licensee or in a mutual fund in which 50 percent or more of the fund is invested in the nuclear power industry. As a result, NRC cannot confirm that licensees are avoiding conditions described in the standards that may impair fund growth. Without awareness of the nature of licensees' investments, NRC cannot determine whether it needs to take action to enforce the standards."

With our limited national experience in decommissioning power reactors, we view this as an evolving concern. We also note it is unclear to us whether NRC's Decommissioning Planning Rule has directly addressed persistent shortfalls in the decommissioning trust funds, especially in instances where there is subsurface and groundwater site contamination. When coupled with the notable and heretofore unacknowledged costs of remediating subsurface and groundwater contamination at numerous sites, it seems apparent the decommissioning trust funds could in some instances be exhausted long before full decommissioning has been accomplished. Adding

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[15] *NRC's Oversight of Nuclear Power Reactors' Decommissioning Funds Could Be Further Strengthened*, GAO-12-258: published April 5, 2012, publicly released: May 7, 2012; online at http://www.gao.gov/products/GAO-12-258.

to this uncertainty funds for decommissioning is the fact that over 40 reactors operate in merchant power markets, where long-term financial assurances are not in place as had been the case for U.S. reactors already entering into decommissioning.

Put bluntly, a plausible risk exists that States and their taxpayers could be placed in a position where they may foot significant portions of the bill to decommission, decontaminate and restore the reactor sites and degraded resources, and accept blighted and unproductive areas in their midst for generations that have been granted waivers for essential security and environmental safeguards. Rather than leave this burden to the States, we urge the Commission to revise the Decommissioning Final Rule in accordance with the State of New York's 2010 comments,[16] wherein NRC was urged to increase the strength and timeliness of the financial assurance monitoring regime so that decommissioning funds will not operate at shortfalls. Moreover, the Commission should adopt New York's wise suggestion that the formula by which decommissioning costs are estimated for each successive reactor should take into account "site-specific" factors such as the presence of contamination so that the ultimate costs will not be borne by States and their citizens.

We look forward to continuing to work with the Committee and all the parties at the table on this issue. I am happy to answer any questions.

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[16] See *Supplemental Comments Submitted By The State Of New York Concerning The Nuclear Regulatory Commission's Proposed Decommissioning Rulemaking;* November 30, 2010, found online at http://pbadupws.nrc.gov/docs/ML1033/ML103350167.pdf.

Responses to Questions for the Record on
"Nuclear Reactor Decommissioning: Stakeholder Views"

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Before the
Committee on Environment & Public Works
United States Senate
Washington, D.C.

May 14, 2014 Hearing
June 30, 2014 Responses

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FROM SENATOR CARPER

Question 1: *I understand that Southern California Edison has created a community advisory group comprised of 18 local community leaders of diverse backgrounds. This panel is chartered to foster education and involvement of the surrounding communities in the decommissioning of the San Onofre Nuclear Power Plant. Do you see value in this type of community engagement and would you encourage other licensees facing decommissioning to establish the same type of community advisory groups?*

Answer to Senator Carper's Question 1

NRDC supports broad, transparent and inclusive involvement of state and community representatives in the decommissioning process for any nuclear power plant (or, for that matter, the decommissioning of any major industrial operation). But such advisory groups, while potentially helpful conduits of information to affected communities, are no substitute for meaningful regulatory oversight.

As a first matter, substantially detailed in our submitted testimony, we have concerns that the Nuclear Regulatory Commission's (NRC) safety requirements and the agency's oversight regime are significantly scaled back when nuclear power reactors cease operation. Wide ranging waivers from safety requirements have been granted and are currently being sought even in the event sizable quantities of spent nuclear fuel are left in pools, potentially for decades. In the face of such regulatory relaxation, community advisory boards are no substitute for meaningful health and safety requirements that can assure an environmentally sound and publicly accepted decommissioning process.

As a second matter, and directly pertinent to your question about the usefulness of advisory boards, there will continue to be contentiousness and fierce disputes over the adequacy of health, safety and environmental matters at commercial nuclear facilities until a meaningful and appropriate role for direct state regulatory oversight is provided. This can be done simply by amending the Atomic Energy Act (AEA) to remove its express exemptions of radioactive material from environmental laws. These 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.

As you, Senator Carper, are 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. This is true in the area of everything from nuclear waste to the decommissioning process. The State of Vermont testified at length before the Committee on this subject, describing Vermont's experience in negotiations over the decommissioning process as working with "one hand tied behind its back."

In the absence of clear language in those statutes authorizing EPA (and/or states where appropriate) to regulate the environmental and public health impacts of radioactive waste and the

facilities therein, the NRC thereby retains broad authority, with the consequence that EPA and state regulators are only able to push for stringent cleanups on the margins of the process.

While states are welcome to consult with the NRC and the DOE and many site-specific advisory boards have been created in a wide range of instances – but the agencies, nevertheless DOE and NRC can, and will, assert preemptive authority where they see fit. This has happened time and again at both commercial and DOE nuclear facilities. Indeed, disputes over cleanup at the Hanford Reservation have gone on for decades and show little sign of subsiding. This outdated regulatory scheme is the focal point of the distrust that has poisoned federal and state relationships in the nuclear waste context and, we submit, may negatively impact the growing numbers of decommissioned nuclear plants.

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 we could be much farther along in remediating the toxic legacy of the Cold War. Further, with EPA and state authority we could likely avoid some of the ongoing legal and regulatory disputes over operations at commercial nuclear facilities, including appropriate and safe requirements for decommissioning that meet the concerns of state and local advisory groups that are the subject of your question.

As we have noted in past hearings addressing nuclear waste, 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 to achieve regulatory change is certainly within the capacity of the current federal agencies and engaged stakeholders. Some states would assume regulatory jurisdiction over radioactive material, 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, transparent decisions and meaningful regulatory oversight at commercial nuclear facilities, and the regulatory work would be less susceptible to the acrimony that has marked it during the past decades.

Question 2: *Do you believe a defueled reactor poses essentially the same off-site radiological emergency risk profile as an operating reactor? Why?*

No, we do not believe that a defueled reactor poses precisely the same off-site radiological risk as a currently operating reactor, assuming that the hypothetical operating reactor also has a filled spent fuel pool. But that does not mean a defueled reactor cannot pose a serious risk to public health and the environment, nor that the current regulatory regime and industry practices for defueled reactors are adequate.

As described above, in the current regulatory environment, owners of defueled and decommissioning reactors have sought and obtained wide ranging waivers from safety requirements, even as sizable quantities of spent nuclear fuel are left in pools, potentially for decades. As we detailed in our written testimony, chief among nuclear power's environmental

impacts is its deadly and long-lasting byproduct: highly radioactive spent nuclear fuel. At high doses, radiation exposure will cause death. 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. And regarding these serious health consequences from exposure, 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 Yucca Mountain Standards, Nat'l Research Council, Technical Bases for Yucca Mountain Standards, 18-19 (1995).

More pointedly, in the NRC's Expedited Spent Fuel Transfer Proceeding,[1] the NRC Staff found that if even a small fraction of the inventory of a Peach Bottom reactor pool were released to the environment in a severe spent fuel pool accident, an average area of 9,400 square miles (24,300 square kilometers) would be rendered uninhabitable, and that 4.1 million people would be displaced over the long-term.[2] Indeed, thirty four of our colleagues in the public interest community have requested NRC consider, in all pending and future reactor licensing and re-licensing decisions, new and significant information bearing on the environmental impacts of high-density pool storage in reactor pools and alternatives for avoiding or mitigating those impacts.[3]

NRDC has noted before this Committee and before your colleagues in the Energy & Natural Resources Committee that there is no evidence that continued reliance on densely packed wet storage should be accepted as adequate in light of the health, safety and security risks that spent fuel pools pose. This is true regardless of the local seismicity, population density, or other environmental factors that might create additional concerns with the current spent nuclear fuel storage configuration. NRDC and our colleagues at the Union of Concerned Scientists and many others noted that President Obama's Blue Ribbon Commission for America's Nuclear Future

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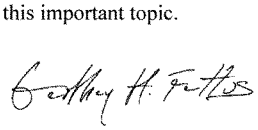
[1] See COMSECY-13-0030, Memorandum from Mark Satorius, Executive Director for Operations, to NRC Commissioners re: Staff Evaluation and Recommendations for Lessons Learned Tier 3 Issue on Expected Transfer of Spent Fuel (Nov. 12, 2013) ("COMSECY-13-0013") (ADAMS Accession No. ML13273A601) and documents cited therein.

[2] Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor (Oct. 2013) ("Consequence Study") (ADAMS Accession No. ML13256A342), at 232 (Table 62) and 162 (Table 33).

[3] Environmental Organizations' Petition to Consider New and Significant Information Regarding Environmental Impacts of High-Density Spent Fuel Storage and Mitigation Alternatives in Licensing Proceedings for New Reactors and License Renewal Proceedings or Existing Reactors and Duly Modify All NRC Regulations Regarding Environmental Impacts of Spent Fuel Storage During Reactor Operation (Feb. 18, 2014), Docket No. 51-31 (Amended June 26, 2014).

was negligent in not recommending Congress statutorily direct movement of spent fuel from wet pools to hardened dry casks as soon as practical, i.e., as soon as spent fuel has cooled sufficiently to permit safe dry cask storage, generally about five to seven years following discharge from the reactor. We again urge Congress to act on this issue in comprehensive legislation or even in a stand-alone bill.

Thank you for your questions and we look forward to continuing to work with the Committee on this important topic.



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Senator BOXER. Thank you so much, Mr. Fettus.

We will turn to our last witness, Mr. Marvin Fertel, President and Chief Executive Officer with the Nuclear Energy Institute. Welcome.

STATEMENT OF MARVIN S. FERTEL, PRESIDENT AND CHIEF EXECUTIVE OFFICER, NUCLEAR ENERGY INSTITUTE

Mr. FERTEL. Thank you, Chairman Boxer, Ranking Member Vitter, and members of the committee.

As already mentioned, decommissioning involves decontaminating a commercial nuclear energy facility to reduce residual radioactivity, dismantling the structures, removing contaminated materials and components to appropriate disposal facilities and ultimately releasing the property for other uses.

The nuclear energy industry has demonstrated that it has the technology, resources and expertise to successfully decommission commercial nuclear reactors. The decommissioning process, as overseen by the Nuclear Regulatory Commission with input from States and local government, is a proven and appropriate method for ensuring that the decommissioning of nuclear energy facilities is accomplished in a safe and secure environmentally compatible way.

The process allows licensees to choose one of three decommissioning options that Mike Weber mentioned and they must be exercised within that 60-year period. Importantly, it also does provide opportunities for interaction with State, local communities and tribes allowing the public to attend meetings, provide comments and have access to plant specific decommissioning information and request a hearing before the license is terminated.

The closure of more than 70 test and power reactors since 1960 including 17 power reactor sites currently undergoing decommissioning, shows the effectiveness and success of the NRC's approach to regulating the decommissioning process.

The NRC also ensures that adequate funds for decommissioning will be available when needed through a system that requires licensees to amass funds needed to decommission their facilities.

Planning for decommissioning takes place over the life of the facility. Throughout the operation of a nuclear power plant from licensing through decommissioning, the licensee must provide the NRC with the assurance that sufficient funding will be available for the decommissioning process.

As I mentioned earlier, the site must be decommissioned within the 60-year period of a plant ceasing operations.

As Mr. Weber indicated, 5 years before expiration of an operating license, the company must provide the NRC with both a preliminary decommissioning cost estimate and a program description for managing used reactive fuel at the site after electricity production is stopped.

Within 2 years of shutting down a facility, the company must submit a post shutdown decommissioning activities report to the NRC and the affected States. Licensees have three options to decommissioning that have been mentioned before.

Decommissioning also includes removing used fuel from the reactor and ultimately placing the fuel into shielded dry storage con-

tainers onsite. The company that produced electricity at the facility remains accountable to the NRC until decommissioning has been fully completed and its Federal license is terminated.

However, without the demands of running a power plant and with the greatly decreased risk of significant accident after fuel was removed from the reactor, stamping in areas such as operations, maintenance, engineering, emergency preparedness and security and other onsite resources can be reduced to be commensurate with the conditions of the plant and the reduced risk to the public and workers.

Throughout the decommissioning process, regulatory oversight is provided by the NRC, the Occupational Safety and Health Administration, the Department of Transportation and the Environmental Protection Agency. There are also multiple opportunities for public involvement that I mentioned before. The request for a hearing before the license is terminated offers an opportunity for extensive solution.

In conclusion, the nuclear energy industry has proven that it has the technology, resources and expertise to successfully decommission commercial reactors. Decommissioning nuclear energy facilities with independent oversight by the NRC and timely interaction with State and local authorities has been efficiently managed and funded in a safe and environmentally sound manner under existing regulations.

The NRC ensures that funds for decommissioning will be available when needed through a system that requires licensees to amass funds needed to decommission their facilities over the entire life of the facility. The NRC's regulatory framework has been proven effective by the fact that every power reactor that is shut down and has been or is currently being decommissioned has been able to fund and safely perform required decommissioning activities.

This has been the case even in situations where the licensee did not operate the facility to the end of its entire license term.

Thank you very much for holding this hearing.

[The prepared statement of Mr. Fertel follows:]

Testimony for the Record
Marvin S. Fertel
President and Chief Executive Officer
Nuclear Energy Institute
Committee on Environment & Public Works
U.S. Senate
May 14, 2014

Chairman Boxer and Ranking Member Vitter, thank you for the opportunity to testify today on the decommissioning process for nuclear energy facilities. I am Marvin Fertel, president and chief executive officer at the Nuclear Energy Institute (NEI).[1] NEI is responsible for establishing unified nuclear industry policy on regulatory, financial, technical and legislative issues affecting the industry. NEI's 370 members include all U.S. companies licensed to operate commercial nuclear power plants, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, materials licensees, labor organizations, universities and other organizations and individuals involved in the commercial nuclear technology industry.

NRC Decommissioning Process Is Sound, Promotes State Involvement

Decommissioning is the process by which nuclear power plants are retired from service. It primarily involves decontaminating the facility to reduce residual radioactivity, dismantling the structures, removing contaminated materials and components to appropriate disposal facilities, and releasing the property for other uses. Decommissioning begins after the power plant licensee permanently ceases operation of the facility.

Nuclear Regulatory Commission regulations and associated guidance detail the requirements and process for decommissioning to ensure the process is safe and secure and meets applicable requirements.

The closure of more than 70 test and power reactors since 1960—including 17 power reactors sites that are undergoing decommissioning—shows the strength and flexibility of the NRC's approach to the process. In addition to federal oversight, the NRC's decommissioning process facilitates participation by state and local authorities at several points along the way.

[1] The Nuclear Energy Institute 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.

The decommissioning process as regulated and overseen today by the NRC is a safe and environmentally sound method for remediating nuclear power plant sites for other uses.

Overview of the Decommissioning Process

Decommissioning a nuclear plant involves removing the used nuclear fuel rods from the reactor, dismantling systems or components containing radioactive products (such as the reactor vessel) and dismantling contaminated materials from the facility. All radioactive materials generally have to be removed from the site and shipped to a waste-processing, storage or disposal facility.

Contaminated materials may be cleaned of contamination on site, cut off and removed (leaving most of the component intact in the facility) or removed and shipped to a waste-processing, storage or disposal facility. Each company decides how to decontaminate materials based on the amount of contamination, the ease with which it can be removed and the cost to remove the contamination.

It also includes removing used fuel from the reactor and, ultimately, placing the fuel into robust and shielded dry storage containers for storage at the site. The company that produced electricity at the facility remains accountable to the NRC until decommissioning has been completed and its federal license is terminated. However, without the demands of running a power plant and with the greatly decreased risk of a significant accident after fuel is removed from the reactor, staffing in areas such as operations, maintenance, engineering, emergency preparedness and security and other onsite resources can be substantially reduced at this time.

Ten reactors have completed decommissioning and 17 commercial reactor sites are in the decommissioning process, including the recently closed Kewaunee, Crystal River 3 and San Onofre 2 and 3 power stations. Of these 17, 10 are using or transitioning to the SAFSTOR option, four are using the DECON option, and two have not yet chosen a decommissioning option. Three Mile Island 2—site of the 1979 accident—is in post-defueling monitored storage.[2]

Decommissioning Planning Occurs over Life of the Facility

Although the decommissioning process begins when the facility operator ceases electricity production, planning for decommissioning takes place over the life of the facility. For example, throughout the operation of a nuclear power plant, from licensing through decommissioning, the licensee must provide the NRC with the assurance that sufficient funding will be available for the decommissioning process. Further, five years before expiration of an operating license, the licensee must provide the NRC with both a preliminary decommissioning cost estimate and a program description for managing used reactor fuel at the site after electricity production is stopped.

Once the licensee permanently ceases operation, it must submit a certification of permanent cessation to the NRC within 30 days. At this point, the reactor can be defueled. In that process,

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[2] http://www.nrc.gov/info-finder/decommissioning/power-reactor/

trained reactor technicians remove nuclear fuel from the reactor vessel so that the facility is no longer able to produce electricity. Generally, this fuel is first placed in the used fuel storage pools on site to reduce its heat and radioactivity. After several years, this used fuel will be moved to container storage on site. After the reactor is defueled, the licensee must submit a certification of permanent fuel removal to the NRC. Once the NRC has docketed both certifications, the license no longer authorizes placement of fuel into the reactor.

Choosing a Decommissioning Option

Within two years of shutting down the facility, the company must submit a post-shutdown decommissioning activities report (PSDAR) to the NRC and the affected states. Licensees have three options for decommissioning the site: decontamination (DECON), safe storage (SAFSTOR) or entombment (ENTOMB). The report must include a description of the planned decommissioning option:

- ***SAFSTOR (Safe Storage).*** In the SAFSTOR process, a nuclear plant is kept intact and placed in protective storage for up to 60 years. During this time, the main components including the reactor vessel, fuel pools, turbine and other elements remain in place. All fuel is removed from the reactor vessel and placed in fuel pools on site. Maintenance and security operations continue and the operator maintains an NRC license. The NRC continues to inspect the site and maintains regulatory oversight of maintenance and security. This method of decommissioning uses time as a decontaminating agent by allowing the radioactive elements in components to decay to stable elements. For example, if a plant is allowed to sit idle for 30 years, the radioactivity from cobalt 60 will be reduced to 1/50th of its original level; after 50 years, the radioactivity will be about 1/1,000th of its original level. After radioactivity has decayed to lower levels, the plant is dismantled in a process similar to the DECON option. Facilities using SAFSTOR include Dresden 1, Indian Point 1, LaCrosse and Peach Bottom 1.

- ***DECON (Decontamination).*** In DECON, all components and structures that have been exposed to radiation are cleaned or dismantled, packaged, and shipped to a low-level radioactive waste disposal site or stored temporarily on site. This work can take five years or more. Generally, used nuclear fuel rods in the fuel storage pool are placed in container storage at the site. When decontamination is completed, the used fuel will continue to be managed at that site under the NRC license and subject to agency oversight until it is shipped offsite for consolidated storage or permanent disposal.

- ***ENTOMB.*** This option involves encasing radioactive structures, systems and components in a long-lived substance, such as concrete. The encased plant would be appropriately

maintained, and surveillance would continue until the radioactivity decays to a level that permits termination of the plant's license and unrestricted release of the property. To date, no company has requested this option.

The PSDAR report to the NRC also must include a schedule to complete decommissioning, a discussion of how site-specific decommissioning activities will adhere to previously issued environmental impact statements, and an estimate of expected costs. The NRC reviews the report and holds public meetings to discuss the company's decommissioning plans and the regulatory oversight process.

While this process is under way, the licensee may perform routine activities, such as maintenance and controlled disposal of small radioactive components. The licensee does not have access to the full amount of funds it has put aside for decommissioning until the site-specific cost estimate has been accepted by the NRC.

Ninety days after submittal of the PSDAR, the operator may begin major decommissioning activities. These include the permanent removal of large components—such as the reactor vessel, steam generators and other components that are comparably radioactive—as well as permanent changes to the containment structure. NRC's regulations dictate when and for what purposes decommissioning funds can be used.

The site must be decommissioned within 60 years of the plant ceasing operations. Licensees can choose to end SAFSTOR at any point during the 60-year period and transition to DECON. Alternatively, licensees can choose to begin DECON at the beginning of the 60-year period. All sites must transition to DECON at some point so that decontamination can begin. Generally, sites must spend no longer than 50 years in SAFSTOR to allow 10 years for the DECON stage of decommissioning.

The SAFSTOR and DECON options allow licensees to choose the optimal time and method for decommissioning their particular site. The NRC maintains continual oversight of a nuclear energy facility until it is fully decommissioned.

What Happens During the DECON Phase?

In the DECON phase, the operator first decontaminates or removes contaminated equipment and materials. Used nuclear fuel rods and equipment account for more than 99 percent of the plant's radioactivity. Their removal lowers the level of radiation and thus reduces the potential exposure of workers during subsequent decommissioning operations.

Next, the plant operator addresses the small amount of radioactivity remaining in the facility, which must be reduced to harmless levels through a cleanup phase called decontamination.

Workers remove surface radioactive material that has accumulated inside pipes and heat exchangers or on floors and walls that were not decontaminated during normal plant operations because of inaccessibility or operational considerations. Workers are aided in decontamination activities by the records that plants are required to keep during operation. Chemical, physical, electrical and ultrasonic processes are used to decontaminate equipment and surfaces. The removed radioactive material is packaged and transported or stored for disposal at a designated low-level radioactive waste management site.

Throughout the decommissioning process, regulatory oversight is provided by the NRC, Occupational Safety and Health Administration, Department of Transportation and U.S. Environmental Protection Agency. State agencies also have played a significant role in the decommissioning of certain sites.

Terminating the NRC License, Releasing the Site

As DECON nears completion, the licensee must submit a license termination plan to the NRC at least two years before the proposed license termination date. The NRC will make the plan available for public comment and schedule a public meeting near the facility to discuss its contents. Most plans envision releasing the site to the public for unrestricted use, meaning any residual radiation would be below NRC's limits of 25 millirem annual exposure.

The licensee's license termination plan must include:

- Site characterization.
- Identification of remaining site dismantlement activities.
- Plans for site remediation.
- Detailed plans for final radiation surveys for release of the site.
- A method for demonstrating compliance with the radiological criteria for license termination
- Updated site-specific estimates of remaining decommissioning costs.
- A supplement to the environmental report that describes any new information or significant environmental changes associated with the owner's proposed termination activities.

The NRC uses its "Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans" (NUREG-1700) to ensure the quality and uniformity of license termination plan reviews. The NRC also will notify and solicit comment from state and local governments in the vicinity of the site.

NRC approval of the license termination plan would be issued in the form of a license amendment, which triggers an opportunity to request an adjudicatory hearing. Once any concerns with the plan are addressed, the NRC will approve the plan.

Finally, if the NRC determines that all work has followed the approved license termination

plan—and if the final radiation survey demonstrates that the facility and site are suitable for release—the agency will terminate the license.

Opportunities for State and Local Engagement
There are multiple opportunities for public involvement and state participation in the decommissioning process, including:

- The licensee's PSDAR report to the NRC is shared with affected states.
- After submittal of the PSDAR report, the NRC holds a public meeting in the vicinity of the facility. Affected states may also submit comments on the PSDAR.
- Licensees must notify the NRC in writing before performing any decommissioning activity inconsistent with PSDAR and copy any affected states.
- Another public meeting is scheduled when the NRC receives the license termination plan. At this time, affected states, local communities and tribes may submit comments on the plan.

In addition, when the NRC holds a meeting with the licensee, members of the public may observe the meeting (except when the discussion involves proprietary, sensitive, safeguards or classified information).

Funding Requirements for Decommissioning
The NRC's decommissioning funding regulations are the product of a decade-long deliberative rulemaking that resulted in a 1988 rule.[3] Since then, the NRC has continued to develop its regulatory framework for decommissioning funding through subsequent rulemakings and the issuance and updating of guidance. As a result, reactor licensees must comply with the robust decommissioning funding framework to assure that adequate funds will be available when needed. Every company that operates a U.S. nuclear energy facility is required to accumulate the funds needed to decommission all portions of its facility that have been contaminated by radioactive material. Specifically, the NRC's regulatory structure provides decommissioning funding assurance through multiple layers of requirements and limitations, including:

- Establishing a minimum certification amount for decommissioning, which is based on technical studies and serves as a standard representing the minimum amount of decommissioning financial assurance that licensees must provide during plant life.
- Requiring adjustment of the minimum certification amount annually to account for inflation over time.
- Limiting funding assurance mechanisms to those considered appropriate by the NRC for assuring that decommissioning funding will be available when needed.

[3] 53 Fed. Reg. 24,018, 24,019-20 (June 27, 1988).

- Limiting the estimated future growth of decommissioning funds over time to a conservative rate of return over inflation, absent allowance of a different rate of return by a rate-setting authority.
- Requiring submittal of a report on the status of decommissioning funds compared to the minimum certification amount on a biennial basis.
- Providing for updating of funding levels, if necessary.
- Requiring a more precise preliminary decommissioning cost estimate at or about five years prior to plant shutdown.
- Requiring a site-specific cost estimate within two years of plant shutdown.
- Requiring an updated site-specific estimate of remaining decommissioning costs at least two years prior to license termination.
- Prohibiting use of decommissioning funds for any purpose other than decommissioning, both during and after plant shutdown.

The NRC's regulatory framework has been proven effective by the fact that every power reactor that has shut down, and has been or is currently being decommissioned, has been able to fund and safely perform required decommissioning activities. This has been the case even in situations in which the licensee did not operate the facility to the end of its license term.

Further, in 2013, the NRC found that commercial reactor operators have adequate funds for decommissioning their facilities and that the agency's formula for determining the minimum amount of required funding assurance yields sound results. NRC staff noted in a report,SECY-13-0105, that as of Dec. 31, 2012, licensees for 100 of the then-104 reactors provided the full amount of decommissioning funding assurance. The remaining four had "provided information to resolve their [decommissioning funding] shortfalls." Another agency paper, SECY-13-0066, said the NRC staff is satisfied with the adequacy of the funding formula used to determine the required level of decommissioning funding.

Conclusion

The nuclear energy industry has proven that it has the technology, resources and expertise to successfully decommission commercial nuclear reactors. The decommissioning process, as overseen by the NRC with input from state and local government, is a proven and appropriate method for ensuring that the decommissioning of nuclear energy facilities is accomplished in a safe, secure and environmentally friendly manner. The process also is flexible, allowing licensees to choose one of three decommissioning options—overseen by the regulator—over a 60-year period. The decommissioning process provides ample opportunities for interaction from states, local communities and tribes—allowing the public to attend meetings, provide comments and have access to plant-specific decommissioning information. Finally, the NRC ensures that adequate funds for decommissioning will be available when needed through a system that requires licensees to amass funds needed to decommission their facilities.

Decommissioning nuclear energy facilities—with independent oversight by the NRC and timely interaction with and state and local authorities—has been effectively managed and funded in a safe and environmentally sound manner under existing regulations.

Senator BOXER. Thank you for all of your statements.

Mr. Mosier, am I right on this? At San Onofre, the spent nuclear fuel pools were designed to hold a total of 1,600 spent fuel assemblies but currently they hold more than 2,600? You mentioned that. I just want to make sure that gets noticed.

Mr. MOSIER. Yes, that is correct. That number, 2,600, was as of 2010. Since the shutdown, the fuel rods have been moved so I don't have the current count. It is higher than 2,600.

Senator BOXER. So it is at least 2,600. It was designed to hold 1,600.

Mr. Weber, as the person overseeing the safety of this decommissioning, does this disturb you?

Mr. WEBER. NRC's focus is on safety and security.

Senator BOXER. But does this disturb you, the fact that the fuel pools were designed to hold 1,600 spent fuels assemblies but there are more than 2,600 in there? Does that concern the NRC? Yes or no.

Mr. WEBER. Yes. We ensure the safety of that spent nuclear fuel.

Senator BOXER. Yes, that concerns you. If it concerns you, then why aren't you moving now to ensure that most of the fuel in the pools, which is not high burn up fuel, should be moved to dry cask as soon as possible? Have you gotten involved in that or have you said to the company, you are exempted, just do what you want?

Mr. WEBER. We have evaluated the safety of spent nuclear fuel since the beginning of NRC's regulatory history in overseeing these facilities. About every 10 years, we have done a——

Senator BOXER. I am asking you about this specific plant where 8 million people live within 50 miles. When I asked the sheriff there, she looked at me and said, if there is an accident, they have to go on the freeway. You can't move on the freeway most of the day. That is not an answer.

I am not asking you globally. I appreciate that you want to do the right thing. I am asking specifically about my people who are near a facility that has 2,600 plus spent fuel rods there instead of the 1,600 the plant was designed to have and why you are not moving to make sure the fuel that is not the high burn up fuel is moved to dry cask as soon as possible at least to get it to the point that it was designed to be, leaving 1,600 in there?

Mr. WEBER. Because the fuel is safely stored today.

Senator BOXER. Even though the facility wasn't designed—do you agree with that, Mr. Mosier?

Mr. MOSIER. No, I don't. The NRC did issue a report on the near criticality reaction because of the failure of the boron plates, born absorbs the neutrons and all the high burn up fuel. This failure was a near disaster. We don't know how often this is going to happen but the more fuel rods you put in the pool, the more boron you have to add—it is a technical problem that can't be solved with the existing pools.

Senator BOXER. Because it wasn't designed to hold these many, is that correct?

Mr. MOSIER. That is correct.

Senator BOXER. That is kind of a simple point. Answering me with some global answer doesn't do it for me. That, in itself, raises alarm bells.

In 2001, NRC studies the risk of spent fuel accidents. The study found that the possibility of a fire leading to a large radioactive release can never be ruled out. This is NRC. Even years after a reactor shuts down, it found that large earthquakes are the most likely causes of spent fuel pool accident. We know we are right near an earthquake fault there.

It also found that the health consequences of a spent fuel accident could be as bad as the consequences of a severe accident at an operating reactor. My staff has confirmed with NRC staff that no more recent data or analysis has altered these conclusions. Mr. Weber, is that correct? Do you still stand by that finding?

Mr. WEBER. We stand by the findings in new reg. 1738, which is the document you are referring to.

Senator BOXER. I am just asking you, you stand by that finding.

Mr. WEBER. Yes.

Senator BOXER. Then it confuses me. Mr. Fertel, does Nuclear Energy agree with NRC's analysis that a spent fuel accident could be as bad as the consequences of a severe accident at an operating reactor?

Mr. FERTEL. Under certain circumstances that they assume in the new reg, yes, you can get that answer, but under the regulations and the actions that they require you to take to plant and particularly things being done post-Fukushima, Madam Chairman. There are significant additional safeguards to prevent that from happening at any of the plants.

Senator BOXER. That is the question. Mr. Mosier, I don't see that happening at San Onofre where they are not saying move to dry cask. They are essentially saying to the company, don't worry about it.

Mr. MOSIER. That is my impression. I have gone to meetings the NRC has held talking about decommissioning plans. Frankly, those were the most non-productive meetings I have ever attended in my life since we had hours of testimony about what the regulations are and none about enforcement and what they were going to do at San Onofre.

Senator BOXER. That is my worry.

Senator Vitter or Mr. Inhofe, I don't know which one of you wants to go first. It is your call.

Senator VITTER. I will go first.

Thank you, witnesses, for being here.

I think it is important since these three bills were just filed to focus on the ideas behind these three bills. They focus on emergency exemptions, State involvement and expedited transfer.

First, on the so-called emergency exemptions, I think some of this is semantics. There is an attack that a company would get exemptions from regulations but as I understand it, the reason for exemptions is these are requirements that mainly apply to operating nuclear plants. When you turn from an operating nuclear plant to a non-operating plant, a plant that is being decommissioned, that is a very different animal, I assume.

I am not an expert or an engineer but I assume there are big differences between one and the other. Is that correct, Mr. Weber?

Mr. WEBER. You are correct, Senator Vitter. The regulations exemptions are sought from are really applicable to operating nuclear

power plants. When the plant converts to a decommissioning status, the risk posed by that operation, the security needs, the requirements for emergency preparedness are reduced compared to what they would be at an operating status.

Senator VITTER. The exemptions we are talking about are specifically because we are moving from an operating plant to a non-operating plant, is that fair to say?

Mr. WEBER. You are correct. We would not approve those exemptions unless we had confidence in the safety and the security of those plants.

Senator VITTER. I think some of this is semantics. You could go about it a different way. You could have a different set of requirements, a different rulebook for a non-operating plant. Then you could say there are no exemptions. If you don't like the word exemptions, let's do that but some of this is semantics because there are exemptions from rules that are directly applicable or more applicable to an operating plant, is that correct?

Mr. WEBER. That is correct. If I could add, back in the 1990's when we faced the last wave of decommissioning, we actually considered the need for rulemaking and have proposed that to our commission but the events of 9/11 overtook those activities and we focused on the more pressing problems of the day and that was the security of the United States.

Senator VITTER. In terms of SONGS in particular, obviously the NRC has looked at this issue of the location of the fuel. I know because of our oversight responsibility, the experts housed at the NRC, so I assume they were involved in looking at this, Mr. Weber?

Mr. WEBER. Absolutely.

Senator VITTER. Mr. Mosier, compared to that, you are offering your personal opinion about lack of safety. What is your background in terms of the nuclear energy industry and how these things work? What is your specific technical background?

Mr. MOSIER. I would just like to say that the key issue we are addressing here is whether the safety risk for the public is diminished when the reactor stops and you are just storing spent fuel. The NRC itself has said that risk is not diminished, so I am quoting NRC documents.

I am a scientist as well as a council member. I know a lot about radiation biology. I am not a physicist but I can read the documents and I have.

Senator VITTER. What is your specific science background?

Mr. MOSIER. I am trained as a pathologist. I work in radiation models. I am currently working on the AIDS virus so that is a different expertise.

Senator VITTER. In your testimony, I think you said there wasn't a clear answer about taking these fuel rods and encasing them immediately. What would you suggest immediately versus their storage at the site right now? What would you suggest be done tomorrow as the alternative?

Mr. MOSIER. The faster we can get these rods into dry cask storage the better. There are some old rods that are not high burn up fuel that could be moved immediately. That would help. The new high burn-up fuel rods may have to stay in the pool for a consider-

able period. Any move to decrease the crowding of the spent fuel pool would be a positive for the safety of the people in southern California.

Senator VITTER. Mr. Fertel, as I understand, this expedited transfer issue, which is a specific focus of one of these bills that has been introduced, has been looked at extensively by the NRC. As I understand it, they recommended it be considered a Tier 3 issue, a low priority issue, and more recently recommended that the commission not put time and resources into pursuing this because of lack of significant safety gains. Is that correct?

Mr. FERTEL. That is absolutely correct. They issued their study just a few months ago. They are waiting on a commission decision. That is absolutely correct.

Senator VITTER. That came out of the expertise presumably of the NRC?

Mr. FERTEL. Yes. It was done by the NRC staff and was recommended to the commission. It was looking at was there a safety benefit to rapid removal of the spent fuel into dry cask storage or leaving it in a pool. Their conclusion was there was not enough of a safety benefit to do it.

Senator BOXER. Thank you. We will turn to Senator Sanders.

Senator SANDERS. Thank you, Madam Chair.

Under SAFSTOR, one of the proposals to decommission nuclear power plants, spent fuel rods could remain in pools at the plant for 50 or more years. Mr. Recchia, how do you think the people of southern Vermont would feel knowing that spent nuclear fuel rods would remain onsite in the pool for up to 50 years? How would they feel about that?

Mr. RECCHIA. That is probably the most critical point of Vermonters' belief that fuel needs to be moved into dry cask, ideally taken away and offsite but understanding that a passive system that relies on the fuel just being there in casks is less risky than being in the pools.

I would like to comment on the idea that the NRC has said this is equally safe. They have not. They have said there is a risk to fuel staying in the pool. Ironically, they have relied on the emergency protection zones as one reason why that is OK, to leave the fuel in the pool and yet another part of NRC is suggesting that those emergency protection zones be eliminated after closure.

Senator SANDERS. I think the point here is that I think a lot of people in Vermont felt pretty good when we learned that the nuclear power plant was going to be shut down. Now we are hearing it is going to be shut down but not quite, that we could live with nuclear fuel rods in a pool for the next 50 years and that is a concern.

I want to go to another issue. There have been claims that local communities and States already have plenty of opportunity to influence the outcome of the decommissioning process. In your judgment, is that true? Right now, do you think the State of Vermont or the State of California really has a seat at the table to really express the point of view of its citizens regarding the decommissioning process?

Mr. RECCHIA. Absolutely not. We have an ability to comment but there is no response requirement, there is no role that those com-

ments have in evaluating how the plant moves forward with decontamination and dismantlement.

Senator SANDERS. In other words, despite the ability to comment, a decommissioning process could be approved by the NRC, which many Vermonters would say this is not a good idea?

Mr. RECCHIA. I wish it actually had to be approved by the NRC, but they don't even have to do that. They simply have to receive the report.

Senator SANDERS. From the company?

Mr. RECCHIA. Right.

Senator SANDERS. Let me go to another question. This is for Mr. Weber. Thanks so much for being here.

When the NRC commissioners participated in an oversight hearing several months ago, all five agreed that local communities have a legitimate interest in decommissioning plants. I think everyone would agree with that.

What you are hearing from Mr. Recchia and other panelists is that right now States really do not have much input. They can talk but it doesn't really matter at the end of the day. Do you have any ideas about how we can strengthen the role of local and State governments and communities in the process?

Mr. WEBER. I had an opportunity to participate in a rulemaking back in the 1990's when we specifically considered this. We called it the enhancement participatory rulemaking. We considered giving greater weight to the input from States as well as other local stakeholders. Ultimately the commission found that it lacked the safety basis to justify those requirements. Those requirements were then issued in 1997.

Having said that, we do work closely with the States. In fact, just last week, we had a webinar involving State representatives from around the Country.

Senator SANDERS. I am sorry, but I have limited time. I appreciate that. You work closely with the States but at the end of the day, it really doesn't matter what the States' views are. The plan that can finally be developed and go into impact can be something the States don't want and they really have nothing to say about it. They can talk about it but they have no real seat at the table.

Mr. Recchia, the legislation that I am offering—there are three good pieces of legislation addressing this issue in a broad way—would require licensees to consult with the host State and State and local governments within 50 miles of the plant when drafting a proposed decommissioning plan. This consultation would help ensure that State and local concerns are identified and considered.

The Act would also require the NRC to solicit public input on the proposed decommissioning before the document is finalized and approved. The Act would require the NRC to evaluate and formally adopt or reject a proposed decommissioning plan, which is not required now under current law, thereby improving accountability and transparency. Does that make sense to you?

Mr. RECCHIA. It makes a lot of sense. It simply makes the NRC behave the way most regulatory agencies have to behave on review and response to a significant document. It is a good step in that direction. The Administrative Procedures Act calls for it in every other instance.

Senator SANDERS. Thank you all.

Senator BOXER. Thank you, Senator.

Senator Inhofe.

Senator INHOFE. Thank you, Madam Chairman.

Mr. Weber, I understand that the NRC staff found that the fuel rod assemblies stored in pools remained in tact at Fukushima, is that correct?

Mr. WEBER. That is correct.

Senator INHOFE. I further understand that the NRC staff found the risk of having a spent fuel pool of fire and offset offsite dose consequences are extremely remote. I think in my opening statement I used 1 out of 10,000,000 years once a plant ceases operations and the last fuel is removed from the reactor and has cooled for a relatively short period of time.

Would a relatively short period of time be 6 months?

Mr. WEBER. It could be several months.

Senator INHOFE. I had another question but I think it was adequately asked by Senator Vitter.

Mr. Fertel, you know better than most the tough time that has been going on for the nuclear industry for the past couple years. It is my understanding that the NRC has some 50 orders and regulations being developed right now.

In my opening statement, I might have been a little unkind to part of the bureaucracy but it has been my experience in the past that the less the workload, the greater the bureaucracy, the more time they have to regulate.

While the cost of each individual regulation may not be massive, together with the cumulative cost, it is crippling. Added to that, things like the EPA's 316(b) rule, the water rule, could add another $100 billion to your industry's regulatory compliance.

Will you comment on the cumulative cost of Federal regulations and how they could impact the U.S. electricity affordability and reliability?

Mr. FERTEL. We are actually working with the NRC and others on trying to make sure that the cumulative impact not only doesn't affect us from a cost standpoint but of equal importance, it doesn't distract us from our focus on safety.

When we have too many things coming at us and they have too many things they are looking at, we are probably not as focused on safety things as we should be. We believe right now that what the NRC needs to do—and we are culpable on our side too on some distraction—is to really look across the board as opposed to within each silo and make sure that from a safety standpoint what we are being asked to do truly has benefit for safety and is worth the cost to do.

There are a number of things that probably don't fall into that.

Senator INHOFE. I admit I have been a bit paranoid about the over regulation that we have right now coming out of the Environmental Protection Agency, not just cap and trade but various emission standards where there is no technology to bring that and the cumulative costs. In fact, we have legislation to articulate that cumulative cost.

One thing that hasn't been talked about by any of the witnesses or any of the questions is the issue of reliability and dependability.

We have a lot of sources and I think it is important that you address this because it is my understanding if you look at what can happen to a source of energy in this country, the most reliable would be nuclear.

The least reliable would be some of the renewables like wind. You could develop a level of dependency. All of a sudden the wind stops, what do you do? I would like to have you address the significance of the reliability and dependability issue that we should be dealing with now.

Mr. FERTEL. Probably the easiest way to talk about that is to think back to the polar vortex that we had this past winter. We had a real problem in getting electricity and gas, particularly to New England because of infrastructure issues and because of a shortage.

Nuclear plants really have fuel onsite all the time because it is in the core. We don't emit any emissions of any greenhouse gases or any other criteria pollutants for that matter. Senator Sanders mentioned the good local economic impacts that a nuclear plant has. We also provide stability to the grid from the standpoint of voltage stability.

From a reliability standpoint, we see nuclear plants as a backbone of our electricity infrastructure. Right now, in a number of markets, that is not at all recognized. We are hoping that more and more it will get recognized.

Senator INHOFE. My time has expired, but I want to make sure we are focused on this because we have heard a lot of predictions about what could happen this summer and following summers if we were to have blackouts or brownouts in this country. That would be pretty disastrous. Are you familiar with some of the statements that have been made?

Mr. FERTEL. Yes, I am. They are coming from people that actually look at that very hard not only the industry side but also the policy side. It is because we are shutting down a lot of coal plants because of the EPA regulations. We have a number of nuclear plants in jeopardy because of policies making them uneconomic, even though they are actually very economic plants.

Again, if you shut down coal and nuclear plants, you really are shutting down the backbone of our electricity system.

Senator INHOFE. I think that really needs to be talked about before the disaster occurs.

Thank you, Madam Chairman.

Senator BOXER. Thank you so much.

Senator Markey.

Senator MARKEY. Thank you, Madam Chair.

It used to be that people thought nuclear energy would be too cheap to matter but now with cheap gas and wind, nuclear energy is actually too expensive to matter. The Excelon funded group Nuclear Matters is trying to convince us that nuclear energy is necessary to fight climate change, yet Excelon and other nuclear utilities are actively lobbying against policies that encourage the development of wind and solar energy.

At the time, four nuclear reactors shut down last year and Vermont Yankee announced it will soon join them. A wide range

of analysts believe more retirements are coming. At this rate, nuclear soon may not matter at all.

Meanwhile, waste continues to pile up at reactor sites all across the country. Most of the waste is stored in large pools of water that were built more than 30 years ago and not designed to hold anywhere near what they have now.

Pilgrim's nuclear power plant, for example, was designed to hold 880 spent fuel assemblies and currently holds over 3,200. If an accident or terrorist attack were to occur, it could lead to radiation releases far greater than at Chernobyl or Fukushima.

That is why I recently introduced the Dry Cask Storage Act which gives plants 7 years to remove all the waste that can be removed from the pool and put it into safer dry cask storage, and provides funding to help offset the cost, and increases the size of emergency planning zones around plants that choose not to remove the waste from their pools.

Mr. Recchia, I understand that Entergy has said it would be able to remove all the spent fuel from the pools at Vermont Yankee within 7 years. Do you perceive any obstacles to meeting that deadline?

Mr. RECCHIA. Thanks for introducing the bill that you did.

The only obstacle that I see is a financial one. At this point, Entergy has agreed that it is in their financial interest and Vermonters' interest to move that fuel out of the spent fuel pool quickly. The problem is that the United States, having taken responsibility for that fuel, the Department of Energy needs to quickly reimburse the expenses of that work. That has not happened regularly.

Senator MARKEY. Given the fact that NRC studies show that the consequences of a spent fuel fire can be as severe as the consequences of an accident at an operating reactor, do you think removing the fuel from the pool more quickly will increase safety?

Mr. RECCHIA. Yes, I do, absolutely.

Senator MARKEY. Mr. Fettus, do you agree that storing fuel in dry casks is a safer option and can be done within 7 years?

Mr. FETTUS. It is a substantially safer option and yes.

Senator MARKEY. Mr. Weber, is it true that without continuous cooling of the pools, the spent fuel has the potential to catch fire?

Mr. WEBER. You are correct.

Senator MARKEY. Is it true that removing spent fuel from pools reduces the amount of radioactivity that could be released if a spent fuel fire were to occur?

Mr. WEBER. Yes.

Senator MARKEY. Mr. Fettus, nuclear energy has long made up about 20 percent of U.S. electricity supply. Last year, it dropped to 19 percent. The Energy Information Administration anticipates nuclear's share of the generation portfolio will continue declining so that a decade from now less than 17 percent of U.S. electricity will come from nuclear.

The reason is that plants are closing faster than new ones are opening. Last year, six reactors announced plans to permanently shut down and last week, Chairman Macfarlane testified that the number of nuclear license applications has been reduced from 18 to 8 in the past few years.

Wall Street walked away from financing nuclear power plants decades ago but now wind and cheap natural gas are undermining the economics of existing nuclear plants as well.

Absent legislation such as the Waxman-Markey bill, which the EIA found would lead to the construction of 69 new nuclear reactors by 2030, do you agree with EIA that nuclear's share of the electricity market will continue to decline?

Mr. FETTUS. Yes.

Senator MARKEY. We need the private sector onboard to build out a low carbon energy system. The government can't finance it on its own. Fortunately, billions of private sector dollars are flowing into wind, natural gas, solar and energy efficiency. That is just not happening with nuclear.

The only entities willing to finance nuclear plants are governments. Mr. Fettus, why is the private sector not interested in financing new nuclear power plants?

Mr. FETTUS. Senator, I think you would have to ask the private sector. From NRDC's perspective, one, nuclear power is not going away. It is going to exist for some time forward. Therefore, we need to safely regulate it.

We also, like you just summarized, agree with EIA that there is very likely a declining curve. It is our perspective that renewables and efficiency provide a huge potential gain for major climate benefits much more cheaply and safely than new plants and keeping old plants running that shouldn't be running.

Senator BOXER. I am so sorry to cut you off but we really need to turn to Senator Sessions. The vote just started.

Senator SESSIONS. Thank you, Madam Chair.

Mr. Fertel, investors that build a nuclear plant and invest in that operate under the assumption that they have to meet the decommissioning requirements of the NRC. Would it be a detriment to any construction of a multibillion dollar nuclear plant if they had to guarantee or acquiesce to any decommissioning regulations that would be imposed by local municipalities or a State regulatory board?

Mr. FERTEL. We always would like the input from local folks, but again, the reason the Atomic Energy Act is the way it is was to make sure the Federal Government, through NRC, regulated this. Adding more uncertainty would make it much more difficult for us to build new plants.

Senator SESSIONS. Mr. Weber, what is your policy with regard to listening to Mr. Mosier and others who express concern? Do you react to that? Do you evaluate their concerns and if they are valid, will the NRC act on them? Is that your understanding of your duty?

Mr. WEBER. Yes, absolutely. We listen, we welcome and we consider the comments provided and they often influence how we review the decommissioning projects.

Senator SESSIONS. Mr. Fertel, with regard to the cost of nuclear power, are you aware of any production of electricity that has a cost impact or CO2 impact more favorable than nuclear power?

Mr. FERTEL. No, sir. Nuclear power has the most favorable impact on reducing emissions of any kind, including greenhouse gas

emissions. It is 62 percent of our greenhouse emission free electricity system today.

Senator SESSIONS. Mr. Weber, it seems to me that NRC has taken the safety issue seriously. My understanding is that since the entire commencement of nuclear power in the United States, we have never had an individual killed or even one made sick from excessive exposure to nuclear radiation. You have a pretty good safety record, wouldn't you say?

Mr. WEBER. Yes.

Senator SESSIONS. Mr. Fertel, do you agree with that? Do you have any comment on that?

Mr. FERTEL. I certainly do agree with that.

Senator SESSIONS. We just saw in the paper today hundreds of people in a coal mine in Turkey losing their lives. Natural gas is competitive price-wise. I guess you would agree, but it certainly emits CO2 and pipelines and other transportation and drilling projects create more risk than has been established with nuclear power, has it not?

Mr. FERTEL. Certainly true.

Senator SESSIONS. Are you concerned, Mr. Fertel, about a continuing series of actions by this government, including not taking the waste in the community or adding such burdens to the future of the industry that could be in jeopardy and that we could be missing an opportunity for continued baseload, low cost, environmentally friendly power that we will regret in the years to come?

Mr. FERTEL. I think there is clearly that threat to our existing plants. If we continue to lose existing plants, it would be very hard to see decisions to build new plants.

Senator SESSIONS. Madam Chairman, I thank you for that opportunity. I would note that the NRC staff issued a report in November of last year finding "The expedited transfer of spent fuel to try cask storage would provide only a minor or limited safety benefit and its expected implementation cost would not be warranted."

Mr. Weber dealt with some of the questions we are dealing with. The title of the report was Consequence Study of a Beyond Design Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor. A study was explicitly done on that subject, is that correct?

Mr. WEBER. You are correct, Senator. On top of that, we broadened the conclusions to address the entire United States fleet. That analysis is presently pending before our commission and they are deciding what action should be taken on that.

Senator SESSIONS. If they feel the report calls for additional restrictions or alterations in policy, that would be proposed?

Mr. WEBER. That is correct.

Senator SESSIONS. Thank you.

Senator BOXER. Thank you, Senator.

Mr. Weber, when I asked if you agreed with the NRC finding about the fires, you said you did. I think it is important to note that the NRC paper you agree with says, there is a chance of a fire in spent fuel pools forever.

Understanding that, it is very difficult for me to understand why the NRC has never once rejected a request from the operator of de-

commissioned reactors where they ask to be exempted from all emergency response requirements.

My understanding is the Vermont plant and the San Onofre plant, the NRC is reviewing the request by the operator that they be relieved of all emergency response requirements. When you go back, is it your opinion that they ought to be exempted from those requirements in both Vermont and San Onofre since we have pointed out in both cases there are many more fuel rods sitting there than the plants were designed to hold?

What are you going to say when you go back? Are you going to tell them that you think they ought to be granted this exemption or not?

Mr. WEBER. The staff is currently reviewing those applications and we would not grant them unless we concluded that it was safe to do so.

Senator BOXER. Will you do me a favor? Will you go back and tell them that Senators Boxer, Sanders and Markey are extremely concerned that this isn't just some kind of rote thing. You have never once rejected a request from an operator of decommissioning reactors who has asked to be exempted from emergency responses. It is ridiculous.

Dr. Mosier, Mr. Recchia and Mr. Fettus, do any of you believe the NRC should grant those requests that the operators be exempted from emergency requirements when the NRC admits you could have fires there forever?

Mr. MOSIER. No. I would like to point out that Southern California Edison has already dismissed the security staff at SONGS before they notified NRC. They received a reprimand from NRC after the fact but nothing reversed the action.

Senator BOXER. The NRC said that was wrong but they did nothing to order them back, is that correct?

Mr. MOSIER. That is my understanding.

Senator BOXER. Mr. Recchia?

Mr. RECCHIA. We have 3,800 fuel rods in a pool that was designed for 350. We don't think it is safe to eliminate the emergency protection zones until the fuel is at a minimum in the dry casks.

I should point out that in addition to the individual plant applications for these exemptions, the staff of the NRC has proposed interim guidance to eliminate it entirely across the board as soon as a plant has defueled its reactor. This is a global issue for all plants.

Senator BOXER. I agree.

Mr. FETTUS. I concur with everything that Mr. Recchia just said and I would like to add one other area where it was mentioned there is an opportunity to request a hearing on the license termination.

I speak as one of the few lawyers who had the foolishness to wade into the NRC hearing process. The bars to public or the State entering those hearing processes are so high, it is extraordinary. It is like no other Federal agency.

One, those exemptions should not be granted until the spent fuel is out of the pools. Two, the process provides for no meaningful State or public control.

Senator BOXER. Let me conclude my questioning in this fashion. I look at San Onofre where the plant was designed to hold 1,600

spent fuel rods. There are 2,600 in there. That is dangerous. I am not making it up. Your own Chairman wrote that if there is an accident, it could be worse than Chernobyl. It is outrageous that when they sent home the security teams, all they got was a reprimand, which basically says, file the papers, you didn't file the papers.

I am going to stay on this. I am going to California with—he doesn't know it yet—Mr. Mosier and we are going to demand that the NRC step up to the plate. I am not going to put 8 million people in jeopardy. If the NRC wants to do it, they are not either because we are not going to let them do it. The public opinion is ridiculous.

My friend, Senator Inhofe—with whom I have the best friendship—on these issues, we part ways. He is worried about overregulation of air, water, nuclear safety. I want to be clear, never in all the years I have been in the Senate—that is 20 years, add on 10 in the House, 6 in local government—never has anyone come up to me and said, Barbara, the air is too clean, the water is too clean and the nuclear power plant is just fine. Don't worry about it.

It is the opposite. People want reasonable regulation, not over regulation, not stymie the economy but we know what happens when there is a horrific accident with one of these things. It destroys the industry. It is in the industry's best interest.

I just want to thank Senators Sanders and Markey. They are passionate on this and we are not going away. Could you give that message to your friends at the NRC—our friends at the NRC? Thank you.

Senator Sessions.

Senator SESSIONS. Thank you, Madam Chair.

I appreciate your concerns for your constituents. It becomes a serious and emotional issue but I do believe the NRC has a proven record of success in regulating these matters. We endanger this weak economy driving up the cost of energy, by closing plants that could be productive for a decade or more longer, and blocking the creation of new nuclear plants.

Those are not going to be good for America and not going to add to the environmental improvement of America. In fact, it is going to place us at greater risk. We are not going to be able to replace with renewables any time soon the baseload power we get from nuclear power. It would all be replaced by some other fossil fuel. That is pretty obvious.

To me, nuclear power is environmentally positive, as well as economically feasible.

Mr. Fertel, if we had as much subsidy to nuclear power per kilowatt as wind and solar, would nuclear power be competitive today?

Mr. FERTEL. It probably would be but I think our attitude right now would be we should just remove subsidies and let everybody compete fairly in the markets they are in.

Senator SESSIONS. I would agree. I am not saying you should get that subsidy. I am just raising the point that somebody pays those subsidies. The American people pay them. There is no free lunch here.

Madam Chairman, thank you for raising an important issue. I know you are concerned about it. Your leadership is relentless and I am sure NRC has gotten that message.

Senator BOXER. Good.

Senator Sanders.

Senator SANDERS. I think Senator Boxer and I feel so strongly about this issue we are going to miss a vote.

Mr. Fertel, you just said something and my ears perked up. Let me see if I got you right. You said that we should remove subsidies in terms of energy and I presume let the free market do its thing?

Mr. FERTEL. I am talking in the electricity market.

Senator SANDERS. The electricity market. Will you join me in legislation that I am proposing to end the Price-Anderson legislation—repeal Price-Anderson legislation?

Mr. FERTEL. No, sir, I won't because Price-Anderson isn't a subsidy. Price-Anderson is the best third party liability program in the world.

Senator SANDERS. Mr. Fettus, why isn't the nuclear industry taking advantage of the free market and going to Wall Street for insurance, because I have heard over and over from my conservative friends—maybe Mr. Fertel will talk about—get the government out of energy. Let the free market work.

In terms of nuclear power, how much nuclear power will we have in this country if we let the free market work and we got the government out of the nuclear industry?

Mr. FETTUS. If the government did not back up liability insurance?

Senator SANDERS. Yes.

Mr. FETTUS. If the government did not assume responsibility for liability insurance pasts $12.7 billion, if the government did not assume the responsibility to pick up the waste and if the government did not assume an astonishing array of subsidies that were passed during previous Administrations, like nuclear power 2010 and the loan guarantees with no credit subsidy costs, I don't know how much nuclear power there would be but it has been a government-created process for years.

Senator SANDERS. Is it quite possible the entire industry would collapse without those subsidies?

Mr. FETTUS. I find it hard to imagine the industry expanding.

Senator SANDERS. Here is the point. Most people don't know this. Mr. Fettus, correct me if I am wrong.

If, God forbid, there were ever a Fukushima in this country, it was a real disaster, who picks up most of the liability costs?

Mr. FETTUS. Certainly the taxpayer would.

Senator SANDERS. The taxpayers. I have just heard from Mr. Fertel and my conservative friends they want to get the government out of the energy business. If the taxpayers of this country have to pick up the cost of a disaster, they are very much involved.

Second of all, what impact on the ability of the nuclear industry to borrow is Price-Anderson sitting there? Does that have an impact, do you think, and enable them to get cheaper money than otherwise would be the case?

Mr. FETTUS. Yes.

Senator SANDERS. Mr. Fertel.

Mr. FERTEL. Price-Anderson, as a rule, requires—and Geoff got it right—about $12.7 billion in obligation. Then it says that the Congress will decide if more money is necessary as to whether the industry would pay it or whether someone else would pay it, so it does not default to the taxpayers.

If you look around the world, no one has a third party liability program that has an obligation anything like $13 billion.

Senator SANDERS. Why should the taxpayers have to be the ones?

Mr. FERTEL. The taxpayers don't have any obligation right now—only if you give it to them, Senator.

Senator SANDERS. Mr. Fettus, did you want to respond to that?

Mr. FETTUS. I cannot imagine in the event of—hopefully it will never happen—a dreadful nuclear accident, Congress would not make sure that wherever that accident happened, that all efforts would be taken to support those communities and those people in that environment damaged.

Senator SANDERS. I agree with you.

Mr. Recchia, Entergy, as Senator Boxer mentioned a moment ago, has joined many other nuclear plant operators in requesting an exemption from key safety protection requirements. Correct me if I am wrong. Vermont Yankee was originally proposed to have 350 rods?

Mr. RECCHIA. Yes, that is my understanding.

Senator SANDERS. How many nuclear rods do we have?

Mr. RECCHIA. Over 3,800. I think it is 3,879.

Senator SANDERS. So it is like a tenfold increase. Mr. Weber, are we right on that or is that not the case?

Mr. WEBER. I am sorry, Senator, I don't have the numbers in front of me.

Senator SANDERS. Despite what we think may be a ten times increase in the number of nuclear rods on the premises, Entergy is requesting an exemption from key safety requirements. What is the State's position about an exemption from key safety requirements?

Mr. RECCHIA. The State's position is that until the fuel is moved, at minimum, in to dry cask storage, that emergency protection needs to be kept. There is the potential for offsite emergencies to occur.

I want to emphasize that the real key problem here—and we haven't gotten to the subtleties—that that as merchant facilities, as opposed to a public utility owned facility, there is no money to do that after the plant closes according to Entergy except for the use of the decommissioning trust fund which, by the way, the NRC tends to grant exemptions to go into that fund for various purposes, spent fuel and a variety of things.

It is unconscionable that during the life and operation of the plant that there is no a fund established and funding mechanisms to deal with these issues aside from a decommissioning trust fund which, by the way, the ratepayers of Vermont put every penny into.

Senator BOXER. Thank you so much.

Senator Markey.

Senator MARKEY. I will just speak briefly; there is a roll call going on.

I would just say that right now the nuclear industry's liability is capped in the event of a catastrophic accident. The industry is eli-

gible for billions of dollars in taxpayer loan guarantees for the construction of new nuclear power plants.

Owners of nuclear facilities are allowed favorable tax treatment that permits accelerated depreciation of new reactors and reduced tax rates on nuclear decommissioning trust funds. That is a lot of money that the taxpayers are guaranteeing.

The extent to which all of a sudden with the rise of wind and solar, the nuclear industry becomes concerned that the government might be playing a role in helping to subsidize an energy source while simultaneously the oil and gas industries are receiving $7 billion a year but not a peep is going to be heard from the utility industry on that part, it just shows you that here there is a threat and once you level the playing field and allow the new energy sources to finally compete after 70 years, we are now having that revolution.

The original revolution in nuclear was government subsidized, let's be honest about it. They were given favorable treatment but solar and wind were strangled year after year after year after year. What we have seen in the last 5 years is that 80 percent of all new solar has been deployed. The last 7 years, 80 percent of all wind has been deployed because the tax treatment has been more favorable. State laws are more favorable.

The nuclear industry is frightened, as they should be. Adam Smith is spinning in his grave listening to the nuclear industry protest. Adam Smith is spinning in his grave so quickly that he would qualify for a tax subsidy as a new energy source in protest to the hypocrisy on stilts of the nuclear industry in making those arguments.

All I can say is nuclear get ready to meet your maker in the marketplace. It is coming. It is renewables, it is energy efficiency and unfortunately, as I said earlier, the Waxman-Markey bill had $75 billion worth of funding for new energy technologies which nuclear would have qualified for but that bill died, killed by the coal industry. It turns out one of the collateral victims of this might be the nuclear industry because that was a pathway to the future, putting that cap on carbon.

I thank you all. I thank you, Madam Chairman, for this hearing.

Senator BOXER. Thank you very much, Senator.

Here is the thing. My understanding is that the NRC allowed these three companies—I am focused on Pilgrim, Yankee and San Onofre—to increase the number of fuel rods, am I correct?

Mr. WEBER. You are correct.

Senator BOXER. The NRC said it was perfectly fine for Pilgrim, who was licensed for 800, to have 3,300 spent fuel rods; Yankee to have from 300 to 3,000 and SONGS from approximately 1,600 to 2,600, is that correct?

Mr. WEBER. Again, I don't have the numbers in front of me.

Senator BOXER. Assuming my numbers are right, NRC did approve this change, is that right?

Mr. WEBER. Based on our safety conclusions, yes.

Senator BOXER. Based on your safety conclusions. You very clearly say that a fire in the spent fuel rods would be, according to Allison Macfarlane, more dangerous than Chernobyl and that you

could never say there wouldn't be a fire. That is what the NRC has stated and you have confirmed that is correct.

I think even Mr. Fertel agrees with that finding, although one of your vice presidents said there could never be a fire, so I will ask for that for the record.

My point is, think about this like a normal person, not doing what I do or what you do, a person on the street that says well, the plant was designed for these fuel rods and they allowed them, in many cases, 300 times more than designed for, is that right—ten times more.

Do you think, since we now know you could always have a fire, forever the threat exists, do you think these plants should be exempted from having to have emergency plans for the community? I think the average person would say, you have to be kidding. You still have a grave threat of a fire, a danger, especially when you have an earthquake fault, and yet they have never said no to anyone.

I have to tell you this raises huge concerns to me about who the heck the NRC is and whose side are they on. Are they on the side of the public who they are supposed to protect or are they on the side of industry because industry says, it will cost us money. Yes, think about how much money it will cost you if there is a fire and anything like what happened in Fukushima, but you don't really worry because the taxpayers would bail you out of that. Say what you want, Mr. Fertel, that is what Price-Anderson is.

I believe it is morally unjustified for the NRC to abandon these communities such as the one that City Councilman Mosier represents by telling these companies yes, we allowed you to just over the limit that we thought was safe for the fuel rods, but now just too bad, you don't have anymore requirements for an emergency plan.

I know this is under discussion now but there will be hell to pay if the NRC does what it has done in the past. I need you to take back that message. I am sure you don't agree with me. That is your right. I am sure Mr. Fertel doesn't agree with me. That is fine too.

Guess what? I don't work for the nuclear industry, I work for the people. I have 8 million people within 50 miles of a plant that has been shut down that has more spent fuel rods than it was designed to hold. There is no rhyme or reason other than I am going to save a few dollars for the utility. That is absolutely pennywise and pound foolish because something horrible could happen. I don't even want to think about it.

People say, we have done such a great job so far. They did in Japan too. Senator Sanders said to me, this is an industry where you can't have 99 percent perfect. You have to be pretty close to perfect because of what could happen. Therefore, if you are going to bend, bend toward safety. Don't bend toward the risk.

We have a lot more questions but we are going to be watching what the NRC does, the three of us if not others. We don't expect them to say to these operators, you are off the hook, don't worry about evacuation plans, don't worry about sirens, don't worry about warnings. We expect the NRC to stand up for safety. We expect the chairman who wrote that paper years ago, to stand by what she believes is true, that a fire there could be worse than Chernobyl.

This has been a very important hearing. I just want to say to our panel, I have never seen a panel that truly all of you had the facts and were able to speak to your expertise. It means a lot to us all, Minority and Majority.

This isn't over. We have a few bills now that we are dealing with. My bill is quite simple. We are saying NRC has no right to tell an operator they are off the hook on emergency plans just because a plant is shut down. I am just trying to think of an analogy that is as dangerous as that. It is totally ridiculous.

I guess it is like saying if you have a jail that was being protected as it should be, because one of the dangerous prisoners got out, you just said, OK, we don't need to protect anyone. When a plant shuts down, one risk is definitely gone from that daily operation but you still have this unbelievable risk made worse by the NRC and the operators when they ask to put in more of these spent fuel rods than the plant was safely designed for.

Thank you very much, everybody. We will be back with more of these hearings. We hope you will all stand by to help us as we move forward.

We stand adjourned.

[Whereupon, at 11:46 a.m., the committee was adjourned.]

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