

Comments by Alliance for Nuclear Accountability, Beyond Nuclear, Blue Ridge Environmental Defense League, Center for a Sustainable Coast, Citizens Allied for Safe Energy, Citizens Environmental Alliance, Don't Waste Michigan, Ecology Party of Florida, Friends of the Earth, Georgia Women's Action for New Directions, Hudson River Sloop Clearwater, Missouri Coalition for the Environment, NC WARN, Nevada Nuclear Waste Task Force, New England Coalition, Nuclear Information and Resource Service, Nuclear Watch South, Physicians for Social Responsibility, Public Citizen, Riverkeeper, San Luis Obispo Mothers for Peace, SEED Coalition, Sierra Club Nuclear Free Campaign, and Southern Alliance for Clean Energy on Scope of Waste Confidence Environmental Impact Statement

January 2, 2013

I. INTRODUCTION

Alliance for Nuclear Accountability, Beyond Nuclear, Blue Ridge Environmental Defense League, Center for a Sustainable Coast, Citizens Allied for Safe Energy, Citizens Environmental Alliance, Don't Waste Michigan, Ecology Party of Florida, Friends of the Earth, Georgia Women's Action for New Directions, Hudson River Sloop Clearwater, Missouri Coalition for the Environment, NC WARN, Nevada Nuclear Waste Task Force, New England Coalition, Nuclear Information and Resource Service, Nuclear Watch South, Physicians for Social Responsibility, Public Citizen, Riverkeeper, San Luis Obispo Mothers for Peace, SEED Coalition, Sierra Club Nuclear Free Campaign, and Southern Alliance for Clean Energy ("the Organizations") hereby submit comments in response to the U.S. Nuclear Regulatory Commission's "Request for comments on the notice of intent to prepare and (sic) environmental impact statement and notice of public meetings", 77 Fed. Reg. 65,137 (Oct. 25, 2012) ("Scoping Notice" or "Notice"). All of the Organizations are neighbors of existing or proposed nuclear power plants, and most have either intervened or plan to intervene in NRC proceedings for the licensing or re-licensing of nuclear power plants.

These comments are supported by the technical and factual declarations of Dr. Arjun Makhijani, Dr. Gordon R. Thompson, and Phillip Musegaas, as follows:

- Declaration of Dr. Arjun Makhijani Regarding the Scope of Proposed Waste Confidence Environmental Impact Statement (Jan. 1, 2013) (Attachment 1);
- Declaration of 2 January 2013 by Gordon R. Thompson: Recommendations for the US Nuclear Regulatory Commission's Consideration of Environmental Impacts of Long-Term, Temporary Storage of Spent Nuclear Fuel or Related High-Level Waste (Attachment 2); and
- Declaration of Phillip Musegaas Regarding the Scope of the Proposed Waste Confidence Environmental Impact Statement (Jan. 2, 2013) (Attachment 3).

These declarations are attached and incorporated herein by reference.

II. FACTUAL BACKGROUND

In June 2012, in *State of New York v. NRC*, 681 F.3d 471 (D.C. Cir. 2012), the U.S. Court of Appeals for the D.C. Circuit vacated the Nuclear Regulatory Commission's 2010 Waste Confidence Decision ("WCD") and Temporary Storage Rule ("TSR") (75 Fed. Reg. 81,037 and 75 Fed. Reg. 81,032 (Dec. 23, 2010), respectively) and remanded them to the agency for study of the environmental impacts of storing spent fuel indefinitely if no permanent repository is licensed or if licensing of a repository is substantially delayed. As the Court held, "the Commission's evaluation of the risks of spent nuclear fuel is deficient" because "the Commission did not calculate the environmental effects of failing to secure permanent storage – a possibility that cannot be ignored." 681 F.3d at 473. *See also id.* at 478 ("We hold that the WCD must be vacated as to its revision of Finding 2 because the WCD fails to properly analyze the environmental effects of its permanent disposal conclusion."); and *id.* at 479 ("The Commission apparently has no long-term plan other than hoping for a geologic repository. If the government continues to fail in its quest to establish one, then [spent nuclear fuel] will seemingly be stored on site at nuclear plants on a permanent basis. The Commission can and must assess the potential impacts of such a failure.").

The Court also ordered the NRC to study the "future dangers and key consequences" of spent fuel pool fires and to evaluate the risks of spent fuel pool leakage during sixty years after the expiration of the plant's license. *Id.* at 479. With respect to these risks, the Court concluded that "the Commission's EA and resulting FONSI are not supported by substantial evidence on the record because the Commission failed to properly examine the risk of leaks in a forward-looking fashion and failed to examine the potential consequences of pool fires." *Id.* The Court ordered the NRC to conduct a proper environmental analysis, and "examine both the probability of a given harm occurring and the consequences of that harm if it does occur." *Id.* at 482.

On October 27, 2012, a few months after the Court of Appeals issued its decision in *State of New York*, the NRC issued the Scoping Notice, which provided that the agency intended to prepare an environmental impact statement (the "Waste Confidence EIS") to support its update of the WCD and TSR. The Notice, however, gives very little information regarding the NRC's current thinking about the appropriate scope of the Waste Confidence EIS. According to the Notice, the purpose of the proposed EIS is to respond to the decision in *State of New York*. The Notice also states that the EIS will "form the technical basis for the revision of the Waste Confidence Decision and Rule." 77 Fed. Reg. at 65,138. But contrary to NRC regulation 10 C.F.R. § 51.27(a)(2), the Notice does not identify the "proposed action" that is to be evaluated in the EIS. In a subsequent letter, Chairman Macfarlane asserted that the "proposed action" is the update to the WCD. Waste Confidence Rule. Letter from Allison M. Macfarlane to Diane Curran (Dec. 5, 2012) ("Macfarlane Letter") (ML 12319A309).

The Notice also fails to comply with NRC regulations that require a notice of intent to prepare an EIS to identify "possible alternatives," to the extent sufficient information is available. 10 C.F.R. § 51.27(a)(2). Indeed, the Scoping Notice does not identify a single

alternative, nor does it explain the reason for the omission. Subsequently, in her letter of December 5, 2012, the NRC Chairman stated that the no action alternative is “a decision not to prepare the rule and instead to conduct a site-specific analysis of post-licensed life spent fuel storage for each NRC licensing action that relies on Waste Confidence.” Macfarlane Letter at 1.

The Notice is deficient in other ways as well. For example, it asserts that “[p]ossible” scenarios to be analyzed in the EIS “include temporary spent fuel storage after cessation of reactor operation until a repository is made available in either the middle of the century or at the end of the century, and storage of spent fuel if no repository is made available by the end of the century.” 77 Fed. Reg. at 65,138. But it does not identify the time frame covered by the third scenario, *i.e.*, “storage of spent fuel if no repository is made available by the end of the century.” This should be taken to mean an analysis of the impacts of storage in case no repository ever becomes available. Such an intent for the third scenario was indicated by the NRC Staff in the material presented at the public meeting on November 14, 2012. One of the scenarios was described in the slides as: “Continued storage in the event a repository is *not available*.”¹

The Notice also gives an extremely brief description of the “affected environment,” stating that the affected environment “may include a set of general characteristics and associated ranges to bound the environmental analysis of spent fuel storage throughout the United States.” *Id.* at 65,138. The NRC does not provide any of these characteristics, but merely emphasizes that the focus of the EIS will be “generic.” *Id.*

The Notice then provides a list of nine tasks that it will use the scoping process to accomplish:

- a. Define the proposed action that is to be the subject of the EIS;
- b. Determine the scope of the EIS and identify the significant issues to be analyzed in depth, including potential spent fuel storage scenarios for evaluation, such as availability of a delayed permanent repository towards the end of the century;
- c. Identify and eliminate from detailed study those issues that are peripheral or that are not significant. . . ;
- d. Identify any environmental assessments and other EISs that are being or will be prepared that are related to but are not part of the scope of the EIS being considered;
- e. Identify other environmental review and consultation requirements related to the proposed action;

¹ U.S. Nuclear Regulatory Commission. Office of Nuclear Material Safety and Safeguards. Waste Confidence Directorate. *Scoping Process for the Waste Confidence Environmental Impact Statement*. Washington, DC: NRC, November 14, 2012. On the Web at <http://pbadupws.nrc.gov/docs/ML1231/ML12314A352.pdf>. [Slide presentation], Slide 20, italics in the original

f. Indicate the relationship between the timing of the preparation of the environmental analyses and the Commission's tentative planning and decision-making schedule;

g. Identify any cooperating agencies and, as appropriate, allocate assignments for preparation and schedules for completing the EIS to the NRC and any cooperating agencies;

h. Describe how the EIS will be prepared, including any contractor assistance to be used . . . ; and

i. Obtain public input on potential locations for future public meetings on the draft EIS.

77 Fed. Reg. at 65,138-39. Notably, this task list does not include the identification of alternatives, although NRC regulations list it as one of the objectives of a scoping process. 10 C.F.R. § 51.27(a)(2).

Given these deficiencies, a group of environmental organizations and individuals requested the NRC Commissioners to withdraw the Scoping Notice.² They contended that the NRC had violated the National Environmental Policy Act ("NEPA") and NRC implementing regulations (including, 10 C.F.R. § 51.27(a)) by failing to describe the proposed action or to identify alternatives. Therefore, they argued that the Scoping Notice failed to give the public sufficient information on which to develop comments on the appropriate scope of the EIS proposed by the NRC. The NRC Commissioners rejected the request to withdraw the Notice in the Macfarlane Letter. According to the Macfarlane Letter, the Scoping Notice was not required to comply with 10 C.F.R. § 51.27(a) because the NRC Staff director did not determine that the EIS should be prepared; rather, the Commission exercised its discretion in directing the Staff to prepare the EIS to support an update to the Waste Confidence Rule. Macfarlane Letter at 2. The letter did not provide which regulations, if any, should therefore govern the NRC's Scoping Notice.

The NRC held scoping meetings at NRC headquarters on November 14, 2012 and December 5, 2012, and provided for remote participation through webcasts. In the scoping meetings the NRC Staff presented slides with a schedule for completion of the EIS. Scoping Process for the Waste Confidence Environmental Impact Statement (Nov. 14, 2012)

² Letter from Diane Curran, Geoff Fettus, and Mindy Goldstein to NRC Commissioners (Nov. 8, 2012) (ML12340A149). The organizations and individuals represented in the letter were: Beyond Nuclear, Blue Ridge Environmental Defense League, Center for a Sustainable Coast, Citizens Allied for Safe Energy, the Ecology Party of Florida, Friends of the Coast, Friends of the Earth, Georgia Women's Action for New Directions, Hudson River Sloop Clearwater, Institute for Energy and Environmental Research, Dan Kipnis, Missouri Coalition for the Environment, Natural Resources Defense Council, National Parks Conservation Association, NC Waste Reduction and Awareness Network, Nevada Nuclear Waste Task Force, New England Coalition, Northwest Environmental Advocates, Nuclear Information and Resource Service, Mark Oncavage, Physicians for Social Responsibility, Riverkeeper, the SEED Coalition, San Luis Obispo Mothers for Peace, and Southern Alliance for Clean Energy.

(ML12314A352). The schedule predicts that a draft Waste Confidence EIS will be issued in the fall of 2013, a final Waste Confidence EIS will be issued in August 2014, and the final Waste Confidence Rule will be issued in September 2014. *Id.*, slide 24.

III. COMMENTS

A. Defining the Proposed Action and its Alternatives

1. The proposed action is to update the WCD to permit reactor licensing and re-licensing

The Organizations agree with the NRC that the proposed action is the update of the WCD. 77 Fed. Reg. at 65,138; Macfarlane Letter at 1. But updating the WCD is not the entirety of the action. In addition, the action is a safety determination that permits the licensing and re-licensing of reactors. As stated in the Scoping Notice, “Waste Confidence, though applicable only to the period after the licensed life of a reactor, is part of the basis for agency licensing decisions on new reactor licensing, reactor license renewal, and independent spent fuel storage installation licensing.” 77 Fed. Reg. at 65,138. *See also State of New York*, 681 F.3d at 476 (the WCD is a part of every reactor licensing decision, and may not be treated as “separate from the individual licensing decisions it enables.”)

The WCD constitutes the aspect of reactor licensing decisions that involves predictive determinations of whether there is reasonable assurance that spent reactor fuel can be safely stored and disposed of. These findings are necessary under the Atomic Energy Act (“AEA”) before reactors may be licensed. *Denial of Petition for Rulemaking (Natural Resources Defense Council)*, 42 Fed. Reg. 34,391 (July 5, 1977), *aff’d*, *Natural Resources Defense Council v. NRC*, 582 F.2d 166, 169 (2d Cir. 1978). If the Commission lacks sufficient information to make these reasonable assurance findings, it may not issue new reactor licenses or re-license operating reactors. *Id.* *See also* 42 U.S.C. § 2133 (forbidding issuance of a reactor license if, in the opinion of the Commission, it would be “inimical to the public health and safety”).

As discussed in more detail below, the no action alternative to this proposed action would simply preserve the status quo, in which all reactor licensing and re-licensing decisions have been suspended pending the updating of the WCD. *Calvert Cliffs Nuclear Project, L.L.C.* (Calvert Cliffs Nuclear Power Plant, Unit 3), et al., CLI-12-16 , __ NRC __ (slip op.) (Aug. 7, 2012). Under the AEA, licensing and re-licensing could not resume unless and until the NRC had issued an adequately supported WCD.

2. The no-action alternative is not to issue a WCD and not to license or re-license reactors.

As the courts have long recognized, “the requirement for a thorough study and a detailed description of alternatives” is the “linchpin” of an EIS. *Monroe County Conservation Council, Inc. v. Volpe*, 472 F.2d 693, 697-8 (2d Cir. 1972) (internal citations omitted). This emphatic characterization of the importance of alternatives in an EIS is rooted in the Council of Environmental Quality regulations, which describe the alternatives requirement as the “heart” of

the environmental impact statement. 40 C.F.R. § 1502.14; *see also* 10 C.F.R. Part 51, Subpt. A, App. A (5). NEPA thus requires the NRC to include in its Waste Confidence EIS a thorough and detailed review of alternatives to issuance of a generic WCD, including the alternative of not issuing the decision at all (the “no-action alternative”). *See* 40 C.F.R. § 1502.14(d) and 10 C.F.R. Part 51, Subpt. A, App. A (4).

In her December 5, 2012 letter, Chairman Macfarlane asserts that the “no action alternative is a decision not to prepare the rule and instead to conduct a site-specific analysis of post-licensed life spent fuel storage for each NRC licensing action that relies on Waste Confidence.” *Id.* at 1. The Macfarlane Letter suggests that the only reason the NRC might be unable to issue an updated WCD is that it raises too many site-specific issues.

The Organizations agree that conducting a site-specific analysis is necessary with respect to some aspects of the environmental impacts of spent fuel storage. *See* discussion below in Section C; *see also, e.g.*, Makhijani Declaration at Section 9 and Musegaas Declaration at 4(d). Many of the important environmental issues related to long-term spent fuel storage, such as degradation of spent fuel during prolonged storage, are generic, however. Therefore it is not the principal reason that the NRC is unlikely to be able to issue an updated WCD in the proposed timeframe.

The single greatest reason that the NRC will not be able to complete a scientifically valid EIS and therefore issue an updated WCD based on a sound environmental impact analysis is that it has not given itself enough time to conduct the necessary research and analyses to support reasonable assurance findings with respect to the safety of long-term spent fuel storage. As discussed above, the Commission expects to issue a draft Waste Confidence EIS in the fall of 2013. That is only enough time, however, to summarize currently available information about the risks of long-term spent fuel storage. But the existing information is grossly inadequate to support any reasonable predictive findings about the safety of such long-term spent fuel storage. There is no existing environmental or other study that has even attempted to predict the environmental impacts of storing spent fuel on site for hundreds of years, or perhaps indefinitely. Indeed, all other studies have been premised on the opposite conclusion – that a repository will be available in the relative near future. We are aware of only one study that even commenced the work of evaluating such matters: the “Long-Term Waste Confidence Update Project,” in which the NRC proposes to assess the environmental impacts of storing spent fuel for 200 years after cessation of licensing. *See* the WCD, 75 Fed. Reg. at 81,040.³ But as the Commission is well aware, work on the Long-Term Waste Confidence Update Project had only just begun at the time of the D.C. Circuit’s decision, and it is far from complete.

The NRC Staff estimates that the Long-Term Waste Confidence Update Project EIS will take until 2019 to finish. COMSECY-12-0016, Memorandum from R.W. Borchardt to NRC Commissioners re: Approach for Addressing Policy Issues Resulting from Court Decision to Vacate Waste Confidence Decision and Rule at 3 (July 9, 2012) (“COMSECY-12-0016”). Two preliminary studies issued as part of the Project support the Staff’s seven-year time estimate by

³ As the Court observed in *State of New York*, that rulemaking may address “some or all of the problems” that it remanded to the agency. 681 F.3d at 483.

demonstrating (a) the complexity of the issues raised by long-term and indefinite spent fuel storage and (b) the Commission's lack of knowledge on the subject. The first study, issued for comment in December 2011, sets forth a series of topics that must be addressed in the Long-Term Waste Confidence Update Project EIS, including the degree to which nuclear power will be used in the future, the nature of future dry cask storage and transportation technology, prospects for long-term maintenance of institutional and regulatory control, and accidents to be considered. Draft Report for Comment: Background and Preliminary Assumptions for an Environmental Impact Statement – Long-Term Waste Confidence Update (Dec. 2011) (the “Preliminary Assumptions Document”). While the NRC proposed, as a preliminary matter, to make assumptions about many of these topics, comments show that they may not be assumed and instead should be the *subject* of the EIS for the Long-Term Waste Confidence Update Project. See comments by Institute for Energy and Environmental Research, Blue Ridge Environmental Defense League, Natural Resources Defense Council, Riverkeeper, and Southern Alliance for Clean Energy on NRC Report Updating Preliminary Assumptions for an EIS on Long-Term Spent Fuel Storage Impacts (Feb. 17, 2012) (copy attached as Attachment 4).

The second study, issued for comment in May 2012, identifies an array of technical issues regarding dry storage and transportation impacts on which the NRC must collect additional data before it can evaluate dry cask long-term integrity and cask vulnerability to degradation and accidents. Draft Report for Comment: Identification and Prioritization of the Technical Information Needs Affecting Potential Regulation of Extended Storage and Transportation of Spent Nuclear Fuel (May 2012) (“Technical Needs Document”).

Therefore, and as discussed in Sections 4 and 5, of Dr. Makhijani's Declaration, the NRC has years of research to do in order to gather sufficient data regarding spent fuel degradation and transportation and handling risks. It will take a long time, potentially well over a decade, to collect the data needed to make scientifically valid impact analyses for high burnup fuel stored for long periods. Necessary research tasks include development of a sound database for a scientifically valid evaluation of the environmental impacts of prolonged storage of spent fuel, including high burnup spent fuel up to 62.5 GWd/MTU and MOX spent fuel. In addition, there are essentially no data available for high burnup spent fuel that has been stored in dry casks for extended periods of time. See Makhijani Declaration, Sections 4 and 10. As discussed in Dr. Makhijani's declaration, the significant dearth of information set forth above will take years to surmount.⁴

⁴ Perhaps because the NRC Staff was aware of the need to gather the required information quickly, in COMSECY-12-0016 it considered whether the Long-Term Waste Confidence Update Project could be modified and shortened for purposes of the remanded proceeding, but concluded that the time frame could be reduced only by two years – thus estimating *five* years rather than seven. *Id.* at 6. Nowhere in COMSECY-12-0016 does the Staff come close to suggesting that the Waste Confidence EIS and rulemaking can be completed within just two years. In fact, the Staff's suggestions at how the study might be abbreviated are troubling. The Staff proposes to shorten the study by making “assumptions” about environmental impacts in the far future rather than to study them. *Id.* But to assume the very results that an EIS is intended to determine – the likelihood of future events and their effects upon the environment – defeats the very purpose of the EIS. The types of assumptions suggested by the Staff at page 5 of COMSECY-12-0016 –

Moreover, there are other areas where the NRC Staff is undertaking data collection and analyses that are necessary to prepare an adequate Waste Confidence EIS in response to the Court's decision in *State of New York*, and that are unlikely to be finished within a two-year time frame. For example, the NRC's receipt of post-Fukushima seismic geologic data and analyses regarding seismic risks to nuclear reactor and spent fuel storage sites is crucially important to a host of issues that must be addressed in the Waste Confidence EIS. Under the schedule established by the NRC Staff in a March 2012 Request for Information, reactor licensees are not due to supply this information until September 2013 for reactor sites in the eastern and central U.S. and March 2015 for western reactor sites. Request for Information Pursuant to title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident (Mar. 12, 2012). While it is possible that those September 2013 and March 2015 timelines could be shortened, that is a matter for the NRC Staff and the Commission to address. Given the significant role played by seismic events in accidents ranging from spent fuel pool leaks to pool fires and their potential effects on long-term storage sites, this information is crucial to the NRC's ability to take a "hard look" at all three topics remanded by the Court. 681 F.3d at 480. With respect to the environmental impacts of pool fires, the Waste Confidence EIS should also take into account the lessons that have been learned from the Fukushima accident regarding the potential for and consequences of spent fuel pool fires, which the NRC is still evaluating.

While NEPA may allow for agencies to reach decisions based on incomplete or unavailable information in certain circumstances (*see, e.g.* 40 § C.F.R. § 1502.22), the Atomic Energy Act (the "AEA") does not. Indeed, as the Court of Appeals explained in *Natural Resources Defense Council*, reactor licensing can proceed only "so long as the Commission can be *reasonably confident* that permanent disposal (as distinguished from continued storage under surveillance) can be accomplished safely when it is like to become necessary." 582 F.2d at 169 (emphasis added). *See also* 42 U.S.C. § 2133 (forbidding issuance of a reactor license if, in the opinion of the Commission, it would be "inimical to the public health and safety"). Thus, if the NRC lacks sufficient technical information to support the WCD's findings of reasonable assurance regarding the safety of long-term spent fuel storage, then the AEA gives the NRC no choice but to suspend all licensing and re-licensing actions.

Given that the Commission has allowed only about one year for an effort that should take seven years, it appears impossible for the Waste Confidence EIS to provide an adequate level of technical support to justify the reasonable assurance findings in the WCD. Thus, if the NRC issues the Waste Confidence EIS in 2014 without completing the research and analyses necessary to support the WCD's safety findings, the no action alternative – no issuance of a WCD and no further reactor licensing or reactor license extensions – must be treated as the preferred alternative. Indeed, under the circumstances it appears to be the only viable alternative under the Atomic Energy Act.

"that ISFSIs [independent spent fuel storage installations] are continuously maintained and monitored, with major maintenance and replacement at regular intervals" – must be evaluated.

If the NRC wishes to have enough information to support the issuance of an updated Waste Confidence EIS, it should complete the research and analysis tasks laid out in the Technical Needs Document. And as discussed in Dr. Thompson's Declaration at Section I and Recommendation #1, the NRC's Preliminary Assumptions Document should be a point of departure for determining the scope of the proposed Waste Confidence EIS, especially in regard to storage after the end of the 21st century.

3. The EIS should consider mitigation alternatives

NEPA mandates that in undertaking environmental reviews, agencies must "discuss the extent to which adverse effects can be avoided" so that "the agency [and] other interested groups and individuals can properly evaluate the severity of the adverse effects." NRC has the unequivocal obligation to *consider and discuss* relevant mitigation options that are available, and to weigh the costs and benefits of such options. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351-52 (1989).

In particular, federal regulations require that reviewing agencies consider and assess mitigation measures in an EIS. 40 C.F.R. § 1508.25(b)(3); *see also* 10 CFR Part 51, Subpart A, App. A ("appropriate mitigating measures of the alternatives will be discussed"). The President's Council on Environmental Quality defines mitigation as:

- (a) Avoiding the impact altogether by not taking a certain action or parts of an action.
- (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- (e) Compensating for the impact by replacing or providing substitute resources or environments.

40 C.F.R. § 1508.20.

As discussed in the attached declarations by Dr. Makhijani, Dr. Thompson, and Mr. Musegaas, the EIS should consider the following mitigation alternatives:

a. Mitigation of long-term spent fuel storage and pool fire risks

As discussed in Section VII of Dr. Thompson's declaration, the choice of storage modes for spent fuel and high level waste could have significant implications with respect to the risks they pose. For instance, the EIS should consider placement of spent fuel or high level waste below ground level. *Id.*, ¶¶ VII-9, VII-10. In addition, the potential for pool fires could be effectively eliminated by eliminating high-density storage of spent fuel in pools. *Id.*, ¶¶ VII-12 – VII-14. Storage casks could also be protected from attack by using robust design. *Id.*, ¶ VII-9.

As Dr. Thompson recommends, a range of storage scenarios should be considered in order to help assess the comparative radiological risk posed by alternative options for storing spent fuel or high level waste.

b. Mitigation of spent fuel pool leakage risks

The EIS must also include a comprehensive assessment of all relevant measures that may mitigate adverse environmental consequences of future spent fuel pool leaks and any resulting contamination of the environment. Musegaas, Declaration, ¶ 7. Various feasible measures are available that would avoid, minimize, rectify, reduce, or eliminate the environmental impacts of future radiological spent fuel pool leaks and contamination associated with such leaks. The EIS should include an assessment of the feasibility and efficacy of all reasonable measures to mitigate the impacts of future spent fuel pool leaks on the environment. *Id.*

c. Mitigation in the event of loss of institutional control

The NRC should explicitly consider storage design concept and measures that would mitigate the impact of leaks, fires, and malevolent acts in the event of a loss of institutional control. Makhijani Declaration, Section 6.

B. Scenarios and Impacts That Should be Considered

As the Court concluded in *State of New York*, “[u]nder NEPA, an agency must look at both the probabilities of potentially harmful events and the consequences if those events come to pass.” 681 F.3d at 478-79 (citing *Carolina Env'tl. Study Grp. v. U.S.*, 510 F.2d 796, 799 (D.C. Cir. 1975)). Only if the probability of an environmental impact is so low as to be “remote and speculative,” or if the combination of probability and harm is “sufficiently minimal,” can an agency avoid analyzing the impacts. *Id.* (citing *City of New York v. Dep't of Transp.*, 715 F.2d 732, 738 (2d Cir. 1983) (“The concept of overall risk incorporates the significance of possible adverse consequences discounted by the improbability of their occurrence.”)). Therefore, for each of the categories of spent fuel storage risks remanded by the Court of Appeals to the NRC – *i.e.*, long-term storage risks, spent fuel pool fire risks, and spent fuel pool leakage risks – the NRC must evaluate both the probability and the consequences of these environmental impacts.

1. Time-frame for consideration of impacts

In *State of New York*, the Court found that “a ‘reasonable assurance’ that permanent storage will be available is a far cry from finding the likelihood of nonavailability to be ‘remote and speculative,’” and that the NRC had “failed to examine the environmental consequences of failing to establish a repository when one is needed.” *Id.*, 681 F.3d at 478-79 (quoting *City of New York*, 715 F.2d at 738). The Court unequivocally ordered the NRC to evaluate the environmental impacts that could occur if a repository is never sited. *Id.* at 473, 478, and 479. But the Court did not thereby allow the NRC to forego the required evaluation of the impacts of the eventual siting of a repository. Rather, in order to comply with NEPA, the EIS must make a reasoned and supported prediction of when (and if) a repository will be available. That

prediction must be based, to a significant extent, on the feasibility of safe disposal in a range of geological media and the availability of suitable sites.

Rather than proposing to evaluate the likelihood that a repository will be available in any particular time frame, the NRC appears to treat the question of the availability of a repository as a series of “scenarios” that will be assumed to occur. Thus, it states in the Scoping Notice:

Possible scenarios to be analyzed in the EIS include temporary spent fuel storage after cessation of reactor operation until a repository is made available in either the middle of the century or at the end of the century, and storage of spent fuel if no repository is made available by the end of the century.

77 Fed. Reg. at 65,138. *See also* Transcript of Nov. 14, 2012 Scoping Meeting for Waste Confidence EIS at 20 (ML12331A347) (“Transcript 1”), in which NRC Staff member Michalak made the following statement:

We’ve developed these scenarios during internal scoping. The first scenario is a repository available at the middle of the century. That scenario would assume transportation of spent fuel to the repository beyond that approximately 2050 point, because it doesn’t go there instantaneously. So, the first scenario goes out about 100 years, approximately, approximately 50 to half the storage facility, and then another 50 to really get all the waste there, approximately. The second scenario assumes that a repository wouldn’t be available until the end of the century. Okay, so we’re looking at about 90 years out, a repository would be available, and then again another 40 or 50-odd years to get all that waste or all that spent fuel to the repository. The third scenario was part of the remand. We are going to evaluate no available repository The EIS will address the environmental impacts associated with each scenario. So a scenario where middle of the century, end of the century, no available storage. So we will be evaluating the environmental impacts across resource areas, like air, and water, and transportation across those three scenarios.

While analysis of a range of scenarios may be a useful tool in preparing the EIS, the EIS should address the *probability* that these scenarios will occur, not merely assume their occurrence. In making that evaluation, the feasibility of spent fuel disposal is a relevant consideration. *See* Makhijani Declaration, Section 7.

The EIS must also assess the *consequences* of each scenario. As further discussed in Dr. Makhijani’s Declaration, the NRC no longer has a technical basis to assume that spent fuel disposal in a repository will cause no radiological releases and therefore will have no significant adverse environmental impacts. *Id.*, Section 8.

In assessing these probabilities and consequences, the EIS should clarify the third scenario, *i.e.*, “storage of spent fuel if no repository is made available by the end of the century.” If no repository is available by the end of the century, what is the NRC’s prediction regarding when a repository *will* be available? As discussed in Dr. Thompson’s Declaration, ¶ I-5, the

NRC's Preliminary Assumptions Document assumed that under the third scenario, a repository will be available by 2250.

In addition, as recommended by Dr. Thompson, consideration of spent fuel storage impacts should begin at the time of discharge from the reactor. *Id.*, ¶ I-9 and Recommendation #3.

And, as a final note, in *State of New York*, the Court found that the NRC failed to adequately evaluate the environmental impacts of spent fuel pool fires and spent fuel pool leakage out to 60 years past the cessation of reactor operations. 681 F.3d at 479. That does not mean, however, that these impacts are irrelevant with respect to long-term storage. The EIS must consider the probability and consequences of spent fuel pool leaks and fires occurring under each of its scenarios.

2. Environmental impacts that should be considered in the EIS

While the subject matter of each of the issues remanded by the Court of Appeals varies, there is substantial overlap. It is important to evaluate these issues in an integrated and internally consistent manner. This is reflected in the recommendations of Dr. Makhijani, Dr. Thompson, and Mr. Musegaas. Their recommendations, which the Organizations adopt and incorporate by reference, can be summarized as follows:

- In view of the NRC's own preparations to analyze storage for up to 300 years in the Long-Term Waste Confidence Update, the scope of the Waste Confidence EIS should include a scenario of 300 years of onsite storage followed by repository disposal. This scenario should include at least one inter-cask transfer in this period, followed by transfer to a multipurpose or transportation cask at 300 years. Of course, transportation risks and repository site and disposal risks should be included in this scenario (as with every scenario that includes an assumption of deep geologic disposal and/or an assumption of transfer of spent fuel to an offsite storage location). Makhijani Declaration, Section 3 and ¶ 3.5.
- In order to fully evaluate each long-term spent fuel storage scenario considered in the EIS, the NRC should include consideration of (a) the reasonableness of NRC's prediction that a repository will become available in any of those three time frames and (b) the environmental impacts of disposing of spent fuel once it is placed in a repository. Makhijani Declaration, Section 7 and ¶ 7.1. The evaluation must include radiation doses to workers, the onsite and offsite environmental impacts during the period of preparation, as well as the post-closure environmental impacts up to and including the time of peak radiation dose. *Id.*, ¶ 7.5. The EIS must also explore all reasonable combinations of geology, engineered barriers, sealing systems, and disposal casks to predict bounding doses.
- For scenarios that include repository disposal, the scope of the EIS should also include the calculation of surface impacts at the site (including those from storage, unloading, repackaging, etc.) and post-closure repository impacts. In regard to post-closure

repository impacts, the NRC cannot rely on the estimated zero radiation doses from salt disposal as specified in Table S-3 in 10 C.F.R. § 51.51(b) because (i) the NRC itself has admitted that salt disposal is inappropriate for spent fuel, (ii) all other media will have non-zero impact, and (iii) the impact is highly dependent on the combination of site, engineered barriers (including disposal casks), and sealing systems that are presumed to be used.

- The EIS should analyze, in depth, the environmental impacts of uranium spent fuel degradation. After a total storage period of up to 300 years (i.e. out to the year 2250), there is a far greater likelihood of casks deteriorating to an extent that transfers from one cask to another of much, most, or all of the spent fuel would be required. Transportation accidents involving degraded spent fuel should be evaluated. The impacts on transfer of degraded high burnup spent fuel at the repository site should also be evaluated. Makhijani Declaration, Section 4 and ¶¶ 4.1, 4.23, 11.2.
- The EIS should analyze, in depth, the impacts of transporting and handling spent fuel, and of storing it at repository sites. Spent fuel that has been stored onsite or at an offsite location for prolonged periods is subject to degradation, some of which could be severe enough to breach both the cladding and the canister. Transfer to transportation casks could therefore pose risks that have not yet been encountered in practice. Similarly the impacts of transfer to disposal containers, storage at the repository location, and handling during placement of degraded spent fuel need to be evaluated. Likewise, the consequences of transportation accidents that involved degraded fuel or canisters could be significantly higher than indicated by present understanding of accidents with intact fuel and canisters. Again, this will require significant additional research. Makhijani Declaration, Section 5 and ¶¶ 5.1, 5.5.
- The EIS should not only address the storage of spent nuclear fuel, but also the potential storage of high level radioactive waste from reprocessing of spent nuclear fuel. Thompson Declaration, Section I and Recommendation 2.
- The EIS should consider the radiological risk posed by storage of spent nuclear fuel from the moment of its discharge from a reactor. Thompson Declaration, Section I and Recommendation 3.
- Assessment of radiological risk should be a major function of the proposed EIS, this category of risk being defined as the potential for harm to humans as a result of unplanned exposure to ionizing radiation. Thompson Declaration, Section IV and Recommendation 4.
- The EIS should assess the radiological risk arising from a range of conventional accidents or attacks that could affect stored spent nuclear fuel or high level radioactive waste. Thompson Declaration, Section IV and Recommendation #5.
- The comparative radiological risk posed by a range of alternative options for storing spent nuclear fuel or high level radioactive waste should be assessed in the proposed EIS

as a major indicator of the comparative impacts of these alternatives. Thompson Declaration, Section IV and Recommendation 6.

- Risk assessment in the proposed EIS should be supported by a set of indicators that express the dynamic aspects of the potential risk environment across the time period and suite of scenarios considered in the EIS. Thompson Declaration, Section V and Recommendation 7.
- The EIS should analyze, in depth, the reliability of institutional controls, because there is extensive evidence that it is not prudent to rely on active institutional controls for more than 100 years after a facility ceases functioning for its principal purpose. Makhijani Declaration, Section 6 and ¶ 6.1. The EIS should take account of the technical basis for NRC's low-level waste disposal regulations at 10 C.F.R. § 61.7(b)(4) and (b)(5). These regulations effectively assume that active controls (as defined in 10 C.F.R. § 61.2) will fail after 100 years. Intruder barriers, which are passive controls, are assumed in the rule to last at most 500 years. *Id.* at ¶ 6.3.
- The scenarios considered in the proposed EIS should cover a range of potential outcomes regarding the role of nuclear power, including: (i) shrinkage in the number of operating reactors, with potential shutdown of all reactors by the middle of the 21st century; (ii) expansion in the number of operating reactors; and (iii) introduction of new technology. Thompson Declaration, Section VI and Recommendation 8.
- The scenarios considered in the proposed EIS should cover future societies exhibiting a range of variation in prosperity, technological capability, and the quality of governance. Thompson Declaration, Section VI and Recommendation 9.
- The scenarios considered in the proposed EIS should cover a range of potential future outcomes regarding the propensity for violent conflict, and should cover situations in which stored spent nuclear fuel or high level radioactive waste would experience attacks involving states or non-state actors. Thompson Declaration, Section VI and Recommendation 10.
- The proposed EIS should take a dynamic view of the potential inventories and modes of storage of spent nuclear fuel and high level radioactive waste, by considering a range of storage scenarios. Thompson Declaration, Section VII and Recommendation 11.
- The proposed EIS should use a range of storage scenarios as vehicles to help assess the comparative radiological risk posed by alternative options for storing spent nuclear fuel or high level radioactive waste. Thompson Declaration, Section VII and Recommendation 12.
- In assessing the comparative radiological risk posed by alternative options for storing spent nuclear fuel or high level radioactive waste, the proposed EIS should regard retrievable emplacement in a repository as a mode of storage. Thompson Declaration, Section VII and Recommendation 13.

- In assessing the comparative radiological risk posed by alternative options for storing spent nuclear fuel or high level radioactive waste, the proposed EIS should give special attention to the potential for radioactive release from stored spent nuclear fuel as a result of a pool fire or a cask fire. Thompson Declaration, Section VII and Recommendation 14.
- The spent nuclear fuel storage scenarios to be considered in the proposed EIS should include: (i) an Extended Status Quo scenario; (ii) a Nuclear Power Rundown with Spent Nuclear Fuel Risk Minimization scenario; and (iii) a range of other scenarios. Thompson Declaration, Section VII and Recommendation 15.
- In assessing the potential for radioactive release from stored spent nuclear fuel as a result of a pool fire, the proposed EIS should rely on an updated, transparent, fully published body of analytic and empirical investigation that adequately describes all relevant phenomena, including: (i) the dynamics of cladding self-ignition across a range of water-loss and fuel-loading scenarios; (ii) propagation of exothermic reactions between fuel assemblies; (iii) hydrogen generation; (iv) heat generation; and (v) atmospheric release of radioactive material. Thompson Declaration, Section VIII and Recommendation 16.
- In assessing the potential for initiation of a pool fire at a given facility, the proposed EIS should account for factors including: (i) the potential occurrence of a range of conventional accidents or attacks at the facility; (ii) a range of water-loss and fuel-loading scenarios; and (iii) the potential occurrence of degraded-site conditions due to an incident at an adjacent facility (e.g., a reactor). Thompson Declaration, Section VIII and Recommendation 17.
- In assessing the potential for radioactive release from stored spent nuclear fuel as a result of a cask fire, the proposed EIS could rely on a body of analytic and empirical information that is not fully published, provided that the NRC has engaged an independent Red Team to determine through representative tests whether a cask fire can be initiated and, if so, what release of radioactive material would be likely to occur. Thompson Declaration, Section VIII and Recommendation 18.
- In assessing the likelihood of a radiological incident, the proposed EIS should rely on diverse sources of information, and should not rely solely upon the findings of probabilistic risk assessment. Thompson Declaration, Section IX and Recommendation 19.
- In assessing the impacts of a potential radiological incident involving atmospheric release, the proposed EIS should consider types of impact including: (i) plume exposure; (ii) ground contamination and resulting exposure; (iii) exposure via food and water pathways; (iv) health effects pursuant to total exposure; (v) abandonment of assets; (vi) cleanup costs; (vii) direct and indirect economic impacts; and (viii) social impacts. Thompson Declaration, Section IX and Recommendation 20.

- In considering radiological risk, the proposed EIS should repudiate the arithmetic definition of risk. Thompson Declaration, Section IX and Recommendation 21.
- In assessing the overall impacts of storing spent nuclear fuel or high level radioactive waste, the proposed EIS should consider the implications of alternative storage options for a national strategy of protective deterrence. Thompson Declaration, Section IX and Recommendation 22.
- The NRC's EIS must analyze in-depth the probability that densely packed spent fuel pools at reactor sites will leak toxic radionuclides to the environment following the cessation of plant operations. Musegaas Declaration, ¶ 4.
- The EIS must analyze in-depth the probability of future spent fuel pool leaks in light of the established practices that challenge and prevent full and timely detection of such leaks. Musegaas Declaration, ¶ 4(b).
- The EIS must undertake a comprehensive, in-depth assessment, with due consideration of site-specific factors, of the probability of spent fuel pool leaks during post-operation on-site storage of spent nuclear fuel. Musegaas, Declaration, ¶ 4(e).
- The EIS must analyze the full range of potential consequences stemming from the probability that densely packed spent fuel pools at reactor sites will leak toxic radionuclides to the environment after cessation of plant operations. Musegaas, Declaration, ¶ 5.
- In relation to spent fuel pool leaks, the NRC must fully analyze the cumulative impacts resulting from past, present, and reasonably foreseeable future radiological leaks from non-spent fuel pool systems, structures, and components. In its analysis, NRC should consider the potential impacts to groundwater resources, surface water resources, and public health. Musegaas, Declaration, ¶ 6.
- The NRC must assess the extent to which the probability and environmental consequences of spent fuel pool leaks, may be affected by licensee decommissioning activities that are, or may be, undertaken during post-operation timeframes. NRC must assess (1) how future SFP leaks (and the direct, indirect, and cumulative impacts of these leaks) will affect the overall feasibility and cost of decommissioning reactor sites; (2) the impacts of any residual SFP leak contamination that may be left unremediated after decommissioning; and (3) the extent to which decommissioning actions are relevant to the consideration of potential mitigation measures. Musegaas, Declaration, ¶ 8.

C. The NRC Should Make Provision for Site-specific Analysis of Some Issues.

While the Organizations believe that many of the issues related to long-term storage of spent reactor fuel are generic in nature, that is not the case uniformly. Makhijani Declaration, Section 9 and ¶ 9.3. With respect to long-term spent fuel storage impacts, there are a number of

impacts that must be addressed on a site-specific basis or with a bounding analysis that takes into account the degree of risk at the most adversely affected site. For instance:

- Health and property damage impacts, which are likely to be bounded by high density population sites with high property value concentrations like Indian Point in the suburbs of New York City or Limerick, near Philadelphia, Pennsylvania. Makhijani Declaration, ¶ 9.3.
- Impacts on river systems may be bounded by sites that are quite different in character. For instance, large scale dispersal of radioactivity from spent fuel storage at Prairie Island could create long-term damage to the entire Mississippi River system, including agricultural lands around it, cities that are vulnerable to flooding on its shores, barge traffic that is a major artery of commerce, and so on. Agricultural impacts alone may be bounded by sites like Fort Calhoun or Duane Arnold in Iowa. Makhijani Declaration, ¶ 9.4.
- It is impossible to bound ecological impacts in a generic manner. They will require site specific discussion. For instance, the Calvert Cliffs reactors in Maryland are situated in one of the most sensitive and unique ecosystems of the United States – the Chesapeake Bay. The impacts of a major radioactivity release into the Chesapeake Bay ecosystem are likely to be quite different than those of a similar release at Turkey Point in Florida, which has barrier islands and Biscayne National Park a few miles away or Diablo Canyon, in California, where a major release could severely impact the unique ecosystem in the Monterey Canyon. It is important to remember in this context that the inventory of long-lived radioactivity in spent fuel pools in the United States is generally far larger than that in Chernobyl Unit 4, which had a severe accident and radioactivity releases in 1986. It is essential that the scenarios other than the no-action alternative consider the ecosystem impacts on a site specific basis unless it can classify sites based on types of ecosystems and address bounding impacts for similar sites. None of the sites mentioned in this paragraph could be put into a group with any other by that criterion. Makhijani Declaration, ¶ 9.5.

The EIS must include bounding estimates for (i) the number of cancers caused by a worst case release of radionuclides from any plant; (ii) the worst case damage to riverine ecosystems, such as the Great Lakes, the Mississippi River or the Columbia River; (iii) the worst case loss of agricultural land and production; (iv) the ecosystem damage to each unique ecosystem, including the Chesapeake Bay, the Monterey Trench, the Mississippi River Delta, the Columbia River, and (v) the worst case property damage. These evaluations should include not just today's source term but the projected source terms based on the dates of the expiry of the licenses and the total accumulated spent fuel at that time.

It is also essential for the scope of the EIS to include environmental justice impacts. Many of them are also site-specific. For instance, a spent fuel accident at the Columbia Generating Station in Washington State would seriously compromise the treaty rights, cultural values, and diets of the Yakama as well as other Indian tribes in the area. Such environmental

justice impacts must be included in the scope of the EIS if it is to apply generally to future licensing actions.

With respect to spent fuel pool leaks, determining the probability of future leaks clearly necessitates a consideration of site-specific factors. To begin with, special consideration must be afforded to spent fuel pools that have already leaked. With respect to any known incidents of spent fuel pool leakage, the circumstances surrounding such leakage, the licensee and NRC response to such leakage, the adequacy of any such response, the current and likely future status of such leakage, and other such issues must be analyzed before determining the likelihood of future leakage from these spent fuel pools. For example, at Indian Point, site-specific circumstances (including the facts that the Unit 2 spent fuel pool is still actively leaking), result in site-specific conclusions regarding the likelihood that the Unit 2 spent fuel pool will continue to leak in the future. Musegaas Declaration, ¶ 4(d).

In addition, other site-specific factors must also be considered in order to assess the probability of future spent fuel pool leaks at nuclear power plants. This includes the impact of natural disasters (i.e., earthquakes, hurricanes, floods, etc.) on the integrity of spent fuel pools, and the probability that any such events may create or exacerbate existing spent fuel pool degradation and leaks. Such impacts must take into account current information regarding seismicity in regions where nuclear power plants are located, as well as the most current scientific knowledge regarding sea level rise and other impacts of climate change, including the increased frequency of severe weather events that result in storm surges, flooding, and extended power outages that could compromise safe storage of spent fuel at reactor sites. Site-specific review related to these kinds of external circumstances is necessary since new information reveals such issues can be problematic and since different regions in the U.S. face different geological conditions and weather patterns. Musegaas Declaration, ¶ 4(d).

D. Potential Location for Future Public Meetings

In the Scoping Notice, the NRC requested comments on potential locations for future public meetings on the draft EIS. Given the potentially significant and long-lasting effects of extended spent fuel storage at reactor sites, we request that public comment hearings be held in each community housing a nuclear reactor. Unfortunately, however, it seems as though NRC has rejected this option before even receiving scoping comments. *See e.g.*, statement by NRC Staff member Andy Imboden, Transcript 1 at 16 (“In scoping we’re asking broad questions, what scenarios in environmental issues should we consider, and one important question that we’re asking is *we will be holding regional meetings* in the draft stage, and we’d like your feedback on where those meetings should be held. But *we can’t hold them everywhere*, but if there are some areas of particular interest, we’d like to know that.”)(emphasis added); and NRC Staff member Chip Cameron, Transcript 1 at 40 (“And I’ve just reminded with the tribal government and state government presentations that one of the specific issues that the staff would look for comment on is *locations of the regional meetings*.”)(emphasis added).

In light of NRC’s refusal to conduct meetings at every reactor site, we request, in the alternative, in-person meetings in Maryland (at NRC headquarters), in California, and in each of the

following regions: the Northeast, the mid-Atlantic region, the Southeast, the Midwest, and the West. These locations would roughly correspond to the locations of the NRC's headquarters and its four regional offices (in Pennsylvania, Georgia, Illinois and Texas), plus California, New York and the New England states. The meetings could be held at the NRC's offices or at a public facility that is located equidistant between the multiple facilities in the region. Webcasts are simply not a substitute for live meetings, especially because many individuals living near these facilities do not have access to the internet. Thus, to afford the concerned public a reasonable opportunity to participate, meetings in each region housing a nuclear facility are required.

Respectfully submitted,

Signed (electronically) by:

Diane Curran

Harmon, Curran, Spielberg & Eisenberg, L.L.P.

1726 M Street N.W. Suite 600

Washington, D.C. 20036

202-328-3500

Fax: 202-328-6918

E-mail: dcurran@harmoncurran.com

Signed (electronically) by:

Mindy Goldstein

Turner Environmental Law Clinic

1301 Clifton Road

Atlanta, GA 30322

404-727-3432

Fax: 404-727-7853

Email: magolds@emory.edu

January 2, 2013