



June 8, 2018

Via the Department of Public Service's Document and Matter Management System

The Honorable Kathleen H. Burgess, Secretary of the Commission
New York State Public Service Commission
Three Empire Plaza
Albany, New York 12223-1350
secretary@dps.ny.gov

Re: Comments on the Indian Point Closure Task Force 2018 Annual Report and Site Reuse Study (Matter 17-00994)

Dear Secretary Burgess:

I am writing to you on behalf of Riverkeeper, Inc. to provide comments on the Indian Point Closure Task Force's 2018 Annual Report and Site Reuse Study (Matter 17-00994).¹ We thank you for providing us with the opportunity to comment on the 2018 Annual Report and Reuse Study.

In addition to being a party to the agreement to close the Indian Point electric generating facility,² Riverkeeper is a member-supported watchdog organization dedicated to defending the Hudson River and its tributaries, and protecting the commercial, recreational, ecological and aesthetic qualities of the Hudson River estuary, its fishery, and the entire Hudson River ecosystem, including its watershed and tributaries which make up the drinking water supply of nine million New York City and Hudson Valley residents. For more than 50 years, Riverkeeper has stopped polluters, championed public access to the river, influenced land use decisions, and restored habitat, benefiting the natural and human communities of the Hudson River and its watershed.

In pursuit of these goals, Riverkeeper sought the closure of Indian Point facility because its antiquated once-through water cooling system kills over one billion fish and fish larvae each year. The system withdraws 2.42 billion gallons per day from the Hudson River and heats it up to a deadly temperature before discharging it back into the river. Fish are killed when they are impinged on filter screens, entrained through the cooling system, and scalded by hot water. Evidence indicates that such slaughter and habitat degradation have contributed to the decline of numerous important fish species in the river over the past 40 years.

¹ Available at <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=17-00994>.

² See Indian Point Closure Agreement (Jan. 8, 2017) available at <https://www.riverkeeper.org/wp-content/uploads/2017/01/Indian-Point-Closure-Agreement-January-8-2017.pdf>.

Comments of Riverkeeper, Inc.

I. Overarching Comments and Recommendations

The U.S. Nuclear Regulatory Commission (“NRC”) is tasked with enforcing stringent licensing requirements for utilities seeking to build and operate a nuclear power plant which are designed to protect public health and safety, and national defense and security. However, the NRC has a long history of bias promoting the development of nuclear facilities and protecting the financial interests of the utility licensees.³ In almost every conceivable safety area, the NRC is backing off from effective safety regulation, promoting industry self-regulation, and tacitly placing the financial health of utilities above the enforcement of strict safety standards.⁴

With the NRC’s focus solely on safety (and not necessarily on returning the site to a usable condition) during the decommissioning process, and with its inherent bias of promoting financial security of licensees, it is necessary and appropriate for the State Task Force to act as a champion of local concerns and interests during the forthcoming Indian Point decommissioning process. We acknowledge and appreciate the Task Force’s efforts thus far to do just this, including holding numerous public meetings, reaching out to the labor community and other stakeholders, and engaging with local government.

We also recognize that the Task Force Report cogently lays out many salient facts regarding the issues stemming from the closure at Indian Point. The Report lays out for the public complex issues regarding spent fuel management, current NRC regulations, the radiological contamination of the site, effects on communities and workers, and provides useful references regarding other reactors that have closed.

However, the main thrust of our comments on the first annual Report is that the State of New York and its Task Force can and should do more. There is real opportunity for the State Task Force to steer the decommissioning process towards a resolution that addresses not only the NRC’s statutorily-mandated safety goals but also addresses the concerns of local communities—which the federal agency and Entergy have no incentive to address. To this end and as discussed in depth below, Riverkeeper recommends that the state focus on advocating for a prompt decommissioning

³ See Riverkeeper, “Indian Point Closure FAQ” (Jan. 2018) available at <https://www.riverkeeper.org/wp-content/uploads/2018/01/Indian-Point-FAQ-Jan-2018.docx.pdf> (“The federal Nuclear Regulatory Commission has repeatedly acted to protect the nuclear industry rather than vigorously and transparently enforce safety requirements. For example, the NRC recently allowed Indian Point more time to improve cyber-security even though attempts to hack nuclear power plants have already been in the news.”); see also *Beyond Nuclear*, “NRC” (accessed June 4, 2018) <http://www.beyondnuclear.org/nrc/> (“The U.S. Nuclear Regulatory Commission is mandated by Congress to ensure that the nuclear industry is safe. Instead, the NRC routinely puts the nuclear industry’s financial needs ahead of public safety.”).

⁴ See, e.g., Riverkeeper, “As Indian Point shutdown approaches, safety and security measures must not be relaxed” (Nov. 1, 2017) available at <https://www.riverkeeper.org/blogs/docket/indian-point-shutdown-approaches-safety-security-measures-must-not-relaxed/>; Riverkeeper, “Earthquake is a reminder that Indian Point is a clear and present danger” (Feb. 8, 2018) available at <https://www.riverkeeper.org/blogs/indian-point-blogs/earthquake-reminder-indian-point-clear-present-danger/>; Riverkeeper, “Entergy spokesperson wrong to deny earthquake risk” (Feb. 14, 2018) available at <https://www.riverkeeper.org/blogs/indian-point-blogs/entergy-spokesperson-wrong-deny-earthquake-risk/>.

process and cleanup of the entire site in a 20-year timeframe, rather than attempt to split the current property up into smaller parcels with limited utility and reuse opportunities.

Unfortunately, the local communities face significant obstacles in the redevelopment of the Indian Point site which the Reuse Study fails to address, limiting the usefulness of the study. We question whether the Reuse Study's focus on short term redevelopment of Indian Point land parcels is realistic. The Reuse Study is premised on numerous assumptions which are not clearly laid out for readers of the report and which are never evaluated themselves for reasonableness. For example, the entire study is premised on the possibility of the licensee (Entergy) releasing back to the local communities some of the parcels early, before decommissioning is complete. There is no evidence, however, that the drafters of the Reuse Study evaluated whether this fundamental premise was reasonable, and in fact, Entergy has recently stated publicly that it does not intend to allow the early release of any parcels.⁵ There is consequently a demonstrated need for a supplemental assessment premised on this likelihood that Entergy will refuse to allow any land parcels to be available before decommissioning is complete.

Similarly, the Site Reuse Study fails to take into account existing features of the parcels which would limit or impede some of the reuse opportunities touted, the most egregious of which is the failure to consider the Risk Assessment for the Algonquin Incremental Market Pipeline currently sited across Parcel C. The Reuse Study's assessment and conclusions are fatally undermined by its failure to consider this essential document.⁶

The Site Reuse Study also uncritically assumes that the current, existing NRC regulations will be operative at the time of the Indian Point decommissioning, despite the agency's years-old announcement that it is reevaluating its regulatory scheme.⁷ Failing to provide even a caveat about this imminent change undermines the study's recommendations considerably. In fact, since the finalization of the Task Force Report, the NRC has released a draft of the new regulations which could be applicable to the Indian Point decommissioning process.⁸ Failing to recognize this imminent regulatory change and its importance, the Site Reuse Study does not consider the need for the State to ensure that the decommissioning process and reuse opportunities support local communities.

Both the Reuse Study and the Task Force Report ignore the possibility of a prompt decommissioning and cleanup whereby the entire site is released. The Reuse Study fails to consider

⁵ See Statements of Entergy at May 24, 2018 Local Task Force Meeting (May 24, 2018) (explaining that Entergy would likely not sell certain parcels to the community for various reasons including that the parcels might be needed for the decommissioning work, and if the plant were sold to NorthStar or one of the other companies that buy and decommission plants, that company might have its own plans regarding the land); *see also generally* Town of Cortlandt, "Indian Point NYS Task Force Meeting" (Apr. 11, 2018) <http://www.townofcortlandt.com/cn/news/index.cfm?NID=46250&jump2=0>.

⁶ The Site Reuse Report states that all evaluated "development opportunities are fact-based, employing verified site characteristic data documented in available third-party studies and reports." Site Reuse Report at 1. However, failure to obtain the Risk Assessment, even if "unavailable," should have been discussed or at least noted in the report.

⁷ See *Regulatory Improvements for Decommissioning Power Reactors*, 80 Fed. Reg. 72,358 (Nov. 19, 2015) available at <https://www.gpo.gov/fdsys/pkg/FR-2015-11-19/pdf/2015-29536.pdf>.

⁸ See U.S. Nuclear Regulatory Comm'n, "Proposed Rule: Regulatory Improvements for Production and Utilization Facilities Transitioning to Decommissioning" (May 27, 2018) available at <https://www.nrc.gov/docs/ML1801/ML18012A019.html>.

a “whole site” reuse possibility. However, this is the path forward upon which we recommend the State should place its focus, as the largest and most lucrative opportunity for site reuse is through such a prompt decommissioning which would provide a larger parcel with more varied redevelopment opportunities. By focusing only on pre-decommissioning or early release site reuse, the study misses out on evaluating the most valuable site reuse option: speedy decommissioning and cleanup of the main parcel.

This as-yet-unstudied potential for reuse and redevelopment of the whole site should be carefully evaluated. The State should assess how it can incentivize and drive a prompt cleanup, either through negotiations with Entergy, advocating for changes to federal NRC regulations, or the exercise of state jurisdiction over the economic aspects of decommissioning. By participating in the federal rulemaking proceeding, the State Task Force is already advocating on behalf of local communities for more equitable decommissioning processes; however, given the current political climate at the federal level, the State should recognize that the final regulations may end up being even less protective than the current regulations, and should establish a contingency plan to protect local interests. For example, if the NRC allows licensees to use money from the decommissioning fund for spent fuel management, this would make a prompt decommissioning harder to finance. Therefore, the Task Force should recognize the need for the State to devise approaches to disincentivize such misuse of fund money, even if the NRC ultimately allows it.

A creative plan to tax the storage of spent nuclear fuel is one possibility the state should explore. In effect, closed reactor sites become interim storage facilities and local communities should be compensated appropriately. In the same vein, we also support state taxes levied on nuclear operators for the period of time the former nuclear facility site is unusable during decommissioning until the point at which it is released for non-nuclear uses. Such a state tax is one way the Task Force could sway the decommissioning process to incentivize a prompt decommissioning and cleanup to the benefit of the local communities and residents.

Ultimately, there is no perfect solution to the problem the Task Force faces of incentivizing local community interests in an imperfect federal decommissioning process. However, its ultimate goal should be a safe, effective and prompt cleanup with the State assisting, where possible, in counteracting the NRC’s preference favoring nuclear power plant operators over communities. Decommissioning experience to date shows that a prompt, 20-year decommissioning and cleanup is possible and should be the requirement for Entergy here, as this timeframe balances the community’s interest in obtaining quick redevelopment and reuse opportunities at the Indian Point site with safety constraints and Entergy’s financial interests. The Site Reuse Study presents an historical assessment of the decommissioning at other nuclear facilities, demonstrating that a 20-year decommissioning timeline is reasonable and practicable.⁹ The average decommissioning length is even faster than the 20 years we propose here, at approximately 11 years on average, with most decommissionings occurring within a 10- to 30-year time range.¹⁰

Unfortunately, the current Reuse Study focuses too much on the minutiae surrounding the physical redevelopment of parcels of land and fails to consider big picture opportunities available to the local communities. The Task Force should not lose the forest for the trees by focusing

⁹ Site Reuse Study at 40-41.

¹⁰ *Id.*

prematurely on specific reuse plans rather than seeking to identify the opportunities for ensuring that the decommissioning process itself is responsive to the interests and priorities of the local communities and other stakeholders. In fact, the physical and existing development on many of the parcels evaluated for reuse—as well as geographical constraints—pose significant limitations for redevelopment. As discussed more herein, segmenting the Indian Point site into various parcels limits the redevelopment opportunities at the site. The Task Force should have all the information necessary when evaluating site reuse, and that means the Site reuse Study should additionally look at all possible reuse approaches. We thus recommend that the Site Reuse Study examine reuse and redevelopment opportunities at the site as a whole, understanding that such opportunities would necessarily arise where a prompt decommissioning and thorough site cleanup would be undertaken on a rapid timeline such as the 20-year timeframe we suggest.

Finally, we note the Task Force Report’s failure to evaluate the need for a Citizen’s Oversight Board (“COB”). The mandate underpinning the creation of the Task Force itself will expire long before the decommissioning process is finished, and so the State should advocate for the creation of a COB to oversee the entire decommissioning and cleanup process. Additionally, a COB would allow community organizations and individual stakeholders to engage with the decommissioning process and inject public interests and concerns into the decision-making process. Currently, there is no process or procedure for NGO involvement or participation in the decommissioning process, and no ability for the public to require disclosure of information from Entergy about critical issues such as the use of decommissioning fund monies, plans for decommissioning, or environmental concerns such as contaminated groundwater cleanup at the site. We recommend that the State Task Force advocate for state legislation that to establish a Citizen Oversight Board for decommissioning as well as an independent audit of the decommissioning fund.

II. Specific Comments on the 2018 Task Force Report

In addition to the overarching comments and recommendations presented above, we also provide the following specific comments on the 2018 Task Force Report.

A. Closure Agreement Environment and Community Fund

The 2018 Task Force Report recommends that Entergy and the State of New York “develop criteria for award[ing]” funding to community and environmental projects under the \$15 million Indian Point Closure Agreement fund.¹¹ As signatories to the Closure Agreement, Riverkeeper reminds the Task Force that the Closure Agreement itself already sets forth criteria for allocating this funding to community and environmental projects:

To further augment its commitment to the environment and the community in which Indian Point operates, Entergy shall establish a fund in the amount of \$15 million (the “Fund”), the goal of which is to fund projects designed to benefit the Hudson River and to

¹¹ See Indian Point Closure Task Force 2018 Annual Report at 38 (May 9, 2018) [hereinafter “Task Force Report”] available at <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={F8F80D6F-A7AA-4D29-A1E9-19B3F556D5B9}>.

support the community, and to provide environmental protection and other public benefits to the community. The Fund will provide for the completion of projects to be selected by NYS and Entergy, after consultation with regional environmental organizations and community groups and interests. With respect to the environmental projects, priority will be given to projects for dam or culvert removal, purchase of sensitive wetlands areas along the Hudson River, continuation of scientific studies designed to advance the protection of riverine species, and prevention of the introduction of invasive species into the Hudson River watershed, and other projects determined by NYS and Entergy that are consistent with the purposes for which the Fund has been established.¹²

Thus, the Closure Agreement requires that projects funded by the \$15 million fund be “designed to benefit the Hudson River and to support the community, and to provide environmental protection and other public benefits to the community.”¹³ The Closure Agreement prioritizes those environmental projects which include “dam or culvert removal, purchase of sensitive wetlands areas along the Hudson River, continuation of scientific studies designed to advance the protection of riverine species, and prevention of the introduction of invasive species into the Hudson River watershed.”¹⁴ We therefore support an equitable division among environmental and community-focused projects, as contemplated by the Closure Agreement.

The funding allocation recommendations presented by the Task Force seem to focus on the community-focused projects contemplated by the Closure Agreement. However, these recommendations, such as that funding go to projects which “have maximum benefit to the taxing jurisdictions”—while hugely important—should come into consideration only after the explicitly listed Closure Agreement Fund criteria are first considered.¹⁵ Similarly, the Task Force’s recommendation that “consideration be given to water and sewer infrastructure projects in the affected taxing jurisdictions and for consultant services that are specifically procured for the purpose of addressing impacts associated with the closure . . . be eligible for reimbursement from the fund,” must also be second-tier to explicit criteria discussed in the Closure Agreement itself.¹⁶ To the extent that the Task Force seeks to have its recommended criteria for projects prioritized above those explicit considerations discussed in the Closure Agreement, its recommendations do not comport with the language of the agreement.

In accordance with the explicit Closure Agreement Fund criteria, we thus recommend that long-term funding be allocated to the continuation of the Hudson River Biological Monitoring Program (“HRBMP”), including the Longitudinal River Ichthyoplankton Survey, the

¹² Indian Point Closure Settlement Agreement at schedule 1a (Jan. 8, 2017) [hereinafter “Closure Agreement”] available at <https://www.riverkeeper.org/wp-content/uploads/2017/01/Indian-Point-Closure-Agreement-January-8-2017.pdf>.

¹³ *Id.*

¹⁴ *Id.*

¹⁵ Task Force Report at 38.

¹⁶ *Id.*

Fall Shoals Survey, and the Beach Seine Survey.¹⁷ This request is based upon the language of the Closure Agreement, which requires that priority be given to environmental projects for, *inter alia*, the “continuation of scientific studies designed to advance the protection of riverine species.”¹⁸

In addition to being a priority project under the Closure Agreement, the HRBMP is extraordinarily important, because it provides a retrospective and unbroken view of the ecological health of the estuary over time by tracking numerous ecological indicators and a host of environmental factors. The HRBMP is unique across the nation—and possibly the world—in that it encompasses the entire estuarine portion of the Hudson River and has been conducted continuously since 1982 providing unparalleled continuity.¹⁹ Additionally, the scientific data collected undergo rigorous control and quality assurance.²⁰ For these reasons, the HRBMP allows for tracking and modeling of a variety of biological indices based upon *thirty five years* of monitoring. The continuation of this invaluable study is precisely the kind of environmental project envisioned and prioritized by the Closure Agreement.

B. Replacement Energy

The Task Force Report discusses and evaluates conclusions made by the New York Independent System Operator (“NYISO”) in its December 2017 Operations Performance Metrics Monthly Report.²¹ This report showed Indian Point could be replaced without building any new natural gas-fired power plants, with only 100 megawatts (“MW”) of energy capacity shortfall in 2021, escalating to 600 MW by 2027. In its 2018 predictions, the NYISO further reduced its estimates of power demand due to efficiency measures, showing that there is likely to be no shortfall at all between 2021 and 2027, even if no new power plants are constructed.

More specifically, preliminary analysis from expert consultants at Synapse Energy Economics shows that using the recently released 2018 Gold Book load forecast data already shows that reduced peak load (relative to the 2017 forecast) has eliminated all of the “compensatory” power necessary to meet the energy capacity shortfall from the Indian Point closure. The 2020 forecast for the G-to-J locality summer peak is 380 MW lower in the 2018 Gold Book than 2017 Gold Book. Similarly, the 2023 forecast is 567 MW lower, and the 2027 forecast is 696 MW lower for the same zone grouping (G-to-J). This indicates that if NYISO redid this study using the 2018 Gold Book data, there would be zero shortfall or deficiency without any buildout of new gas plants. Thus, it is essential that the Task Force take the 2018 Gold Book data for load forecasts into account in evaluating the region’s energy needs in the context of potential reuse opportunities for the decommissioned Indian Point site, as these updated forecasts will bear significantly on the economic viability of any energy-focused reuse opportunities there.

¹⁷ See Riverkeeper Letter to Tom Congdon, Deputy Chair of the New York State Public Service Commission (Apr. 12, 2018) (attached hereto as “Attachment A”).

¹⁸ Closure Agreement at schedule 1a.

¹⁹ See Attach. A.

²⁰ *Id.*

²¹ Task Force Report at 2, 23 (discussing App’x B, NYISO, “Generator Deactivation Assessment – Indian Point Energy Center” (Dec. 13, 2017)); NYISO, “Monthly Report – December 2017” (Dec. 2017) *available at* http://www.nyiso.com/public/webdocs/markets_operations/documents/Studies_and_Reports/Reports/Monthly_Reports/2017/Board-Monthly-Report-December-2017.pdf.

III. Specific Comments on the Site Reuse Study

In addition to the above comments, we also provide the following specific comments on the Site Reuse Study prepared by consultant D.L. English Consulting, Inc.²²

A. Consideration of Public Comments on Site Reuse Study

The Task Force Report states that “DL English will review any comments from *taxing jurisdictions*, and consider updates to the report if necessary.”²³ This narrow review of comments *only* from taxing jurisdictions severely undermines public input into this process and improperly limits review of the potential reuse opportunities at the site. We recommend that comments from any member of the public, not just those from municipalities, should be considered and evaluated.

Meaningful public comment requires that a range of stakeholders with diverse knowledge of different issue-areas, and holding an array of views and concerns are included in the public involvement process. Excluding significant stakeholders from this public comment process undermines the effectiveness of the public input process. The consultant should be required to evaluate comments from any and all affected stakeholders.

Furthermore, there is no legitimate basis for excluding comments from affected stakeholders on this issue, and in fact the Task Force Report does not even purport to provide a justification for this improper limitation on the scope of comments. If anything, this arbitrary restriction on public comments demonstrates the extent to which the Task Force is focused on fiscal impacts of the closure and decommissioning process solely upon taxing jurisdictions. We suggest that this is an opportunity for the Task Force to engage with all affected stakeholders, municipal, organizational and individual alike.

B. Radioactive Groundwater Concerns

The Site Reuse Study discusses the impact of irradiated groundwater (“tritium”) contamination as well as other contaminated groundwater plumes upon the reuse potentials of Parcels A, B, and C of the site.²⁴ Because of these releases of contaminants, the site will require extensive cleanup after operations cease. For example, radioactive contaminants such as Strontium-90, Cesium-137, and tritium (radioactive water) have leaked from the site into the groundwater and the Hudson River.²⁵

However, the Site Reuse Study fails to consider whether these contaminants are already impacting the Hudson River and whether they will be cleaned up to allow unrestricted reuse of the main parcel after decommissioning. The study should instead evaluate the adequacy of NRC guidance on radiological cleanup so that the Task Force can understand what the physical state of

²² See generally Task Force Report at App’x C, “Indian Point Site Reuse Report” (Apr. 30, 2018) [hereinafter “Site Reuse Study”] (citations to the study herein reference internal pagination of the Site Reuse Study).

²³ Task Force Report at 27 (emphasis added).

²⁴ Site Reuse Study at 14-16.

²⁵ Riverkeeper, “The Indian Point Campaign” (2012) available at <https://www.riverkeeper.org/wp-content/uploads/2012/01/Indian-Point-2012.pdf>.

the site will be post-decommissioning and whether the State needs to impose stricter clean up standards before Energy can walk away from the site.

Furthermore, the Site Reuse Study—like the NRC—concludes that the groundwater contamination will have no “public health and safety concern[s]”²⁶ in the short term because it will mix with the Hudson River, but does not evaluate the impacts of these contaminant releases on the Hudson River itself, and its ecology. Thus, we recommend that the Task Force consider the need for an interim remedy to stop or intercept this contaminated groundwater from flowing into the Hudson River.

C. Prompt Movement of Spent Fuel From Pools

The Nuclear Regulatory Commission provides little oversight of the decommissioning process, and would allow Entergy to finish decommissioning in as long as 60 years after plant closure under the SAFSTOR option.²⁷ Furthermore, the Indian Point Closure Agreement requires Entergy to move fuel from the spent fuel pools to dry cask storage at a specified rate of four per year. This rate sets the minimum transfer rate required. Currently, there are 125 more casks yet to be moved from the spent fuel pools to dry storage. At the Closure Agreement specified rate, it will take up to 30 years to transfer the spent fuel to dry storage. This slow transfer rate is thus discretionary, as generally spent fuel is suitable for transfer to dry casks after around 5 years in the spent fuel pool.

Spent fuel pools present a significant safety hazard, because the amount of radioactivity in them vastly exceeds the amount in the reactor core and they are vulnerable fires when active cooling is lost. In addition, they have been the source of leaks of radioactivity to the groundwater. This slow rate would not only perpetuate an unnecessary safety and environmental risk, it would also preclude a prompt decommissioning. Thus, reuse opportunities could be increased by a state mandate to move spent fuel to dry cask storage as soon as reasonably practicable. It is positive to note that in its comments on the Task Force Report, Entergy states that it is estimating that it will transfer the spent fuel from wet to dry storage in 10 years—faster than the rate required under the Closure Agreement.²⁸ We recommend and support any effort the State Task Force can make to ensure that the proposed expedited transfer rate is binding upon the licensee. This would facilitate prompt reuse of whole the site and would have the major collateral benefit of reducing the risks from spent fuel pool fires and leakage.

A recent trend in nuclear regulation has allowed operators to divert money from decommissioning funds to manage spent fuel, which previously had been a separate cost paid for throughout operation. Entergy has received variances from existing NRC spent fuel management regulations to use money from the decommissioning fund for the non-decommissioning activity of relocating the spent fuel from pools to dry storage.²⁹ A separate problem is the lack of public audit of the decommissioning funds. We recommend that the State Task Force consider carefully the need for an independent audit of the fund.

²⁶ Site Reuse Study at 16.

²⁷ *Id.* at 17.

²⁸ Site Reuse Study at 103.

²⁹ *Id.* at 34.

The federal government's decommissioning regulations inherently disincentives prompt cleanups of sites. The regulations requiring a certain level of funding to be set aside by the licensee for decommissioning purposes is based on the assumption that the licensee will undertake the 60-year SAFESTOR decommissioning plan. Based a default timeframe of 60 years, the agency underestimates the amount of money which must be set aside in order to complete a proper decommissioning and cleanup as it assumes a certain level of economic appreciation of the fund over decades. This incentivizes a slow cleanup process, to the disadvantage of local communities and detriment of local labor force.³⁰ Furthermore, this results in an increased likelihood that the decommissioning fund will run short if the cleanup is undertaken on a faster than 60-year timeframe. Additionally, the safety risks inherent in operating the plant do not disappear during the decommissioning process, despite relaxation of various fundamental safety requirements.³¹ Unfortunately, the NRC's recently released new draft decommissioning rulemaking do not rectify these problematic provisions related to the decommissioning fund or safety concerns.

The new draft regulations proposed for rulemaking unfortunately also codify the exception to the decommissioning fund uses, allowing decommissioning funds to be used for non-decommissioning activities, such as spent fuel management. These types of uses further deplete the fund, incentivize licensees to delaying cleanup, and increase the likelihood that the fund will not have enough in it to properly decommission the facility. For these reasons as well, it is important that the state balance communities interest in prompt decommissioning by examining how the state can use its powers to incentivize a prompt decommissioning process.

D. Hardened On-Site Storage

The Site Reuse Study does not discuss or evaluate the potential benefits of implementing hardened on-site storage ("HOSS") technologies at the Indian Point site. Currently, *all* of Indian Point's radioactive waste is stored at the reactor site in two spent fuel pools and an independent spent fuel storage installation ("ISFSI") comprised of waste casks.³² However, casks are security-vulnerable and should be "hardened" while a permanent waste storage solution is sought by the federal government. While cask storage is significantly safer than storage spent fuel pools, we advocate for the use of HOSS for spent fuel management, though HOSS facilities should not be regarded as a permanent waste solution.

Whether or not HOSS is implemented at the site during or post-decommissioning will have a huge impact on the reuse opportunities for the site. Some of the opportunities evaluated in the study describe uncertainty because of the semi-permanent nature of the ISFSI on the site, and questions about buffer zones. We appreciate the vast uncertainty surrounding spent fuel

³⁰ As NRDC stated in its comments on the scope of the rulemaking in 2016, in light of the agency's candid assertion that "the 60 year duration of decommissioning activities was chosen because it roughly corresponds to 10 half-lives for cobalt-60," "[w]e advise the commission that the timetable for decommissioning needs to be worked out with human lives and community livelihoods in mind and not just nuclear physics." Natural Resources Defense Council, Inc. Comments on "Regulatory Improvements for Decommissioning Power Reactors, Advance Notice Of Proposed Rulemaking (Request For Comment Docket ID NRC-2015-0070) at 10 (Mar. 22, 2016) [hereinafter "NRDC Comments on Scope of New Decommissioning Rule"] *available at* <https://www.nrc.gov/docs/ML1608/ML16085A311.pdf> (attached hereto as "Attachment B").

³¹ *Id.* at 16-19.

³² Task Force Report at 7.

management given the federal government’s failure to establish a permanent repository, and consequently the difficulties inherent in evaluating reuse opportunities, however, we recommend that HOSS be included in the site reuse assessment.

E. Interim Storage Facilities for Spent Fuel

The Site Reuse Study uncritically assumes that dry cask spent fuel stored on the ISFSI will—at some point during the decommissioning process—be sent to an interim nuclear waste storage facility. However, there is no evidence that this will ever occur, and, in fact, there are many reasons why we recommend that it should not, such as the creation of sacrifice zones and safety concerns with moving spent fuel multiple times. It is much more realistic to assume for purposes of the Site Reuse Study that the spent fuel will not be relocated at all until the federal government establishes a permanent repository at some very uncertain and likely distant future date. At the very least, the Site Reuse Study should evaluate a scenario where the waste is stored on-site for the foreseeable future in conjunction with its existing assumption of relocation to an interim storage site.

F. Pipeline Risk Assessment

The Site Reuse Study utterly fails to evaluate any of the potential risks posed by existing natural gas pipelines that traverse and run alongside the nuclear facility site.³³ It is unrealistic to assume, as the study does, that the risk posed by this pipeline is zero given the demonstrated and established safety concerns posed by natural gas pipelines.³⁴ Furthermore, the Site Reuse Study does not discuss the independent expert risk evaluation of the Algonquin Incremental Market Pipeline installation that the State commissioned but has yet to release.³⁵

Evaluating reuse opportunities without also consulting the independent safety analysis of the pipeline cannot be justified. Assuming that the pipeline poses no risk to redevelopment and reuse opportunities—particularly given the high likelihood that the ISFSI will remain on the site for a semi-permanent duration—fails to consider an important and essential component of potential future reuse opportunities and undermines confidence in the Site Reuse Study’s conclusions.

G. Impacts to Current Employees and Local Labor Force

The Task Force has appropriately focused significant energy on understanding the scope and impact of the Indian Point closure on plant employees, and evaluating options for retraining

³³ In fact, there are pipelines both buried underground at the site and above-ground traversing the site. Pipelines under the site predate the nuclear power plant; the above-ground natural gas pipeline was built alongside the site, but close enough that if there was a problem pipeline, the nuclear power plant’s back-up power sources are within the blast radius of a pipeline explosion.

³⁴ See, e.g., U.S. Pipeline and Hazardous Materials Safety Admin., “Pipeline Incident 20 Year Trends” (Dec. 6, 2017) available at <https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-20-year-trends>.

³⁵ See Letter from Sandy Galef, New York State Assemblywoman to Governor Andrew Cuomo (Jan 19, 2018) available at <https://sape2016.files.wordpress.com/2018/05/galef-letter-to-cuomo-re-risk-assessment-1-19-18-2.pdf> (discussing need to evaluate safety implications of pipeline project’s proximity to nuclear facility in the context of post-decommissioning site reuse).

and continued employment during the decommissioning process.³⁶ Unfortunately, however, Entergy has recently announced that it does not intend to make any special effort or plans to try to keep the current workers at the plant to do the decommissioning or to be trained for other jobs that would allow them to be able to stay in the community.³⁷ Rather, it intends for current workers to remain until Indian Point Units 2 and 3 are both shut down, and then seeks to relocate excess positions to other Entergy facilities, such as in Arkansas.³⁸ In the same vein, Entergy expressed that if the facility is sold to a decommissioning contractor, it still does not intend to negotiate with the potential new owner to accommodate any current workers' future positions.³⁹

A prompt decommissioning process, which we propose should be examined, would not only maximize site reuse opportunities but it would also maximize opportunities for current workers with institutional knowledge of the plant well to participate appropriately in the decommissioning process. The retrospective discussion in the Task Force report about the treatment of workers and labor interests at the recently closed Vermont Yankee facility provides one example of how the SAFESTOR process for decommissioning (allowing up to 60 years for decommissioning and cleanup) is detrimental to labor interests and employees.⁴⁰ For the state to assist workers, it should aggressively pursue a prompt decommissioning, ideally with full cleanup and remediation within 20 years.

H. Unplanned Outages

As noted in the Site Reuse Study, Indian Point has been subject to six unplanned outages, some of them recently. Both the history of safety concerns and continuing problems at the aging facility demonstrate need for its closure and prompt decommissioning.⁴¹ Prompt decommissioning (within 20 years) would address many of the safety and site reuse problems local communities face in this cleanup and decommissioning process. We reiterate our support for a prompt, safe and thorough cleanup and decommissioning of the site.

I. Parcel-Specific Reuse Opportunities

The Site Reuse Study considered non-energy development (residential and commercial), and energy generation development reuse opportunities at each of four parcels of land segmented from the Indian Point site.⁴² However, the study does not consider any redevelopment or reuse opportunities for the site as a whole.

When it comes to specific reuse opportunities proposed by the Site Reuse Study, we recommend that the state seriously consider its "50 by 30" clean energy goals—to obtain 50

³⁶ See, e.g., Task Force Report at 20-22.

³⁷ Statements of Entergy at May 24, 2018 Local Task Force Meeting (May 24, 2018) (discussing Entergy's plan for current employees post-plant shutdown).

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ Task Force Report at 20.

⁴¹ Site Reuse Study at 37.

⁴² Site Reuse Study at 57-59.

percent of the state’s energy from renewable sources by the year 2030⁴³—and more closely examine energy storage opportunities at the site, such as battery storage. If feasible, battery storage would provide electrical grid support—which will become ever more essential as more renewable energy sources come online in New York State. Additionally, any site reuse or redevelopment opportunity considered by the Task Force must take into account and consider the site’s resiliency to climate change, and a transition to a carbon-neutral energy economy.

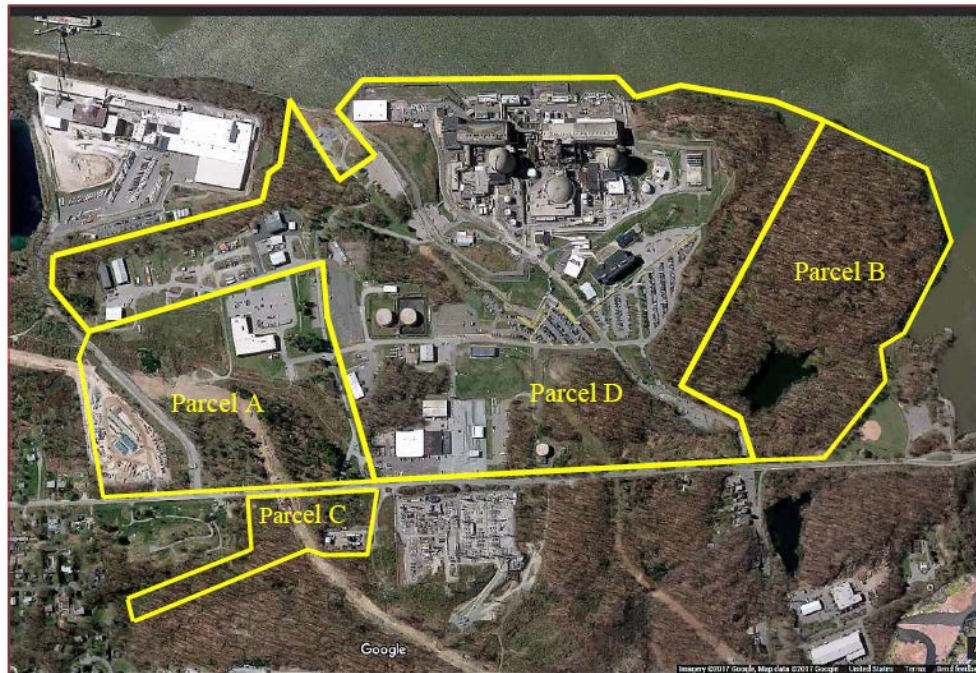


Figure 1: Parcel Map⁴⁴

Parcel A – The Site Reuse Study suggests that Parcel A—comprising approximately 50 acres of land containing rights-of-ways for electric and gas transmission lines, an access road to a gypsum plant and the Training Building—has potential for near-term reuse. However, the Site Reuse Study does not address or evaluate the risks posed to these redevelopment opportunities by the existing gas and electric transmission lines, nor the problems posed to any reuse by the small amount of undeveloped land remaining on the parcel.⁴⁵ The study also finds that these limitations mean that wind and solar development on the parcel are uneconomical.⁴⁶

Parcel B – The Site Reuse Study suggests that Parcel B should be considered for “delayed near-term” reuse opportunities because of its close proximity to the ISFSI and the huge amount of uncertainty surrounding the size the ISFSI will need to be, access roads to the ISFSI, and the length of time the ISFSI will remain on the site (given the federal government’s failure to develop a permanent repository for nuclear waste). Essentially, this means that, because of its proximity to

⁴³ NY State, “Governor Cuomo Announces Establishment of Clean Energy Standard that Mandates 50 Percent Renewables by 2030” (Aug. 1, 2016) available at <https://www.governor.ny.gov/news/governor-cuomo-announces-establishment-clean-energy-standard-mandates-50-percent-renewables>.

⁴⁴ Site Reuse Report at 2.

⁴⁵ *Id.* at 71.

⁴⁶ *Id.* at 74, 79.

the ISFSI and its “heavily wooded and rocky” geography, on its own, Parcel B will never be reusable or developable.⁴⁷ Parcel B has numerous geographical impediments to development, including steep rocky slopes in close proximity to the Hudson River, potential regulatory concerns surrounding the presence of endangered and protected species, and accessibility concerns where access roads would have to be built. As the Site Reuse Study notes, Parcel B has also “remained an undeveloped parcel for over 80 years.”⁴⁸ The poor geography of this parcel has prevented development from occurring here as of yet, and its proximity to the semi-permanent nuclear waste storage ISFSI means that it is highlight unlikely that this parcel will ever be developed.

Parcel C – Identified as a “near-term” development parcel, the Site Reuse Study suggests that this 18-acre section could be reused as commercial development, despite the existing natural gas pipeline. Energy storage should be considered here, as the site space, size and road proximity would make such redevelopment ideal. Yet, the Site Reuse Study does not address or evaluate the safety risks posed to these redevelopment opportunities by the existing gas and electric transmission lines, nor the problems posed to any reuse by the small amount of undeveloped land remaining on the parcel. Instead it merely states that “[t]he location of the [natural gas] transmission line will impact” siting of redevelopment opportunities.⁴⁹ Similarly, other renewable energy opportunities, such as wind turbines, are incapable of being implemented on this site because of limited access to the parcel; however, “post-decommissioning” such access “may improve.”⁵⁰

Parcel D – As the site of the ISFSI and location of the nuclear reactors, spent fuel pools and bulk of other irradiated material, Parcel D is classified for long-term use only by the Site Reuse Study. Additionally, the proximity of the ISFSI and spent fuel pools to the other parcels also impose reuse and redevelopment constraints on adjacent parcels as well, particularly parcel B (because of proximity to the ISFSI) and Parcel A (because of existing access road). As Parcel D is the largest parcel—though the most impacted by the nuclear facility—all redevelopment opportunities on Parcel D discussed in the study focus on much more uncertain long-term opportunities for redevelopment, as dependent upon what types of reuse occurs on adjacent parcels.⁵¹ Thus, the study’s evaluation of Parcel D redevelopment opportunities is very preliminary and thus vague.

As discussed above, after evaluating the reuse opportunities for each parcel, separately from the others, the Site Reuse Study fails to evaluate whether there would be any reuse opportunities if the whole site were kept intact and redeveloped as a whole. In fact, the Site Reuse Study makes clear that, based on space available and siting, the largest and most promising site reuse opportunity lies with Parcel D. For that reason alone, the State should examine how to achieve a prompt decommissioning of the site, so as to release the most valuable parcel back to the communities as quickly as possible.

⁴⁷ *Id.* at 3.

⁴⁸ *Id.* at 89.

⁴⁹ *Id.* at 92.

⁵⁰ *Id.*

⁵¹ *Id.* at 93 (“long-term development is expected to be directly influenced by the development of surrounding Parcels A and B”).

Similarly, the Site Reuse Study shows that, taken individually, each parcel of land is highly constrained by various issues including existing development (such as transmission lines and pipelines), small parcel size, geographical impediments (including steep rocky slopes in close proximity to the Hudson River), potential regulatory concerns surrounding the presence of endangered species, and accessibility concerns where access roads would have to be built. All of these limitations, discussed in detail for each parcel in the Site Reuse Study, motivate the bigger picture perspective that redeveloping the Indian Point site piecemeal in small parcels will not be possible. To inform its decisions going forward, the Task Force needs to understand what potential whole-site reuse opportunities are available, and the concerns surrounding that option. The Site Reuse Study should thus evaluate whole-site redevelopment opportunities.

The study even admits that “[t]he opportunities discussed in this report are not yet considered options because property subdivisions and ownership transfer must first be resolved.”⁵² This fundamental issue undermines all of the report’s conclusions since, as discussed above, Entergy has stated publicly that it will not release portions of the site piecemeal prior to or during decommissioning.⁵³ This too weighs in favor of treating the site as a whole when weighing development and reuse opportunities. By making the whole site available and reimagining the entire site as a whole and not piecemeal, reuse opportunities will be even more expanded. In the interim, the state should advocate for legislation or taxes to incentivize a prompt decommissioning and release of the entire site for reuse.

Conclusion

Overall, we appreciate the good start the Task Force has made in evaluating and assessing the existing regulatory scheme underpinning the decommissioning process, and identifying the issues the local communities will face in the coming years. However, we believe the Task Force should evaluate the realism of the site reuse assumptions in the D.L. English report. In addition, the it should evaluate ways in which to achieve a prompt decommissioning which would benefit local communities and the Hudson River. The State has a real opportunity to stand up for local interests in the various ways discussed above, including examining potential state legislation, executive action, taxation, input into the federal regulatory rulemaking process, or undertaking further direct negotiation with Entergy. Finally, we reiterate that projects financed by the Closure Agreement’s environmental and community fund should be prioritized and allocated according to criteria explicit in the agreement itself.

We appreciate the opportunity to comment on these important issues. Thank you for your consideration of our comments.

Sincerely,

Richard Webster, Legal Director
Riverkeeper, Inc.

⁵² *Id.* at 1.

⁵³ *See supra.*

Attachment A



April 30, 2018

Via electronic and certified mail

Tom Congdon
Chair, Indian Point Closure Task Force
Executive Deputy, New York State Department of Public Service
3 Empire State Plaza
Albany, New York 12223-1350

Re: Potential projects to be funded by the Indian Point Environmental and Community Fund – Hudson River Biological Monitoring Program

Dear Mr. Congdon:

I am writing to you on behalf of Riverkeeper, Inc., a member-supported watchdog organization dedicated to defending the Hudson River and its tributaries, and protecting the drinking water supply of nine million New York City and Hudson Valley residents. For more than 50 years, Riverkeeper has stopped polluters, championed public access to the river, influenced land use decisions, and restored habitat, benefiting the natural and human communities of the Hudson River and its watershed. We thank you for coordinating a very useful meeting on potential projects to be funded by the Indian Point Environment and Community Fund established under the agreement to close Indian Point (the “Closure Agreement”).¹

Riverkeeper, requests that long-term funding be allocated to the Hudson River Biological Monitoring Program (“HRBMP”), including the Longitudinal River Ichthyoplankton Survey, the Fall Shoals Survey, and the Beach Seine Survey. As part of the Hudson River Settlement Agreement of 1980, the operator of Indian Point partially funds this survey. The closure of other plants that fund this survey has already reduced its scope. The closure of Indian Point means that the funding of this invaluable longstanding program is now under threat. Because the HRBMP provides critical information about the ecological health of the Hudson over time, we would like to see it given secure long term funding from the fund.

This request is based upon the language of the Closure Agreement, which requires that priority be given “to projects for dam or culvert removal, purchase of sensitive wetlands areas along the Hudson River, continuation of scientific studies designed to

¹ Available at <https://www.riverkeeper.org/wp-content/uploads/2017/01/Indian-Point-Closure-Agreement-January-8-2017.pdf>.

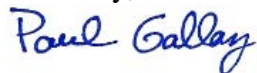
advance the protection of riverine species, and prevention of the introduction of invasive species into the Hudson River watershed.” The HRBMP is a scientific study designed to advance the protection of riverine and estuarine species by providing a long term view of fish populations throughout the River. Funding for its continuation should therefore be considered a priority project.

In addition to being a priority project under the Closure Agreement, the HRBMP is extraordinarily important, because it provides a retrospective and unbroken view of the ecological health of the estuary over time by tracking numerous ecological indicators and a host of environmental factors. The HRBMP is unique in that it encompasses the entire estuarine portion of the Hudson River, and has been conducted continuously since 1982, providing unparalleled continuity. Additionally, the data collected undergo rigorous control and quality assurance. For these reasons, the HRBMP allows for tracking and modeling of a variety of biological indices based upon thirty five years of monitoring.

In the near term, continuing this survey should demonstrate the ecological improvements that will come about as a result of closing Indian Point as well as from improved fisheries management, dam removal and habitat restoration projects beginning to be implemented throughout the valley. To date, the HRBMP has essentially documented the decline of numerous species and the overall vitality of the river. Now that numerous restoration efforts and specific protections have been implemented we hope that the HRBMP will allow us to measure success - a new and healthier future for the river. We are confident that by documenting recovery more success will follow. Over the longer term, the Hudson River will face increasing environmental challenges as sea levels rise and our climate warms. Continuing to build upon the existing long term data set is essential to enable us all to track and evaluate ongoing environmental changes. Effective management and restoration of the Hudson’s aquatic life will not be possible without the data which the HRBMP provides.

We therefore respectfully request that you carefully consider funding the continuation of this invaluable monitoring program from the Indian Point Community and Environment Fund. Thank you for your consideration. Please feel free to contact me with any questions or requests for additional information.

Sincerely,



Paul Gallay

Cc: Linda Puglisi, Supervisor of the Town of Cortlandt
Theresa Knickerbocker, Mayor, Village of Buchanan

Attachment B

Rulemaking1CEm Resource

From: RulemakingComments Resource
Sent: Friday, March 25, 2016 2:36 PM
To: Rulemaking1CEm Resource
Subject: Comment on ANPR-26, 50, 52, 73, and 140 - Regulatory Improvements for Decommissioning
Attachments: Comment from Fettus on behalf of Natural Resources Defense Council, Inc..pdf

DOCKETED BY USNRC—OFFICE OF THE SECRETARY

SECY-067

PR#: ANPR-26, 50, 52, 73, and 140

FRN#: 80FR72358

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Regulatory Improvements for Power Reactors Transitioning to Decommissioning

Comment On: NRC-2015-0070-0007

Regulatory Improvements for Decommissioning Power Reactors; Extension of Comment Period

Document: NRC-2015-0070-DRAFT-0119

Comment on FR Doc # 2015-32599

Submitter Information

Name: Geoffrey Fettus

General Comment

Natural Resources Defense Council, Inc. (NRDC) Comments on: Regulatory Improvements for Decommissioning Power Reactors, Advance Notice Of Proposed Rulemaking, Request For Comment Docket ID NRC-2015-0070

Attachments

NRDC Comments on Regulatory Improvements for Decommissioning Power Reactors

Natural Resources Defense Council, Inc. (NRDC)
**Comments on: Regulatory Improvements for
Decommissioning Power Reactors, Advance Notice Of
Proposed Rulemaking, Request For Comment**
Docket ID NRC-2015-0070



March 18, 2016

**Natural Resources Defense Council, Inc.
1152 15th St. NW, Suite 300
Washington, D.C. 20005
Tele: 202-289-6868**

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March 18, 2016

Via Electronic Mail

Secretary, U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTN: Rulemakings and Adjudications Staff

RE: Regulatory Improvements for Decommissioning Power Reactors, Advance Notice Of Proposed Rulemaking; Request For Comment; Docket ID NRC-2015-0070.

Dear Sir/Madam:

The Natural Resources Defense Council (NRDC) writes today to comment on the Nuclear Regulatory Commission (NRC) *Regulatory Improvements for Decommissioning Power Reactors, Advance Notice Of Proposed Rulemaking; Request For Comment*; Docket ID NRC-2015-0070, 80 Fed. Reg. 72358-72373 (November 19, 2015) (hereinafter “ANPRM”).

We begin by observing that attention to reactor decommissioning by the NRC came late in the nuclear era, after many of today’s nuclear power plants were already in operation. The NRC’s current objective of 2019 for completion of a rulemaking on reactor decommissioning is timely and overdue. As we note later in these comments (*see infra* at 20 for discussion and citation), we agree with the NRC’s own recent adjudicatory reflections, “[t]he NRC has never promulgated comprehensive regulations governing the decommissioning of nuclear power reactors.” It is past time the agency promulgate such comprehensive regulations. Decommissioning is an integral component of the nuclear energy lifecycle, and communities that host nuclear power plants need to know the rules of the road from the start of a reactor project to the end.

This issue of decommissioning is all the more important with respect to the fact that five reactor retirements since 2013 occurred without advance notice or pre-planning, and with respect to fact of growing challenges for the U.S. nuclear industry related to aging, reliability and safety, and economic competitiveness. Together these challenges will likely result in a growing number of reactors transitioning to decommissioning in the decades ahead.

I. NRDC Statement of Interest

NRDC is a national non-profit environmental organization with over one million combined members and activists. NRDC's activities include maintaining and enhancing environmental quality and monitoring federal agency actions to ensure that federal statutes enacted to protect human health and the environment are fully and properly implemented. Since 1970, NRDC has sought to improve the environmental, health, and safety conditions at the civil nuclear facilities licensed by the NRC and we will continue to do so. We are pleased at this opportunity to comment on this long overdue ANPRM.

II. Summary of NRDC's Comments

A revised and comprehensive NRC regulatory basis for decommissioning is a key component of a necessary, greater national focus on the back end of the nuclear fuel cycle, including the remediation of radiologically contaminated sites and radioactive waste management. Decommissioning issues are pertinent to nuclear reactor design and operation, so as to minimize nuclear end-of-life-cycle environmental impacts, risk and cost.

NRDC agrees with the statement in the NRC's decommissioning ANPRM that: "During reactor decommissioning, the principal radiological risks are associated with the storage of spent fuel onsite." While the risk of zirconium fire is not the only radiological risk associated with decommissioning, such an event would have by far the largest impacts in terms of off-site radiological contamination. NRDC disputes that the

risk of a radiological release from a decommissioning reactor is always significantly lower than that for an operating reactor, because risk is not just a function of whether the reactor is generating electricity or not, but also a function of facility maintenance, accident mitigation measures and security.

During decommissioning a large radiological source term is still present. Spent nuclear fuel is dangerous and highly toxic while fissioning in reactors and it remains so for millennia to follow. Spent fuel remains dangerous while resting in overpacked pools not designed for the length of time they will be used, including when a reactor has been shut down and decommissioning has commenced. We recommend no relaxation of health, worker safety or environmental exemptions – as have become common at the growing number of decommissioning sites – as long as spent fuel remains in the pools.

The ANPRM describes the intention of the NRC to improve the efficiency of decommissioning regulations but states that the proposed rulemaking is not based on safety concerns. We caution the NRC that, if not done right, safety concerns can emerge from this rulemaking process.

NRDC is supportive of a tiered approach for modifying emergency planning requirements. We recommend that the tiers be defined as: (1) the period immediately after cessation of power operations; (2) the period during removal of fuel from the reactor vessel; (3) the period when any spent fuel is still in wet pool storage; and (4) the period when all spent fuel is in dry cask storage. NRDC cautions against any erosion of emergency planning, physical security requirements, fitness for duty requirements, or training requirements until the final tier is achieved where the physical protection of dry cask storage creates a robust barrier to release of fission products.

Furthermore, NRDC comments that the NRC should maintain the Emergency Response Data System (ERDS) during decommissioning up to the final tier where all fuel is in dry cask storage. But – fully throughout decommissioning – NRDC comments that the NRC should require decommissioned reactor sites provide the public with real-

time, online radiation data within the decommissioned plant site and in the emergency planning zone. Networks of radiation sensors can be set up and maintained at very low cost, and provide transparency for communities hosting decommissioning reactors with spent fuel for decades. This is not an extraordinary proposition. NRDC itself is working to develop citizen radiation monitoring capabilities and its well within the capacity of NRC to do the same.

An important aspect of decommissioning is determining how clean the area is. The NRC's release criteria for unrestricted release include a dose limit to an average member of the critical group and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). This limit cannot be measured directly. So a clear understanding of dose modeling is critical. Dose modeling helps to translate the dose release criteria to measurable concentrations of radioactivity in different environmental pathways.

The decommissioning process cannot be excluded from the National Environmental Policy Act (NEPA) process. At a minimum, the billion-dollar operation that is decommissioning a power reactor is a major federal action affecting the environment and requires supplementation of an existing environmental impact statement. The generic NEPA coverage of the past is dated, stale, and misses a host of site specific opportunities. This NEPA supplemental document for each decommissioning site should be done in light of NRC requiring the licensee to submit a formal decommissioning plan that provides a complete roadmap that both the state and affected community can follow in such a massive undertaking. The Post-Shutdown Decommissioning Activities Report (PSDAR) now submitted within two years of final shutdown has been an inadequate process that is only generating needless and contentious disputes. A formal decommissioning plan, a NEPA supplement, and a necessary restoration of public and state hearing and intervention rights are necessary both to restore public trust and acceptance of NRC's regulatory oversight and the final assurance a site will be cleaned up and restored to productive use.

As noted, a role for the NEPA supplemental is to address site-specific issues for reactor decommissioning. Decommissioning will impact different communities in different ways, including issues related to environmental justice. Communities hosting nuclear power plants can and have changed dramatically over decades of reactor operations preceding decommissioning. The source terms in spent nuclear fuel pools will vary from decommissioning reactor to decommissioning reactor, along with the configuration of spent fuel pools. These site-specific issues point to the need for a close look at plans and risks with an opportunity for stakeholder input in the context of NEPA, and provide the framework for the role of State and local governments and non-governmental stakeholders in the decommissioning process.

The NRC needs to be explicit and have absolute clarity as to the viability and necessary amount of funding available to support the decommissioning process. As has been noted by others such as the Government Accountability Office, NRC's formula may not reliably estimate adequate decommissioning costs assurance. This cannot stand. Along with a thorough review that the financial assurance requirements are adequate to the task, we comment that NRC present a public, online dashboard for the decommissioning process where stakeholders can see if the owner of a reactor in their community is putting enough funds aside, and if investment is performing adequately to meet the needs of the cleanup. Such a process would do much to bolster public trust in the decommissioning process.

The ANPRM notes the objective for the draft regulatory basis of evaluating "the appropriateness of maintaining the three existing options (DECON, SAFSTOR, and ENTOMB) for decommissioning and the timeframes associated with those options." In a revised regulatory framework for decommissioning, the NRC should eliminate the ENTOMB option and fundamentally revise the SAFSTOR option. NRDC comments that SAFSTOR can simply become an expedient way to defer addressing important cleanup responsibilities thereby raising money for decommissioning costs that should have been there in the first instance, while putting what can be an extraordinary burden on states and affected communities by drawing out the decommissioning process.

The ANPRM is candid that the 60 year duration of decommissioning activities was chosen because it roughly corresponds to 10 half-lives for cobalt-60. We advise the commission that the timetable for decommissioning needs to be worked out with human lives and community livelihoods in mind and not just nuclear physics. And currently the NRC's approval of a PSDAR is not even required as part of the regulatory framework. NRDC comments that it is time for the NRC to step up and take back key responsibilities as regulator in decommissioning, established on a framework of maximum protection from risk –and a framework of public input and of transparency of information.

III. Background on Decommissioning

When a nuclear plant is retired, the facility must be decommissioned by safely removing it from service and reducing residual radioactivity to a level that permits release of the property and termination of the operating license. The purpose of decommissioning is to protect both public health and safety and the environment from accidental releases of remaining radioactivity.¹

Currently there are three alternative decommissioning approaches within NRC's regulatory framework: DECON, SAFSTOR and ENTOMB. In DECON, all components and structures that are radioactive are cleaned or dismantled, packaged, and shipped to a low-level waste disposal site or they are stored temporarily on site. In SAFSTOR, the nuclear plant is kept intact and placed in protective storage for up to 60 years. This method, which involves locking the part of the plant that contains radioactive material and monitoring it with an on-site security force, essentially also uses time as a decontaminating agent by allowing the radioactive components to decay to stable elements. In ENTOMB, radioactive contaminants are permanently encased on site in structurally sound material such as concrete and appropriately maintained and

¹ Found online at <https://www.princeton.edu/~ota/disk1/1993/9305/9305.PDF>

monitored until the radioactivity decays to a level permitting restricted release of the property.²

NRDC notes that deliberately delaying the decommissioning and demolition of a plant, or conducting it in time separated stages, will result in a subsequent decrease in the radioactive inventory over time and can significantly reduce the quantities of materials with higher radioactivity levels. Because of the process of radioactive decay, the quantity of radioactivity decreases with time after plant shutdown, particularly for reactor components where ⁶⁰Co is dominant.³ However, as commented below, the SAFSTOR option for decommissioning currently does not provide a clear regulatory framework with respect to the mitigation of exposure from allowance for natural decay of isotopes. Table 1 shows the approximate masses and activities of steel from active areas at various times after shutdown in a 1000 MW(e) PWR.⁴ When comparing 5 and 25 years after shutdown, the amount of steel contaminated to levels higher than 0.1 Bq/g or 0.37 Bq/cm² decreases by about 50%. Further reductions may be made by decontamination.

Table 1 Effect of decay on masses and activity of steel from a 1000 MW(e) PWR

		Time after reactor shutdown					
		5 years of decay		25 years of decay		100 years of decay	
Surface activity (Bq/cm ²)	Average activity (Bq/g)	Mass (t)	Total activity (Bq)	Mass (t)	Total activity (Bq)	Mass (t)	Total activity (Bq)
37-370	10	800	8.0 × 10 ⁹	440	4.4 × 10 ⁹	240	2.4 × 10 ⁹
3.7 - 37	1	1600	1.6 × 10 ⁹	880	8.8 × 10 ⁸	480	4.8 × 10 ⁸
0.37 - 3.7	0.1	3200	3.2 × 10 ⁸	1760	1.8 × 10 ⁸	960	9.6 × 10 ⁷

² Found online at <http://www.nei.org/master-document-folder/backgrounders/fact-sheets/decommissioning-nuclear-energy-facilities>

³ Found online at http://www-pub.iaea.org/MTCD/publications/PDF/trs462_web.pdf

⁴ Found online at http://www-pub.iaea.org/MTCD/publications/PDF/trs462_web.pdf

In the United States, 10 reactors have completed decommissioning and 16 reactors are in the decommissioning process. Fourteen out of the 16 plants in the decommissioning process are using the SAFSTOR option, and 2 are using the DECON option. Table 2 shows the decommissioning status for retired NRC-licensed reactors in the U.S.

Table 2. Decommissioning status for retired NRC-licensed reactors

No	Reactor	Owner	Type	Location	End of operation	Status	Estimated date for closure
1	Big Rock Point	Consumers Energy	BWR	Charlevoix, MI	08/29/97	Decommissioned	12/30/2012
2	Haddam Neck	Connecticut Yankee Atomic Power	PWR	Haddam Neck, CT	12/09/96	Decommissioned	11/15/2007
3	Maine Yankee		PWR	Wiscasset, ME	12/06/96	Decommissioned	2005
4	Rancho Seco	Sacramento Municipal Utility	PWR	Sacramento, CA	06/07/89	Decommissioned	10/23/2009
5	Trojan	Portland General Electric	PWR	Portland, OR	11/09/92	Decommissioned	2005
6	Yankee Rowe	Yankee Atomic Electric Company	PWR	Franklin Co., MA	10/01/91	Decommissioned	
7	Pathfinder	Northern States Power	BWR	Sioux Falls, SD	09/16/67	Decommissioned	
8	Saxton	Saxton Nuclear Experimental Corp	PWR	Saxton, PA	05/01/72	Decommissioned	2005
9	Shippingport	Dusquesne Light Company	PWR	Shippingport, PA	10/01/82	Decommissioned	12/89
10	Shoreham	GE	BWR	Suffolk Co., NY	06/28/89	Decommissioned	05/95
11	Humboldt Bay	PG&E	BWR	Eureka, CA	07/02/76	DECON	2019
12	Zion – Units 1 & 2	Exelon	PWR	Zion, IL	02/13/98	DECON	12/31/2020
13	Crystal River – Unit 3	Duke	PWR	Crystal River, FL	02/20/2013	SAFSTOR	2074
14	Dresden – Unit 1	Exelon	BWR	Morris, IL	10/31/78	SAFSTOR	12/31/2036
15	Fermi – Unit 1	DTE Energy	Fast Breeder	Monroe Co., MI	09/22/72	SAFSTOR	10/01/2032
16	GE VBWR	GE	BWR	Sunol, CA	12/09/63	SAFSTOR	2019
17	Indian Point – Unit 1	Entergy	PWR	Buchanan, NY	10/31/74	SAFSTOR	10/01/2026

No	Reactor	Owner	Type	Location	End of operation	Status	Estimated date for closure
18	Kewaunee	Dominion	PWR	Carlton, WI	05/07/2013	SAFSTOR	2073
19	LaCrosse	Dairyland Power Cooperative	BWR	Genoa, WI	04/30/87	SAFSTOR	TBD
20	Millstone – Unit 1	GE	BWR	Waterford, CT	07/21/88	SAFSTOR	12/31/2056
21	Nuclear Ship Savannah	US Gov	PWR	Baltimore, MD	11/70	SAFSTOR	12/01/2031
22	Peach Bottom – Unit 1	Exelon	HTGR	Delta, PA	10/31/74	SAFSTOR	12/31/2034
23	San Onofre – Unit 1	Southern California Edison	PWR	San Clemente, CA	11/30/92	SAFSTOR	12/30/2030
24	San Onofre – Units 2 & 3	Southern California Edison	PWR	San Clemente, CA	06/12/13	SAFSTOR	12/31/2031
25	Three Mile Island – Unit 2	FirstEnergy	PWR	Middletown, PA	03/28/79	SAFSTOR	12/31/2036
26	Vermont Yankee	Entergy	BWR	Vernon, VT	12/29/2015	SAFSTOR	2073

IV. The Risk of Off-Site Radiological Release during Decommissioning

During the decommissioning of nuclear reactors, the highest-impact radiological risk is associated with zirconium fires at the storage of spent fuel onsite in wet pools. Until spent nuclear fuel is removed from the decommissioning plant site, a large radiological source term is still present. The risk of off-site release of fission products is not just a function of whether the reactor is operational, but also a function of facility maintenance, accident mitigation measures and security. NRDC’s comments on decommissioning flow primarily from consideration of this risk, and mitigation measures to reduce this risk.

Spent fuel pool fires can be occurred due to a loss of pool water inventory caused by either accidents or terrorist attacks. While the probability of an accident can be estimated using a probabilistic risk assessment framework, the total probability of such

an event cannot be known with certainty. The accident progression in a spent fuel pool fire is as follows:

- A Leak of the pool water or failure of the pool cooling pumps occurs;
- The water level of the pool falls below the top of the spent fuel, uncovering the fuel;
- Heat-up of the fuel ensues, and the fuel cladding initiates an oxidation reaction with water;
- This cladding oxidation reaction increases the temperature of the cladding further and causes the cladding to melt and catch fire, and explosive hydrogen gas is also produced;
- Radioactive aerosols and vapors disperse throughout the spent fuel pool building and outside of the reactor building; and
- A potentially very large inventory of Cs-137, radioactive iodine and other fission products is released to the atmosphere that can lead to the radiation exposure of nearby populations.

According to NRC assumptions for the high-density spent fuel pool zirconium fire involving a leak without mitigation measures, the maximum release is approximately 75%, which was used for the base case. A 90% and 10% release fractions are used for the high estimate and low estimate, respectively, to account for spent fuel pool variations and uncertainties in the accident progression.⁵

How would the consequences of spent fuel pool fires be different at different decommissioning reactor sites in terms of nearby populations and spent fuel pool packing? The table below shows consequence estimates for the five sites, for 3.5 and 35 MCi Cs-137 releases.⁶

⁵ NRC, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel," COMSECY-13-0030, November 12, 2013

⁶ Jan Beyea, Ed Lyman, Frank von Hippel, "Damages from a Major Release of ¹³⁷Cs into the Atmosphere of the United States," *Science and Global Security*, 12:125-136, 2004.

Table 3. Estimates of economic losses (\$ billions) and cancer deaths.

Site	Release (MCI)	Total costs	Condemned property	Other losses ³⁰	Temporary relocation	Decontamination ³¹	Cancer deaths ³²
Catawba	3.5	71	10	32	0	29	3,100
	35.0	547	145	192	11	199	7,650
Indian point	3.5	145	43	42	5	56	1,500
	35.0	461	282	85	8	86	5,600
LaSalle	3.5	54	2	23	1	27	2,100
	35.0	270	10	121	7	131	6,400
Palo Verde	3.5	11	1	5	0	5	600
	35.0	80	24	26	2	29	2,000
Three-Mile Island	3.5	171	13	65	6	87	2,300
	35.0	568	278	134	11	144	7,000
Averages	3.5	91					1,900
	35.0	385					5,700

Resulting cancer deaths described at the column of the table depend on nearby population densities of the sites. The figure below shows the cumulative populations within a given radius out to 1600 km from each of these nuclear power plants.⁷

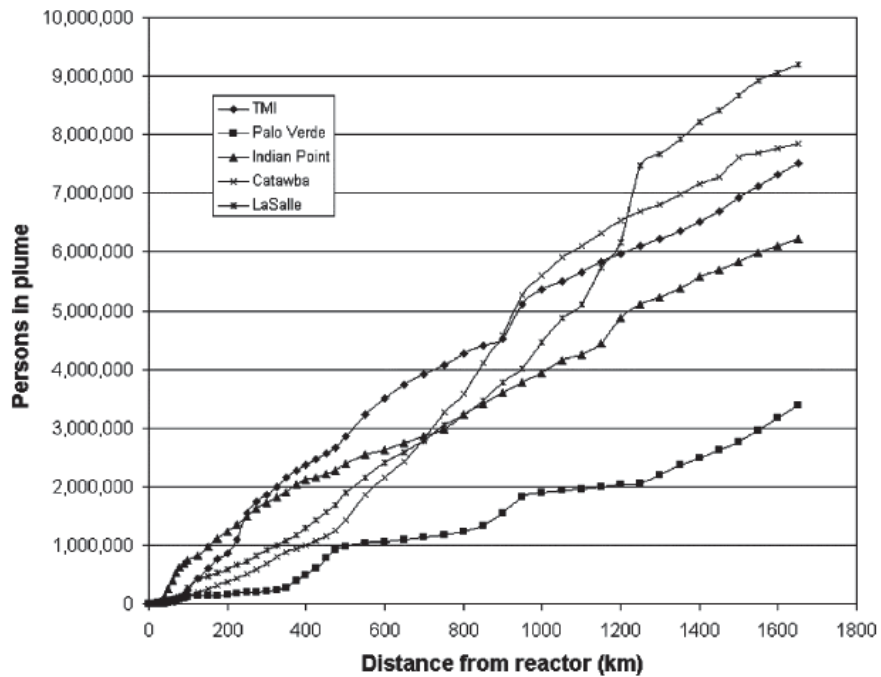


Figure 1. Cumulative population as a function of distance from five U.S. nuclear power plants multiplied by a plume-width factor of 0.038.

⁷ Jan Beyea, Ed Lyman, Frank von Hippel, "Damages from a Major Release of ¹³⁷Cs into the Atmosphere of the United States," Science and Global Security, 12:125-136, 2004.

The table below shows consequence estimates for the Peach Bottom site in terms of spent fuel pool packing, i.e. whether dense packing (high-density pool) or not (low-density pool).⁸ According to the table, the U.S. NRC estimates spent fuel pool fire consequences from high-density pool fire to be about 40 times than low-density pool fire and 10-100 times worse than Fukushima.

Table 4. U.S. NRC's estimated consequences from spent fuel pool fire

	High-density pool	Low-density pool	Fukushima-Daiichi
Release (PBq)	925	4	6-20
Cancer deaths	43,100	1,100	~1000
Area evacuated (km²)	46,600	221	1,100
Population displaced	10.9 million	72,000	165,000

This dense-packing is to provide additional space for normal storage pool of spent fuel by spacing a spent fuel assembly about a half of the original spacing by enclosing each spent fuel assembly in a metal box whose walls contain neutron-absorbing boron. However the partitions of the walls would block the horizontal circulation of cooling air if the pool water were lost.⁹

V. A Tiered Approach to Emergency Preparedness, Security and Workforce Management

In contrast to the current system of *ad hoc* exemptions, NRDC is supportive of a tiered approach for modifying emergency planning requirements. We recommend that the tiers be defined as: (1) the period immediately after cessation of power operations; (2) the period during removal of fuel from the reactor vessel; (3) the period when any

⁸ Frank von Hippel, "The large costs and small benefits of reprocessing," Updated for KAIST graduate students hosted by the Partnership for Global Security (PGS) and the US-Korea Institute at SAIS, Washington DC, 20 January 2016.

⁹ Robert Alvarez et al., "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States," *Science and Global Security*, 11:1-51, 2003.

spent fuel is still in wet pool storage; and (4) the period when all spent fuel is in dry cask storage. NRDC cautions against any erosion of emergency planning, physical security requirements, fitness for duty requirements, or training requirements until the final tier is achieved where the physical protection of dry cask storage creates a more robust barrier to release of fission products. The primary factor to be evaluated in this tiered approach is the risk of off-site radiological release due to zirconium fire.

Within the first two tiers, the period immediately after cessation of nuclear power operations and the period during de-fueling, the emergency preparedness requirements, formal offsite radiological emergency plans, emergency planning zones, alert and notification systems should be maintained during these tiers as for an operating reactor. Physical security requirements and fitness for duty requirements should similarly be maintained during these tiers as for an operating reactor. Prior to de-fueling, power reactor licensees should continue to be required to classify and declare an emergency, assess releases of radioactive materials, notify licensee personnel and offsite authorities, take mitigating actions, and request offsite assistance if needed. During the first two tiers, licensees at decommissioning sites should maintain existing agreements with offsite authorities for fire, medical, and law enforcement support that are were in place prior to cessation of nuclear power operations. These first two tiers are distinguished by existing NRC oversight governing distinct power reactor activities, but in terms of accident safeguards and preparedness, these first two tiers would regulated in continuous manner from before cessation of operations with respect to the risk of severe accident and offsite release of radiological materials.

Upon permanent removal of fuel from the reactor vessel the third tier, emergency preparedness requirements, formal offsite radiological emergency plans, emergency planning zones, alert and notification systems, physical security requirements and fitness for duty requirements should be re-oriented to focus on mitigating risk of off-site radiological release from spent fuel pool fires. NRC should require the licensee to implement emergency planning and preparedness based on plume modeling of the source term from the spent fuel inventory within the storage pool, including site-specific

fuel burnup, pool racking, pool construction, and regional meteorological and population data. Physical security requirements should be adapted to focus on greater protection of the spent fuel pool given changes to personnel and procedures across the plant site after cessation of reactor operations. For this tier, the emergency planning zone size and regulatory allowances for changes to activities or procedures impacting emergency planning-related equipment would have as a basis the calculated consequences of a zirconium fire in a spent fuel pool at the decommissioning reactor.

In the third tier of the decommissioning process, the period when any spent fuel is still in wet pool storage, nuclear power reactor licensees should continue to be required to review all emergency planning program elements every 12 months to ensure protection of plant workers, regional populations and the environment from the consequences of a zirconium fire. With respect to emergency planning, licensees should maintain interfaces with State and local government officials to support emergency planning and disaster response based on the source term plume modeling from a spent fuel pool zirconium fire.

Within this third tier, nuclear power reactor licensees would continue to be required to make an immediate notification to the NRC for the declaration of any of the emergency classes specified in the licensee's NRC-approved emergency plan pertaining to a zirconium fire in the spent fuel pool. Additionally, nuclear power reactor licensees would continue to be required to make an 8-hour report of any event that results in a major loss of emergency assessment capability, offsite response capability, or offsite communications capability specific to the spent nuclear fuel pool and its supporting infrastructure and security configuration, including the decommissioning plant as a functioning system.

Furthermore, NRC should maintain the Emergency Response Data System (ERDS) during decommissioning up to the final tier where all fuel is in dry cask storage. But – fully throughout decommissioning – NRC should require decommissioned reactor sites provide the public with real-time, online radiation data within the decommissioned plant site and in the emergency planning zone. As described below, networks of radiation sensors can be set up and maintained at very low cost, and provide

transparency for communities hosting decommissioning reactors with spent fuel for decades.

When the fourth tier is reached during the decommissioning process, at which time all spent fuel has been removed from wet pool to dry cask, emergency preparedness requirements, formal offsite radiological emergency plans, emergency planning zones, alert and notification systems can be re-assessed in light of more robust protection of the residual source term after cessation of operations of the nuclear reactor.

VI. Dose Modeling and Radiation Monitoring for Regulation of Decommissioning

An important aspect of decommissioning is determining how clean the area is. The NRC and the U.S. Environmental Protection Agency (EPA) are the two principal federal agencies responsible for the cleanup and decommissioning of radioactively contaminated sites. These agencies have their own methods of determining a cleanup. The NRC has adopted unrestricted use radiological criteria for license termination of 25 mrem (0.25 mSv) per year total effective dose equivalent to an average member of the critical group from all pathways including groundwater and drinking water sources. The NRC also requires licensees to demonstrate that residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).¹⁰ The EPA's release criteria are risk-based rather than dose-based. Specifically, the EPA uses an acceptable lifetime excess cancer risk of 10E-6 to 10E-4 to assess whether a site should be released or not.¹¹

These quantities cannot be measured directly. So NRDC comments that clear understanding of dose modeling is critical. Dose modeling analysis helps to translate the dose- or risk- based release criteria (e.g., mSv/y or mrem/y) into measurable concentrations of radioactivity (e.g., Bq/Kg or pCi/g). Dose modeling can also be used to translate known radionuclide concentration at a site into an annual dose/risk value. Dose modeling analysis should be conducted using environmental pathway analysis and modeling of dose/risk impacts, or exposures, to a human receptor representing a

¹⁰ Found online at http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/30/060/30060319.pdf

¹¹ Found online at <https://www.ornl.gov/documents/ivhp/PhD-Dissertation-E-Abelquist-7-29.pdf>

specific critical group of the potentially exposed population. Environmental pathway analysis includes:

- i. Direct radiation from equipment;
- ii. Internal radiation from inhaled radioactive aerosols; and
- iii. External radiation from radioactive aerosols in premise

Radiation monitoring should have a special importance in the entire decommissioning process. Radiation monitoring should be a key component in the process of reactor dismantlement, decontamination and cleaning of equipment, facilities and buildings as well as radioactive waste disposal. All personnel working in radiological designated areas at a decommissioned reactor wear a personal dosimeter. These dosimeters, however, only provide a retrospective measure of dose received by an individual and give no indication of the instantaneous dose or dose rates that an individual has/is being exposed to. Therefore, as stated above, NRC should require that reactors undergoing a decommissioning process to provide the public with real-time, online radiation data within the decommissioned plant site and in the emergency planning zone. Radiation monitoring should be done by involving the communities living within the emergency planning zone of the reactor. Radiation monitoring stations can be established on a community-by-community basis. In order to establish a proper monitoring system, NRC should address the following critical questions:

- How many monitoring stations should be established and where should they be located?
- Who should do the monitoring and how should they be selected?
- What kind of radiation detector and real-time communication system should be selected?
- How should the radiation data be presented and disseminated to the public?
- How will readings above normal background levels be handled?
- What kind of education and training should the communities receive to prepare them to conduct the monitoring?

VII. National Environmental Policy Act (NEPA) Implications for Decommissioning

NEPA's "twin aims" are to force every agency "to consider every significant aspect of the environmental impact of a proposed action," and to "inform the public that it has indeed considered environmental concerns in its decision-making process." *Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 97 (1983). NEPA requires federal agencies to prepare an Environmental Impact Statement ("EIS") for all "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(C). Among other issues, an EIS must analyze the "environmental impact of the proposed action" and reasonable alternatives. *Id.* This includes considering the risks that the proposed action may result in a catastrophic environmental impact, the consequences of such an outcome, and reasonable alternatives for mitigating such consequences. *e.g.*, *New York et al. v. NRC*, 681 F.3d 471, 478 (D.C. Cir. 2013) ("Under NEPA, an agency must look at both the probabilities of potentially harmful events and the consequences if those events come to pass."); *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 741 (3d Cir. 1989) (alternatives to mitigate the effects of severe accidents "must be given careful consideration" in the NEPA process).

The renewal of a nuclear power plant operating license is a major federal action significantly affecting the quality of the human environment, and thus a new EIS is required. *New York*, 681 F.3d at 476; *see also* 10 C.F.R. § 51.95(c). In addition, an agency must supplement an EIS in the event of "significant new circumstances," or new "information relevant to *environmental concerns and bearing on the proposed action or its impacts.*" 40 C.F.R. § 1502.9(c); *Deukmejian v. NRC*, 751 F.2d 1287, 1298 (D.C. Cir. 1984) (emphasis added). Thus, the decommissioning of a nuclear power reactor – a billion dollar cleanup operation that takes more than a decade to perform in the best of cases – cannot be excluded from the NEPA process. *See C.A.N. v. NRC*, 59 F.3d. 284, 292-93 (1st Cir. 1995). Currently, subsequent to its rewriting of the decommissioning rules 1996, NRC last attempt to bound the decommissioning process was with a generic supplemental NEPA analysis concluded in 2002. *See Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities*, Supplement 1, *Regarding the*

Decommissioning of Nuclear Power Reactors; NUREG-0586, Supplement 1, Vols. 1 and 2; November 2002, <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0586/s1/v1/>. In that NEPA review, NRC states its limited analysis was a supplement to the *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities* issued in 1988 (NUREG-0586), prepared because of technological advances in decommissioning operations, experience gained by licensees, and changes made to NRC regulations since the original decommissioning GEIS in 1988.

The purpose of NRC's 2002 generic supplement was explicit: "to provide an analysis of environmental impacts from decommissioning activities that can be treated generically so that decommissioning activities for commercial nuclear power reactors conducted at specific sites will be bounded, to the extent practicable, by this and appropriate previously issued environmental impact statements." NUREG-0586, Supplement 1 at 1-1. NRC further states in a public presentation: "if the environmental impacts that are identified have not been considered in existing environmental assessments, the licensee must address the impacts in a request for a license amendment regarding the activities. The licensee also must submit a supplement to its environmental report that relates to the additional impacts. The NRC will review this environmental assessment or supplement to the environmental statement in conjunction with its review of the license amendment request." *See* <http://www.nrc.gov/waste/decommissioning/faq.html> (last visited Mar. 17, 2016).

How this has played out in practice is not adequate. As just one example and only using the most recent, the decommissioning of Vermont Yankee has been host to a swathe of serious, contentious disputes over exemptions from safety requirements and alleged misuse of the decommissioning trust fund for radiological cleanup. Put succinctly in one its rulings, the NRC's own Atomic Safety & Licensing Board acknowledged while ruling against Vermont, "[t]he NRC has never promulgated comprehensive regulations governing the decommissioning of nuclear power reactors." *In the Matter of, Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear*

Operations, Inc. (Vermont Yankee Nuclear Power Station), LBP-15-18 at 3. The Board further noted that “... the NRC has historically granted regulatory exemptions for permanently decommissioned reactors. Under the Atomic Energy Act of 1954, a petitioner such as Vermont may request a hearing to challenge an License Amendment Request. The extent to which Vermont can challenge exemption-related issues is less clear. Because the Act does not list exemption requests as agency actions subject to a hearing, the Commission has concluded that petitioners generally cannot seek hearings on exemptions.” *Id.* at 4.

This is a situation that must change and a more straightforward regulatory structure, with complete rules, NEPA compliance and hearing rights are a necessity, especially in light of the suite of reactor closures sure to arrive over the next several decades. Notably, we agree that an entirely new NEPA EIS of a reactor site for decommissioning would be unnecessary and likely duplicative, but after nearly 3 decades since the original generic EIS and nearly 15 years since the last supplemental and generic analysis, there will be ample need for *site specific* supplemental NEPA analysis that analyzes the relevant impacts and compares reasonable available alternatives (not to the act of decommissioning itself but comparisons and analysis of the timeline and cleanup options) and mitigation strategies available for the decommissioning process. *See* NEPA, 42 U.S.C. §4321, *et seq.*; *see also* 40 C.F.R. §1502.14 and § 51.10-125 and App A. CEQ’s regulations governing implementation of NEPA direct that Federal agencies “shall to the fullest extent possible....(b)...emphasize *real environmental issues and alternatives*...(e) Use the NEPA process to identify and assess the *reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions* upon the quality of the human environment.” 40 C.F.R. §1500.2 (emphasis added).

As one obvious example why such a supplemental analysis is necessary, since 2002 the affected areas around dozens of reactor sites could have changed enormously in terms population, economic interests, and competing water or development impacts (and in other ways not foreseen). Compounding this problem could be the continued use

of the SAFSTOR option, which has the option of essentially freezing the site and its contaminated areas and significant cleanup challenges in place for nearly 60 years, with enormous state and community costs in so doing. Further, this NEPA supplemental can have a key role in addressing the wide range of site-specific issues for reactor decommissioning. Decommissioning, whether done over a shorter or longer time frame, will impact different communities in different ways, including issues related to environmental justice. As noted above, communities hosting nuclear power plants can and have changed dramatically over decades of reactor operations. The source term in spent nuclear fuel pools will vary from decommissioning reactor to decommissioning reactor along with the types of fuel (high burnup or otherwise), along with the configuration of spent fuel pools. These site-specific issues point to the need for a close look at plans and risks with an opportunity for stakeholder input, and provide the framework for the role of State and local governments and non-governmental stakeholders in the decommissioning process.

Thus, this NEPA supplemental document should be done in light of NRC requiring the licensee submit a formal decommissioning plan that provides a complete roadmap that both the state and affected community can follow in this massive undertaking. The Post-Shutdown Decommissioning Activities Report (PSDAR) now submitted within two years of final shutdown has been an inadequate process that is only generating needless and contentious disputes (again, NRC need only review its own pleading files with respect to the disputes with the State of Vermont to see this in stark form). While NRC asserted in its last set of 1996 revisions to the decommissioning regulations that its rules will prohibit the licensee from performing any major decommissioning activity that results in significant environmental impacts not previously reviewed (*see* Final Rule, *Decommissioning of Nuclear Power Reactors*, 61 Fed. Reg. 39278, July 29, 1996)), with the removal of hearing rights such a decision cannot be challenged. The ASLB's Vermont decision (LBP-15-18) only clarifies the gap between what the states and public have called for and what the agency seems willing to allow.

NRC further asserted that when the licensee submits the PSDAR, the licensee must specifically include a section discussing how the planned activities fit within the envelope of environmental effects included in either the FGEIS (NUREG-0586, August 1988) or the facility's site-specific environmental impact statement – and the licensee must notify NRC if the intended decommissioning activity is inconsistent with the PSDAR. *Id.* None of this suffices in comparison to a formal decommissioning plan that is accompanied by a NEPA supplemental analysis. Requirement of meaningful site specific NEPA analysis and a thorough decommissioning plan will go far in providing a necessary restoration of public trust. Further providing a full reinstatement of hearing and intervention rights on this supplemental analysis will go a long way to restore acceptance of NRC's regulatory oversight and the final assurance a site will be cleaned up and restored to productive use.

VIII. The Regulatory Role for Financial Assurance

Five nuclear power reactors (Crystal River 3 in Florida, Kewaunee in Wisconsin, San Onofre Units 2 and 3 in California, Vermont Yankee in Vermont) permanently shut down over the last few years and owners of other reactors (Pilgrim in Massachusetts and Oyster Creek in New Jersey, Fitzpatrick in New York) announced they would permanently shut down in the next few years.

Decommissioning, a painstaking and complicated process that by any measure can take decades, carries with it cost projections from \$400 million to well over \$1 billion per reactor. The New York Times reported in 2012 that Entergy Corporation was more than \$90 million short of a (then) projected \$560 million cost of dismantling Vermont Yankee. 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->. This was consistent with NRC's Staff's own 2009 estimate of an \$87

million funding shortfall.¹² More recently, the State of Vermont has raised concerns regarding the Entergy's planned uses for the decommissioning trust fund.¹³

NRDC shares Vermont's concerns that current decommissioning funding mechanisms could prove insufficient to fully decommission the power reactors due to come off line in the next several years (or even if not insufficient, then prematurely depleted by inappropriate use). The United States Government Accountability Office (GAO) issued a report on this issue in 2014 where its top line findings were:¹⁴

- “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

¹² See <http://pbadupws.nrc.gov/docs/ML0934/ML093410582.pdf>

¹³ In the State’s November 5, 2015 filing, Vermont alleges that “Entergy Nuclear Operations, Inc. and Entergy Nuclear Vermont Yankee LLC (collectively, Entergy), however, have filed a multitude of separate requests to use the Vermont Yankee Nuclear Decommissioning Trust Fund (Decommissioning Fund or Fund) for purposes other than radiological decommissioning. Considered together, Entergy’s actions threaten to undermine the radiological decommissioning work that is the very purpose of the Fund. Unless the Commission intervenes, Entergy will divert hundreds of millions of dollars from their intended purpose.” Vermont Petition at 1, found online in NRC’s Electronic Hearing Docket, <https://adams.nrc.gov/ehd/view>.

¹⁴ See *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>.

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 relatively 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 current regulatory scheme is even capable of addressing 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 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 propose a draft Decommissioning Rule in wherein (1) NRC requires a substantial increase in the strength and timeliness of the financial assurance monitoring regime so that decommissioning funds will not operate at shortfalls; and (2) a clear prohibition on the use of decommissioning funds for purposes outside of NRC's defined scope. Moreover, the Commission should adopt the State of 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.

IX. Eliminating the ENTOMB and Revising the SAFSTOR Options for Decommissioning

The decommissioning ANPRM notes the objective for the draft regulatory basis of evaluating "the appropriateness of maintaining the three existing options (DECON, SAFSTOR, and ENTOMB) for decommissioning and the timeframes associated with those options." In a revised regulatory framework for decommissioning, NRDC comments that the NRC should eliminate the ENTOMB option and revise the SAFESTOR option. The ENTOMB option is essentially predicated on cessation of reactor operations caused by a severe accident, and is inappropriate to consider within this regulatory framework. SAFSTOR as it is currently constituted can simply become an expedient way to defer addressing important cleanup responsibilities, thereby potentially raising money for decommissioning costs through return on investment that should have been in place at cessation of operations, while putting what can be an extraordinary burden on states and affected communities by drawing out the decommissioning process.

The ENTOMB option is defined by the NRC as a "method of decommissioning, in which radioactive contaminants are encased in a structurally long-lived material, such as concrete. The entombed structure is maintained and surveillance is continued until

the entombed radioactive waste decays to a level permitting termination of the license and unrestricted release of the property. During the entombment period, the licensee maintains the license previously issued by the NRC.” NRC’s definition of ENTOMB implicitly refers to engineered efforts to contain radioactive debris from the Chernobyl Unit 4 reactor following the accident in Ukraine in April, 1986. A large concrete shelter was constructed around the destroyed reactor by October, 1986, in part to enable continued operation of the adjacent reactor units. Structural flaws in this original entombment of the Unit 4 reactor have led to the need to build a second entombment structure, the “New Safe Confinement,” which is scheduled to complete in 2017.

The ENTOMB option is essentially predicated on cessation of reactor operations caused by a severe accident, and is inappropriate to consider as a basis for rulemaking. Should a severe nuclear accident occur in at an NRC-licensed reactor resulting in the need to supplement primary and secondary containment with a protective structure, the full impacts of such an event would plausibly fall well outside of NRC authority, and involve multiple federal, state and local decision-making and negotiated actions. Simply put, long-term maintenance of a protective structure to contain radioactive debris is not reactor decommissioning. And clearly ENTOMB would not be an appropriate option for decommissioning of a reactor that ceased operation in a controlled and planned manner. Therefore, the NRC should eliminate the ENTOMB option in revised decommissioning rulemaking.

The NRC defines the SAFSTOR option as: “A method of decommissioning in which a nuclear facility is placed and maintained in a condition that allows the facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use.” In NUREG 0586 (“Final Generic Environmental Impact Statement on decommissioning nuclear facilities,” 1988 and Supplement 1, 2002), a rationale for the SAFSTOR option is given:

There are several advantages to using the SAFSTOR option of decommissioning. A substantial reduction in radioactive material as a result of radioactive decay during the storage period reduces worker and public doses below those of the

DECON alternative. Since there is potentially less radioactive waste, less waste-disposal space is required. Moreover, the costs immediately following permanent cessation of operations are lower than costs during the first years of DECON because of reduced amounts of activity and a smaller work force. (p. 3-19)

In this formulation of its regulatory oversight the impacts of decommissioning on the communities hosting the nuclear power plant are utterly disregarded. Full freedom is given to the licensee whether to begin decommissioning activities immediately follow cessation of activities or indefinitely to delay such activities. Furthermore, such assumptions about worker and public doses and radioactive waste volume need to be revisited in light of additional experience with the decommissioning process, and the application of new technologies and processes to decommissioning.

There is no basis in Radiation Protection that led to the arbitrary conclusion that 60 years is an acceptable amount of time to wait to decommission a nuclear power plant. While it is true that radioactive material decays over time, the benefits of dose reduction are largely accrued during the first 10 years after a nuclear plant shut downs. Co-60 is the primary isotope causing significant exposure to personnel during the first 10 years after shutdown. Since Co-60 has 5-year half-life, only 25% of Co-60 remains after 10 years¹⁵. Moreover, dose and waste issues can be site-specific to a degree that requires individual adjudication. Importantly, no regulatory framework exists causing the licensee to expediently move spent nuclear fuel from wet pool to hardened dry cask storage.

The SAFSTOR option should revised in a new regulatory framework for decommissioning; as it stands this option is essentially a deferral of the DECON option at the discretion of the licensee, resulting in longer-term risk of off-site release of radioactive materials from zirconium fires, and lengthening the period of time in which the public cannot repurpose the former nuclear reactor site for economic development and community uses.

¹⁵ Found online at <http://www.leg.state.vt.us/jfo/envy/2015-03-23%20Post-Shutdown%20Decommissioning%20Activities%20Report.pdf>

X. Public Participation

The current decommissioning regulatory scheme bars the public and the affected states from meaningful roles in the process. One need only look at Vermont's frustration over the past few years, a situation well known to the NRC. This is not a new complaint. On January 31, 2013, Christopher Paine, then Director of NRDC's Nuclear Program, at the request of the Commission submitted for consideration *The Big Moat, How NRC Rules Suppress Meaningful Public Participation In NRC Regulatory Decision-making*. One of the insights Mr. Paine offered into the problematic NRC hearing process was his reminder that a former chief of the Atomic Safety and Licensing Board, B. Paul Cotter, Jr., outlined the value of public participation in 1981: "(1) Staff and applicant reports subject to public examination are performed with greater care; (2) preparation for public examination of issues frequently creates a new perspective and causes the parties to reexamine or rethink some or all of the questions presented; (3) the quality of staff judgments is improved by a hearing process which requires experts to state their views in writing and then permits oral examination in detail...and (4) Staff work benefits from [prior] hearings and Board decisions on the almost limitless number of technical judgments that must be made in any given licensing application." – "Memorandum to Commissioner Ahearne on the NRC Hearing Process," May 1, 1981, at 8. as quoted in E. R. Glitzenstein, "The Role of the Public in the Licensing of Nuclear Power Plants," in *Controlling the Atom in the 21st Century*, D.P. O'Very, C. E. Paine, and D.W. Reicher, eds. Westview Press, 1994, at 161.

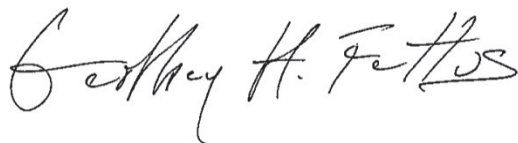
Mr. Paine further went on to note that much more recently, in 2008, Judge Michael Farrar, an NRC Judge for over thirty years, reaffirmed the valuable contribution public participation can make to the licensing process: "The Petitioners were instrumental in focusing the Board's attention on the troubling matters discussed above. That they did so is a testament to the contribution that they, and others like them, can make to a proceeding. Moreover, in doing so they often labor under a number of disadvantages." *In the Matter of Shaw Areva Mox Services (Mixed Oxide Fuel Fabrication Facility)*, LB-08-11, Docket No. 70-3098-MLA, at 49 (June 27, 2008) (Farrar, J., concurring).

In the NRC's efforts to "streamline" or make "more efficient" its rules, the agency can lose the thread of trenchant observations. Public involvement and acceptance of the multi-billion dollar enterprise that is nuclear power reactor decommissioning is not a burden – it's a crucial priority. NRC should take this opportunity to write comprehensive rules that engage the public and provide for meaningful opportunities for public input and for public impacts on the decommissioning process.

XI. Conclusion

The observations we provide today we hope will guide the agency as it drafts a thorough, transparent decommissioning rule that is protective of public health and the needs of communities that surround the reactor sites across the country. We appreciate the opportunity to comment. If you have any questions, please do not hesitate to contact NRDC.

Sincerely,



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