From:	John J. Sipos <John.Sipos@ag.ny.gov>
Sent:	Monday, March 31, 2014 5:58 PM
To:	RulemakingComments Resource; McConnell, Keith; 'Andrew.Imboden@nrc.gov'
Subject:	NRC-2012-0246; Errata to Additional Comments by NYS OAG
Attachments:	2014 03 31 Errata (for 12-20-13 Add'l Comments).pdf; pages (reflecting errata corrections for 12-20-13 Add'l Comments).pdf

Dear Dr. McConnell, Mr. Imboden, & NRC Staff:

In preparing for the March 21, 2014 meeting with the Commissioners in Rockville, I noticed a handful of inadvertent and minor typographical errors in the December 20, 2013 NYSOAG "Additional Comments."

Attached is an errata list identifying the corrections. Also, for convenience, a set of individual pages reflecting the corrections is attached. I believe that the corrections are self-explanatory; also, they do not change the overall pagination or substance of the document.

Please inform me if you encounter difficulties in opening the attachments. Thank you.

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Assistant Attorney General
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of:

Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operations	RIN 3150-AJ20 NRC-2012-0246

ERRATA TO

STATE OF NEW YORK OFFICE OF THE ATTORNEY GENERAL ADDITIONAL COMMENTS ON NRC STAFF'S DRAFT WASTE CONFIDENCE GENERIC ENVIRONMENTAL IMPACT STATEMENT AND PROPOSED RULE

Page	Line	Now Reads	Should Read
1	7	accidents at the Indian Point	accidents at Indian Point
7	Map	[red circle]	[move approximately ½ inch to the northwest]
11 n 3	3	Revolutionary War Sony Point	Revolutionary War Stony Point
12	11	peer-reviewed by Dr. Sykes	peer-reviewed article by Dr. Sykes
13	4	NRC that earthquake hazard in the	NRC that earthquake hazards in the
13	5	Rocky Mountains, was	Rocky Mountains, were
16	20	Point Unit 2	Point Unit 3
20	16	However, under NEPA, analysis	However, NEPA requires analysis
30	2	below on page 26	below on page 43
45	4	, The recent	The recent
56	13	reflected in the revised GEIS for license renewal.	reflected in a revised EIS and rule.
63	1	'Alvarez et al.	Alvarez et al.
65	7	mentioned above on pages 37-38	mentioned above on pages 54-55
75	21	the 1972 attach at the	the 1972 attack at the
82	2	and are plainly	and is plainly

Dated: March 31, 2014
Albany, New York

The State of New York Office of the Attorney General submits the accompanying report by International Safety Research, Inc. ("ISR") as well as these additional comments to the record in this rulemaking and environmental review proceeding.[1]

Throughout this proceeding, New York has requested that NRC conduct a transparent, objective, and comprehensive site-specific severe accident mitigation alternatives analysis of spent fuel pool accidents at Indian Point – and conduct a site-wide analysis of severe accidents at Indian Point.

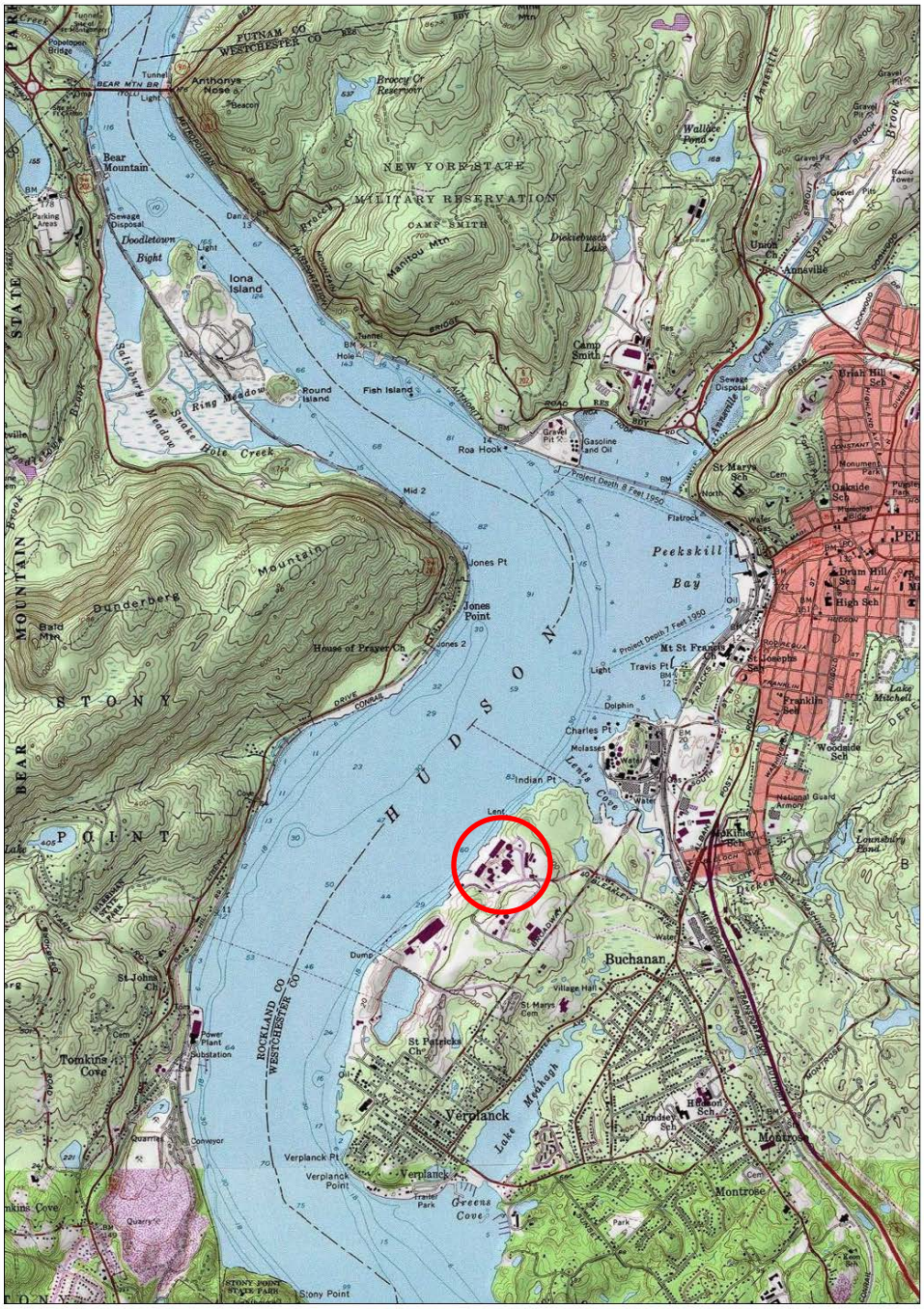
I. The Indian Point Site

Population. The Indian Point power reactors, spent fuel pools, and dry storage casks are 24 miles north of New York City, 35 miles from Times Square, and approximately 38 miles from Wall Street. The U.S. Census Bureau recognizes that New York City is the largest city in the Nation – with more than 8,000,000 residents.

The facilities are approximately 3 miles southwest of Peekskill, with a population of 22,441, 5 miles northeast of Haverstraw, with a population of 33,811, 16 miles southeast of Newburgh, with a population of 31,400, and 17 miles northwest of White Plains, with a population of 52,802, 23 miles northwest of Greenwich, Connecticut, 37 miles west of Bridgeport, Connecticut, and 37-39 miles north northeast of Jersey City and Newark, New Jersey.

[1] 78 Fed. Reg. 56621 (Sept. 13, 2013) (notice of release of proposed draft waste confidence generic environmental impact statement), 78 Fed. Reg. 56776 (Sept. 13, 2013) (notice of release of proposed regulation concerning waste confidence – continued storage of spent nuclear fuel), 78 Fed. Reg. 66858 (Nov. 2013) (extending time due to federal government shutdown).

The first topographical map depicts the area within five miles of the facilities:



and historic sites. By way of example, Wall Street, the Nation's financial center, is 38 miles away. These unique sites are identified on the accompanying list. *See* LIST OF VARIOUS SITE SPECIFIC IMPROVEMENTS, INCLUDING LANDMARKS, PARKS, ARENAS, UNIVERSITIES, AND TRANSPORTATION FACILITIES WITHIN 50 MILES OF INDIAN POINT POWER REACTORS AND SPENT FUEL POOL FACILITIES. Many of the historic sites are on the national historic preservation list and are protected under the National Historic Preservation Act.[3]

The Hudson River Ecosystem. The Indian Point facilities are located on the eastern bank of the Hudson River (at river mile 43). The Native American name for the river, Mahicantuck, means "great waters in constant motion" or "river that flows two ways." This name highlights the fact that this waterway is more than a river -- it is a tidal estuary. The Hudson River is an important regional resource of significant aesthetic value in addition to providing transportation, recreation, and water supply. More than 200 species of fish are found in the Hudson and its tributaries. Bald eagles, herons, waterfowl, and other birds feed from the river's bounty. Tidal marshes, mudflats, and other significant habitats in and along the estuary support a diversity of life. Tidal freshwater wetlands near Indian Point support this life web. The Hudson River is one of the Nation's fourteen American Heritage Rivers.

Seismic Hazard. Indian Point is susceptible to earthquake damage since it

[3] *See, e.g.,* Letter from Thomas Lyons, New York State Office of Parks, Recreation, and Historic Preservation, to David Wrona, NRC (Oct. 26, 2010) ML103060210 (as part of NEPA and SAMA review, discussing the Revolutionary War Stony Point Battlefield site, which has been designated a National Historical Landmark by the U.S. Department of the Interior, and stating that "the Stony Point Battlefield is an irreplaceable asset to the people of New York State and the Nation.").

was initially designed to withstand an earthquake and ground acceleration which are now deemed to be below the reasonably predictable earthquake and ground acceleration for the site and its environs. *See generally*, Declaration of Lynn R. Sykes, Ph.D., and Declaration of Leonardo Seeber and accompanying Exhibits, (Nov. 2007), available at ML073400205 (Volume I of II); Letter from Attorney General Schneiderman to NRC Commissioners, Seismic Risk at Indian Point Nuclear Generating Station, (March 18, 2011) ML110820058; *see also* Comments Concerning the Proposed Generic Communication "Draft NRC Generic Letter 2011-XX: Seismic Risk Evaluations for Operating Reactors," Docket ID NRC-2011-0202, at 14-19 (Dec. 15, 2011) ML11354A231. In 2008, the Bulletin of the Seismological Society of America published a peer-reviewed article by Dr. Sykes, Mr. Seeber, and others, identifying a new seismic feature in the vicinity of Indian Point. *Observations and Tectonic Setting of Historic and Instrumentally Located Earthquakes in the Greater New York City–Philadelphia Area*, BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA, Vol. 98:1696-1719 (Aug. 2008). The article concluded:

> Two nuclear power plants at Indian Point (near Peekskill in Fig. 2) are located closer to more people at any given distance than any other similar facilities in the United States. Entergy, their owner, recently applied for 20-yr extensions of their existing 40-yr licenses. Much new seismological information is available since their initial approvals in 1973 and 1975. Nevertheless, the U.S. Nuclear Regulatory Commission so far has not permitted any new information to be used or old information on which the original licenses were based to be contested in considering extensions of licenses. Indian Point is situated at the intersection of the two most striking linear features marking the seismicity (Fig. 3) and also in the midst of a large population that is at risk in case of an accident to the plants. This is clearly one of the least favorable sites in our study area from an earthquake hazard and risk perspective.

Id. at 1717.

There is substantial new evidence that there is earthquake risk that NRC did not take into consideration when approving operation licenses for existing reactors and spent fuel storage facilities. In 2004, United States Geological Survey ("USGS") told NRC that earthquake hazards in the Central and Eastern United States ("CEUS"), the portion of the lower 48 states east of the Rocky Mountains, were higher than previously understood. In May 2005 NRC staff acknowledged that earthquake risk for reactors and spent fuel storage in CEUS may be greater than NRC assumed when it approved operating licenses for these facilities. *See, e.g.,* May 26, 2005 NRC Staff memorandum re: Identification of a Generic Seismic Issue (available at ML051450456). NRC staff's response to the new USGS earthquake hazard information was to consider issuing a "generic letter" on the subject of "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States." June 9, 2005 NRC staff memorandum Generic Issue 199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States" (available at ML051600272). This memorandum contained an estimate that "the initial screening technical analysis will be completed within three months of receipt of the necessary information from [NRC's Office of Nuclear Reactor Regulation]." Id.

The summary of the February 6, 2008 NRC staff public meeting relates that a seismologist working on Generic Issue 199 stated that for some CEUS areas the current earthquake frequency estimates were several times larger than those used

NRC confirms that severe accidents and consequences were not taken into account when selecting and approving the Indian Point site. In its 1979 Siting Study Report, NRC stated:

> The maximum credible accident concept was carried into Part 100 in which an analysis of the consequences of the accident was used as a test of suitability of a proposed site and plant design. In Part 100, the maximum credible accident is defined as "...a major accident, hypothesized for purposes of site analysis or postulated from considerations of possible accidental events, that would result in potential hazards not exceeded by those from any accident considered credible" [10 CFR §100.11(a), footnote 1]. Although more severe accidents (now generally referred to as Class 9 accidents) are conceivable, the consequences of such accidents were normally not analyzed for assessing the suitability of a proposed site and plant design.

NRC, Report of the Siting Policy Task force, NUREG-0625 (Aug. 1979) at p. 10, ML12187A284. Moreover, severe accidents to spent fuel pools were not considered by AEC or NRC at the initial licensing stages for Indian Point -- and were not analyzed in the Siting Study Report.

Storage and Accumulation of Spent Nuclear Fuel at Indian Point. When the federal government first licensed the operation of Indian Point Unit 2 and Indian Point Unit 3 it authorized each unit's single spent fuel pool to hold 241 spent fuel assemblies. NRC subsequently authorized the pools to hold five times (5x) the original limit. The following charts summarize how NRC has authorized increasing amounts of spent nuclear fuel to be stored in the spent fuel pools for Indian Point

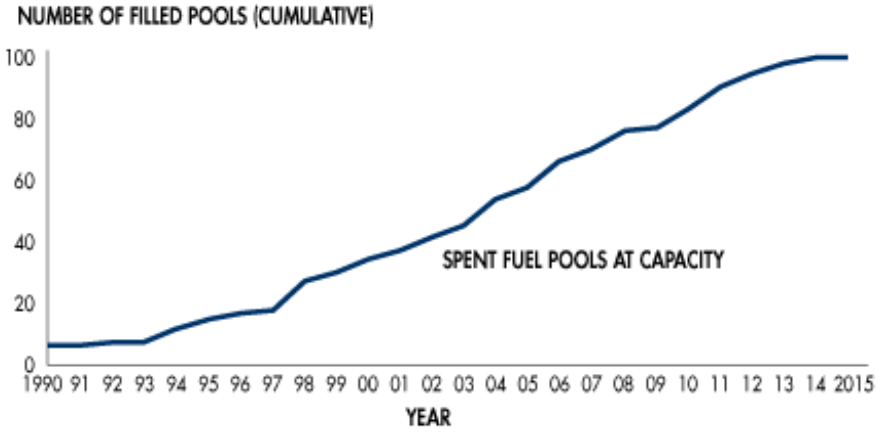
replacement water in the event of loss of coolant accident, re-arrangement of the spent fuel in the pools to allow for better circulation in the event of loss of coolant, to mention only a few of the recommendations contained in the reports identified in the Attachments to this letter.

NRC Staff has already ordered that certain measures be taken at nuclear reactors in an attempt to address some of the environmental and safety problems associated with spent fuel storage. In its March 12, 2012 Status Report on Implementation of the Near-Term Task Force Recommendations Based on Insights from the Fukushima Dai-ichi Accident, NRC announced it had ordered that "strategies shall be developed to add multiple ways to maintain or restore core cooling, containment and spent fuel pool (SFP) cooling capabilities in order to improve the defense in depth of licensed nuclear power reactors" and "[l]icensees are ordered to install enhanced SFP instrumentation." *Id.* at 2-3. These recently-announced, first steps underscore the fact that NRC has now recognized that spent fuel pools represent a potential source of significant adverse environmental impacts for which corrective actions are needed. However, NEPA requires analysis of a full range of site specific alternatives and mitigation measures. Such a full range of alternatives has not been developed or analyzed for Indian Point.

The State is aware of ongoing efforts by NRC to begin to address problems with the spent fuel storage, including the above-mentioned Orders regarding recommendations from the Fukushima Daiichi Near Term Task Force. It is not a satisfactory answer to the State's concerns for NRC to indicate that those efforts

was formally abandoned in a 2010 rulemaking proceeding.[24] As will be discussed below on page 43, the federal government recently abandoned its decades-long effort to create a national repository at Yucca Mountain in Nevada.

The current de facto national spent fuel storage strategy involves maximizing the amount of spent fuel that can be stored in reactor pools through use of high-density storage racks, and then moving the older fuel into on-site dry storage casks as needed to maintain enough free space in the pools for discharge of the full reactor core. As the chart below shows, the spent fuel pools at nuclear plants around the country are quickly reaching capacity.[25] NRC is aware that at some reactors, such as Indian Point Unit 3 located in New York, the spent fuel pools have already reached maximum capacity—even with dense storage.



Note: All operating nuclear power reactors are storing used fuel under NRC license in spent fuel pools. Some operating nuclear reactors are using dry cask storage. Information is based on loss of full-core reserve in the spent fuel pools.

Source: Energy Resources International and DOE/RW-0431 – Revision 1

[24] 75 Fed. Reg. 81040 (Dec. 23, 2010).

[25] The figure below is taken from NRC's website, *available at*: http://www.nrc.gov/waste/spent-fuel-storage/nuc-fuel-pool.html.

and disposal of spent nuclear fuel from reactor sites (such as Indian Point), and is far from establishing one.

B. External Events in Japan and Virginia

The recent earthquakes in Japan and Virginia present significant new information that affirm the importance of site-specific evaluation of spent fuel pool risks.

1. Fukushima Daiichi and Site-Wide Risk

On March 11, 2011, the Japanese earthquake and tsunami led to the largest nuclear disaster since the Chernobyl accident in 1986. [83] A 100 square mile zone around the Fukushima Daiichi nuclear facility was evacuated, and, a year later, at least 80,000 people remain displaced from their homes.[84] The Japanese Environment Ministry plans to decontaminate only two-thirds of the evacuation zone, as radiation levels in the last third of the zone are too high to be brought down to safe levels with current technology.[85]

In the weeks following the disaster, the U.S. Department of Energy and the National Nuclear Security Administration prepared maps depicting the ground

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[83] The Fukushima nuclear disaster has been rated as a 7 on the International Atomic Energy Agency's ("IAEA") International Nuclear and Radiological Event Scale ("INES").[83] Level 7, the most serious level on the INES scale, constitutes a "major accident." It is described as "A major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures." IAEA, Fukushima Nuclear Accident Update, (Apr. 12, 2011), *available at*: http://www.iaea.org/newscenter/news/2011/fukushima120411.html.

[84] Hiroko Tabuchi, A Confused Nuclear Cleanup, New York Times (Feb. 10, 2012), *available at*: http://www.nytimes.com/2012/02/11/business/global/after-fukushima-disaster-a-confused-effort-at-cleanup.html?pagewanted=1&_r=1.

[85] Martin Fackler, Japan: Nuclear Contamination Cleanup Near Stricken Plant to Start in Spring, New York Times (Jan. 26, 2012), *available at*: http://www.nytimes.com/2012/01/27/world/asia/japan-nuclear-contamination-cleanup-near-stricken-plant-to-start-in-spring.html?_r=1

occur in pools, and that the consequences of a zirconium fire could be very large.[121] Furthermore, he stated that since the fuel pools are located outside of the primary containment that houses the reactor, a release of radionuclides from the pool can reach the environment much more easily than a release from the reactor core.[122] Director Weber further acknowledged that thinning the spent fuel pools would reduce the potential land contamination and economic impacts if a large release occurred.[123] He stated that due to the threat of zirconium fires, NRC is studying the benefits of removing spent fuel to achieve lower fuel density in the pools. Additionally, Mr. Weber disclosed that NRC Staff is currently conducting a Spent Fuel Pool Scoping Study to assess the impacts of thinning the pools.[124] This development reflects NRC's new understanding of the risks posed by spent fuel pools, due in large part to the events at Fukushima. The State believes this new understanding must be reflected in a revised EIS and rule.

In the wake of the Fukushima disaster, NRC is considering conducting site-specific reviews of the risks involved with spent fuel pools as part of a Level 3 Probabilistic Risk Assessment ("PRA"). In the policy position paper on options for PRA activities, NRC wrote, "To be complete, estimation of total site accident risk should also include an assessment of the risk from accidents involving other site

[121] *Weber Speech* at 4-5.
[122] *Id.* at 4.
[123] *Weber Slideshow* at slide 20.
[124] *Weber Speech* at 5.

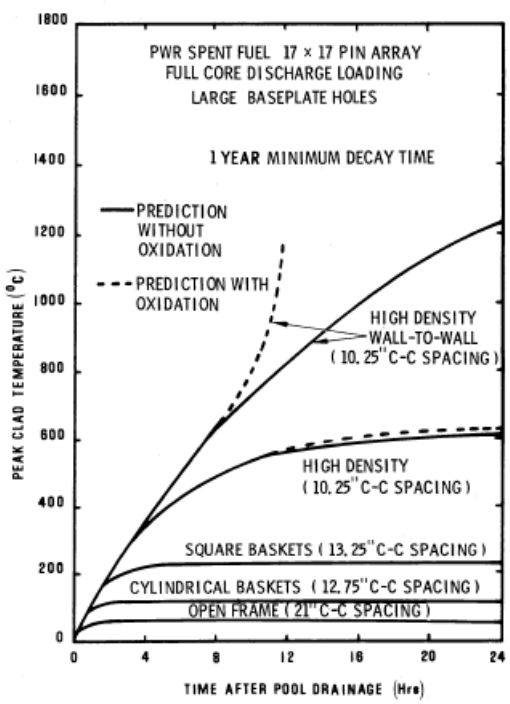

Figure: Effect of Storage Rack Configuration on Heatup of PWR Spent Fuel, Well-Ventilated Room. *Source*: *1979 Sandia Report* at 51.

Alvarez et al. recommend moving away from the current "dense-pack" configurations and returning to open-rack configurations, for which the spent fuel pools were originally designed.[143] The figures below illustrate the different designs.[144]

for closer spacing of the fuel assemblies. . . . can make it more difficult to cool the freshly discharged fuel if there is catastrophic loss of the fuel pool water.").

[143] *Reducing the Hazards* at 23.

[144] First figure: *Reducing the Hazards* at 17. Second figure: *1979 Sandia Report* at 20.

assemblies to be stored in the pool.[147] To keep these closely packed fuel rods sub-critical, they are placed in metal boxes containing neutron-absorbing boron.[148] In a loss of coolant accident, where pool water is lost, these boxes would prevent the horizontal circulation of cooling air.[149] A 1979 Sandia report[150] prepared for NRC found that with an open frame storage configuration in a well-ventilated facility, spent fuel in a drained storage pool would not overheat if it was cooled for five days before being transferred to the pool.[151] Also, as mentioned above on pages 54-55, Sandia recently released the results of a study finding that low density racking is the spent fuel configuration that is least vulnerable to zirconium fires.[152]

If there is not enough room in the pool to permit open frame storage—because too much fuel is unloaded from a reactor during a given five year period—Alvarez et al. recommend considering: "(1) an arrangement where one fifth of the fuel assemblies are removed in a pattern in which each of the remaining fuel assemblies has one side next to an empty space; (2) an arrangement where alternate rows of fuel assemblies are removed from the rack."[153] The first suggestion is illustrated in the figure below.[154]

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[147] *NAS Report* at 43.
[148] *Id.*
[149] *Id.* at 17.
[150] *1979 Sandia Report*.
[151] *Reducing the Hazards* at 23.
[152] Samuel G. Durbin and Eric R. Lindgren of Sandia National Laboratories, Investigations of Zirconium Fires During Spent Fuel Pool LOCAs (Slideshow), ML120380359 (Feb. 7, 2012).
[153] *Id.*
[154]Figure is taken from: *Damages From a Major Release* at 133.

Comm'n on Terrorist Attacks Upon the U.S. ("9/11 Commission"), *The 9/11 Commission Report* (2004).

Minutes before hitting the World Trade Center, two of the hijacked planes flew near or over Indian Point. *See id.* at 32 (American Airlines Flight 11, United Airlines Flight 175). The wind direction at the time of the attacks was towards the southeast -- that is, from Indian Point towards New York City. *See id.* at 285.

The 9/11 Commission's report revealed that Khalid Sheikh Mohammad, the mastermind of the 9/11 attacks, originally planned to hijack additional aircraft to crash into targets on both coasts, including nuclear power plants. *The 9/11 Commission Report,* at 154. As late as July 2001, the terrorists were considering attacking a specific nuclear facility in New York, which one of the pilots "had seen during familiarization flights near New York." *Id.* at 245. This was likely Indian Point.

When Congress disbanded the Atomic Energy Commission and created the Nuclear Regulatory Commission in 1974, it charged the new agency with the responsibility to ensure the security of commercial nuclear power plants and nuclear material. Energy Reorganization Act of 1974, § 204, 42 U.S.C. § 5844 (Commission shall provide and maintain "safeguards against threats, thefts, and sabotage of such licensed facilities, and materials"). Congress added this responsibility in the wake of increasing sabotage and terrorism events in the early 1970s -- such as the 1972 attack at the Munich Olympics and hijackings of

inconsistent with New York's experience with the SAMA process in the ongoing license renewal proceeding for Indian Point – and is plainly inapplicable to spent fuel pools. Equally important, § 4-19 does not identify, discuss, and evaluate alternatives and mitigation measures. Given these omissions, the DGEIS's discussion of the environmental impacts of sabotage events does not comply with NEPA. Moreover, in its current form, the DGEIS fails to account for cumulative impacts, segments review, and does not address site-specific issues relevant to Indian Point and the New York City metropolitan area.

XI. Conclusion

Spent nuclear fuel, one of the most dangerous and long-lasting substances known to humans, was never meant to be stored long-term and densely packed in pools at nuclear plants. When many of these facilities were built, AEC and NRC told the public that the spent fuel would be stored temporarily in pools only for a brief time before being promptly removed from the host communities. Contrary to those assurances, spent nuclear fuel has remained in densely packed spent fuel pools for decades. The events at the Fukushima nuclear facilities should serve as a lesson to reinforce what is already known—long-term storage of spent fuel in pools poses significant environmental risks and impacts. NEPA requires that NRC consider safer storage alternatives such as the thinning of spent fuel pools and the use of dry cask storage. These alternatives must be considered in a site-specific analysis that evaluates the unique features of each fuel pool and its surrounding environment. The State further urges NRC to ensure that the severe accident