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Attachments: SHS Waste Confidence Comments NRC.pdf; Exhibit A- James Lee Witt Report_Executive_Summary.pdf; Exhibit B HighBurnupHandout2013-10-17.pdf; Exhibit C- Desal Radiological Data.pdf; Exhibit D- DesalMapRoss.pdf; Exhibit E- Heat PlumeIMG_1263.jpg; Exhibit F FINAPropertyValueIP____.pdf

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Sent: Thursday, December 19, 2013 11:19 PM
To: RulemakingComments Resource
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Please find attached my comments and attachments A- F,
regarding Docket ID No. NRC-2012-0246 Waste Confidence Storage of Spent Nuclear Fuel

In addition a printed copy is being sent by Fed Ex delivery.

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Exhibit A- James Lee Witt Report_Executive_Summary.pdf	147437	
Exhibit B HighBurnupHandout2013-10-17.pdf	180394	
Exhibit C- Desal Radiological Data.pdf	126395	
Exhibit D- DesalMapRoss.pdf	1162642	
Exhibit E- Heat PlumeIMG_1263.jpg	1484863	
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12/19/13

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RE: Docket ID No. NRC-2012-0246
Waste Confidence Storage of Spent Nuclear Fuel

I am writing to you as a member of the Indian Point Safe Energy Coalition; a farmer; property and business owner; a multi-generational resident of the Hudson Valley; an environmental attorney; and, as a mother living within the Indian Point reactor community. I adopt the comments filed by Diane Curran, Esq. on behalf of the other environmental organizations, in addition to my own comments below.

The Generic Environmental Impact Statement ("GEIS") acknowledges that the Indian Point reactor community is the most populous in the nation. Indian Point is surrounded by 20 million Americans. The Indian Point Reactor community includes NYC; the greater New York metropolitan region; four states (New York, New Jersey, Connecticut and Pennsylvania); \$8.5 trillion dollars in property values; West Point Military Academy; United States 2nd largest Mint; and is one of the most attractive terrorist target in the nation. During 9/11/01 attack on the World Trade Center the terrorists flew directly over Indian Point and evidence was found that it was considered as a target.

Indian Point is less than 30 miles from Wall Street and is located on the banks of the historic Hudson River. George Washington defeated the British here. Washington and his soldiers was aided by the narrowness of the Hudson above Buchanan and the impossibility of escape from lower Hudson Valley without going through the narrow Ramapo pass along the Appalachian Trail. The geography of this region remains unchanged. Then, and now evacuation from this region is impossible. (*see Exhibit A: James L. Witt Report executive summary*)

Indian Point also has the infamous distinction of being named by the NRC the #1 plant in the nation most likely to be severely damaged by earthquake.

Indian Point is located on two intersecting earthquake faults (the Ramapo and Stamford faults) and has two 36” natural gas pipeline within 500 feet from the facility, without on-site shutoff valves. In addition in 2013 the Congressional Government Accountability Office (“GAO”) reported that Indian Point is the nation's reactor site with the most safety violations.

Indian Point currently has 2700 tons of high level radioactive waste and more being produced everyday, even with an expired license. According to physicist Michio Kaku, the average 1000 MW reactor produces about 30 tons of high-level nuclear waste in one year. If the NRC grants Entergy's application for a new 20 year license for each reactor will produce an additional 600+ tons of radioactive waste, including high burn up waste.

Nationally 70,000 tons of radioactive waste is the current inventory. At the current rate each year another 2,000 tons is produced. In addition, over the past years high burn up fuel is now included in the waste inventories of nearly every reactor in the nation.

FAILURE OF GEIS TO CONSIDER HIGH BURN UP WASTE

The GEIS does not address High Burn Up waste which takes at least seven to ten (7-10 years) to cool in the spent fuel pools, instead of the five (5) required by conventional spent fuel . Studies on High Burn Up waste are now, for the first time, being conducted by the DOE with regard to requirements for safe handling and storage of High Burn Up waste. These studies are incomplete and inconclusive, therefore not enough scientific information exists for the NRC to make an informed determination as to methodology and safety requirements necessary for storage of High Burn Up waste. What is known is that High Burn up waste is much hotter for a longer period of time, contain higher levels of radioactive isotopes than conventional spent fuel and causes embrittlement faster. *(see Exhibit B: attached the Coalition to Decommission San Onofre).*

Therefore the GEIS is incomplete and inadequate and cannot be used as a basis for any Decisions or Determinations regarding Waste Confidence. The NRC cannot rely on the current GEIS as a valid Environmental Impact Statement (“EIS”) as it omits consideration of the significant waste storage issues related to High Burn Up waste. When and if scientific investigations regarding storage of high burn up waste are completed, a new or supplemental GEIS must be conducted to meet the requirements of NEPA.

FAILURE OF GEIS TO COMPLY WITH COURT ORDER ANALYSIS

The schedule set forth by the NRC to conduct and complete its EIS review is unrealistic, imprudent and arbitrary. The issues related to storing for thousand of tons of nuclear waste produced by the United States over the past

50 years is one of the most important long term environmental and fiscal decisions this nation must face now, and for the future. The NRC's plan to rush the EIS to be able to grant new licenses and license extensions fly in the face of the D.C. Court's decision that held the NRC's Waste Confidence rule was arbitrary and inadequate.

In the case *New York, et al v. NRC*, the Court ordered NRC to conduct a "full analysis" of "the potential environmental effects" of storing spent fuel onsite at nuclear plants "on a permanent basis." *681 F.3d at 479*.

NRC has failed to do the "full analysis" required by the Court. Instead of examining what would happen if spent fuel remained unprotected on the earth's surface indefinitely, the NRC *assumed* that spent fuel would be safely managed in surface storage for an indefinite period. But the Court required NRC to *examine the risks* of spent fuel storage, and did not allow NRC to merely *assume* that storage would be safe.

The GEIS fails provide a scientific and "full analysis" of the potential environmental effects of permanently storing spent fuel on-site, and therefore does not satisfy the Court's order. Instead the NRC has based the EIS on the unproven and unscientific assumption that spent fuel can be stored safely forever without evidence or proof.

The NRC has failed to fully examine:

- the probability or improbability that a geologic repository will be successfully sited for storage of spent fuel including high burn up fuel;
- the probability or improbability a repository may leak radiation;
- the environmental consequences and costs that may occur if a repository cannot be sited or cannot effectively contain radioactivity;
- the impacts on public health that may occur if a geological repository cannot be sited or cannot effectively contain radioactivity.
- the mitigation alternative of ceasing production of additional nuclear waste, if and until, safe, secure and affordable nuclear waste storage solutions are identified, tested, sited and constructed.

The Draft GEIS fails to provide the necessary environmental analysis sufficient to justify eliminating consideration of spent fuel disposal impacts or storage impacts from every licensing proceeding, as proposed in 10 C.F.R § 51.23.

A GENERIC EIS FAILS TO SATISFY NEPA REQUIREMENTS

The NRC's decision to conduct a Generic EIS does not meet the NEPA requirements. A GEIS cannot and does not adequately address all the various site specific issues of long term on reactor site storage on sites with differing surrounding population densities, seismic, geological and structural issues. Each of the nations 103 nuclear plants have unique issues, are located in unique regions of the nation with different geological issues, have different operating histories, have different environmental considerations, and have different surrounding population densities and evacuation challenges. The GEIS fails to consider the worst case scenario at Indian Point and therefore cannot be relied upon as a comprehensive environmental impact statement.

Since NRC failed to include in the scope of this GEIS site specific issues, the GEIS fails to comply with the requirements of NEPA. Therefore, supplemental EIS will be required at every site in the nation to address a multitude of site specific issues which are not and cannot be addressed in an generic review.

Instead of being cost effective as postulated in Appendix H the reliance on a GEIS will be much more expensive and time consuming. Appendix H does not take into consideration the costs of endless litigation and the need to conduct supplemental EIS for each reactor site.

GEIS IS FATALLY FLAWED ARIBTRARY EXCLUSION OF ALTERNATIVES

The GEIS improperly excludes reasonable mitigation alternative of cessation of production of additional waste, therefore the GEIS review is inherently fatally flawed.

To satisfy NEPA standards the NRC is required to identify impacts, take a "hard look" at impacts and seriously consider alternatives and public comments. Public comments overwhelming call for the inclusion of the consideration of mitigation measure to cease nuclear waste production.

The lethal legacy of nuclear waste is the Achilles heel of the nuclear industry. There is clearly a lack of confidence in any plan for short term, long term or indefinite nuclear waste storage, since human knowledge is limited to less than 24,000 years. In addition funding for even short term storage, let alone long term storage cannot be assured,

GEIS IS IMPROPERLY BASED ON FALSE ASSUMPTIONS

The Federal Registry Notice and GEIS are inadequate because they are based on three inaccurate, misleading, false fundamental assumptions.

A. False Assumption “When Necessary” permanent Disposal will be exist

The NRC cannot guarantee that waste Permanent disposal will be available “when necessary” or ever.

There is no reasonable basis for the NRC to assume that in 60 years or 160 years there will be a storage solution to manage the massive stockpiles of radioactive waste. When nuclear energy was first developed sixty years ago the same assumption/promise was made. This promise was broken.

The GEIS contemplates continued operations of nuclear plants based on the false assumption at either in 60 or 160 years a solution for nuclear waste storage will exist. There is no evidence this is true, especially since for nearly 60 years science is not one step closer to finding a nuclear waste storage solution. No other industry would be permitted continue operations creating waste when the regulatory structure originally created to protect the public does not to exist.

For the past 60 years atomic scientists still have not figured out how to safely manage the tons of radioactive nuclear waste produced each year.

Safe and Secure Geological Repository Does Not Exist

Burial is the only allowed method of disposal of nuclear waste, yet burial for geological reasons untenable. Since Reagan’s Executive Order the only permitted method of disposal of radioactive waste has been geologic burial. However to date no safe and secure burial systems have been indentified, developed and constructed by the NRC.

Yucca Mountain in Nevada failed because it was found to be geologically unsound for 10,000 years. Current NRC Commissioner Allison McFarland’s own study found that Yucca Mountain was to unstable and porous to contain radioactive waste. The Court’s held storing 1000’s of tons of radioactive waste underground for 100’s of year was not safe to human health, and our drinking water supplies.

Prior attempts at geological burial have also failed. The Salt mines in Kansas were also found to also be geologically unsound due to prior oil, gas and coal mining drilling making the ground unstable. Imagine what fracking has done to de-stabilize the ground through out the United States today.

Yucca Mountain was cancelled not for political reasons, but for reasons of public health, due to the uncontainable and uncontrollable radioactively released and the release of “heat waste” from nuclear fission for thousand of years.

Human knowledge is limited, we do not know and cannot know the results of 100's or 1000's of years fission from nuclear waste will have on any containment structures. Yet, to date no safe burial location has been or can be identified because there is no place on earth that is geological stable enough to sequester radiation for hundred of thousands years.

Already billions of taxpayer dollars have been wasted on failed attempts to find a national repository. The NRC must accept the reality that geological repository is not a sustainable option. There is not now or nor will there ever be safe burial ground for large quantities of radioactive waste.

In addition there is no safe way to reverse engineer the nuclear fission reaction once it is started in nuclear reaction. Dr. Rhada R. Roy, nuclear physicist, proposed the Roy Process to reverse engineer nuclear waste, yet to date the Roy Process has never been considered. Since even if reverse engineering was possible, under the current regulations it could never be realized, since the only permissible method for dealing with spent fuel is limited to burial.

The findings in the GEIS that basically all environmental impacts with every few exceptions are small is wholly unfounded, not scientifically supported and are self serving, arbitrary, and conclusory.

In addition shipping nuclear waste from the area which benefitted from the electricity to some poorer region who received no benefit from the waste as a dumping ground is a violation of Environmental Justice. And transporting nuclear waste across the nation by truck and rail significantly increases Homeland security risks.

The NRC's decision to eliminate consideration of the alternative to cease of production of more nuclear waste in the GEIS is arbitrary and capricious and without scientific support, and seems to be wholly based on the NRC's desire to continue to produce more nuclear waste.

This failure to consider a realistic alternative makes it clear the NRC is not the proper agency to determine Waste Confidence since it's allegiance is solely with the nuclear industry to protect its continued profits without unbiased consideration of protecting public health, now and in the future.

B. Spent Fuel Pool Leaks and Detection Does Not Exist

The Second inaccurate and misleading fundamental assumption is about leaks detection and monitoring since the GEIS states that that:

“All spent fuel is currently in operation “have either leak detection system or administrative controls to monitor the spent fuel pools liner.”

This assumption is in direct contradiction to the situation that currently exists at Indian Point. Spent fuel pool #2 has been known to be leaking since at least 2005, yet to date only 40% of the spent fuel pool have been inspected. Instead of requiring a design basis inspection of a known leaking spent fuel pool the NRC granted Entergy exemptions from inspection because it was too difficult to inspect due to construction limitations.

Exacerbating this failure the leaks from Spent Fuel Pool #2 were not detected by “leak detection” or, by “administrative controls”, but by accident when an independent contractor happened to notice a wet spot on the ground outside the spent fuel pool #2 walls.

It remains undetermined how long the leak existed or how much radioactive effluent has been discharged into the ground and groundwater before its accidental discovery.

C. Monitoring and Treatment of Radioactive Leaks does Not Exist

Another basic false fundamental assumption of the GEIS is that :

““Leakage empties into drains that be can be monitored”,
and “directed into a sump, liquid radioactive waste
treatment system or other cleanup or collection system.”

At Indian Point leakage the leaks have not been monitored and there is no collection and treatment system. Instead at Indian Point the NRC made a determination to halt clean up of the large underground lake of radioactive effluent under Indian Point, laced with radioactive cesium, strontium, tritium and cobalt.

Shockingly the NRC decided to leave the radioactive effluent in the fractured bedrock under Indian Point and allow the radioactive effluent to leach into the historic Hudson River.

This decision was made in 2007 when after accidently discovery of the leaking spent fuel pools an attempt to clean up the site was made, but soon discontinued. The GEIS does not address this on going failure to contain and clean up radioactive active waste.

In addition Indian Point #1, which was shuttered for many years, is proof that SAFSTOR isn't safe. Indian Point 1 was known to be leaking radioactive effluent for years without remediation.

Failure of Monitoring

There is no comprehensive, continuous, independent monitoring or on-going capture species studies even though strontium-90 has been found in the majority of fish sampled and at a pilot desalination plant, the Haverstraw Desalination Plant, located 3.5 miles downriver, 6 out of 10 samples of finished water have measurable levels of strontium-90. (*see Exhibit C: attached except from DEIS; Exhibit D: aerial photograph of Desal intake; and, Exhibit E: Thermal heat plume Aerial Photograph Indian Point/Desal*).

Local authorities depend on Entergy to report and radioactive leaks. This is clearly the fox watching the hen house and does not provide adequate monitoring.

It is arbitrary and disingenuous for the NRC to base its GEIS on false assumptions and non-existent data.

The circumstances and facts at Indian Point are contradictory to the main foundational assumptions of the GEIS. Any findings made based on this inaccurate and misleading GEIS will be invalid evaluating the environmental impacts of long term or permanent storage of radioactive waste at Indian Point.

D. Use of probability analysis to evaluated environmental impacts of Spent Fuel fails to meet NEPA requirements

The GEIS focus on probability analysis of Spent Fuel Fires cannot be sustained as complying with NEPA, since Indian Point and many other plants in the nation have not applied for an amendment to become 805 plants and therefore probabilistic fire protection analysis is not permitted without public hearing and amendment process.

This basic assumption of the GEIS cannot be used to evaluate the environmental risks of spent fuel fires when the other requirements of 805 license amendment have not been met. Indian Point is not an 805 plant.

Currently Indian Point continues to use defective fire insulation, which has degraded fire protection at Indian Point from 1 hour to only 24 minutes, in a location where all other mandated fire safety requirements had already been degraded.

At Indian Point the spent fuel pools are so overly packed that there is a very real threat of a spent fuel fire which will melt the zirconium cladding. Aging Zircolloy cladding suffers from creep, erosion , corrosion, embrittlement and pyrophoricity.

In addition the environmental impacts and costs of High Burn Up Fuel on Spent Fuel Fires has not been considered.

NRC Chair Allison MacFarlane co-authored a study with Von Hippel and others, regarding significantly increased fire risk from densely packed spent fuel pools (see: Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Jang, Ed Lyman, Allison Macfarlane Gordon Thompson, Frank N. von Hippel, *Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States, Science and Global Security 11:1-51, 2003 Taylor and Francis DOI: 10.1080/08929880390214124*)

The GEIS does not address the need reduce densely packed spent fuel pools to design basis standards. The GEIS does not address the significantly increased risk of spent fuel fire due at Indian Point due to:

- Overly packed of Spent Fuel Pools;
- Location on Two intersecting fault lines;
- Inclusion of High-Burn up fuel in the spent fuels;
- Known un-located and repaired cracks in spent fuel pools;
- Defective fire insulation at Indian Point which only works for 24 minutes instead of the required 1-3 hours;
- Dilution of Boron in spent fuel pools to density;
- Close proximity to two natural gas pipelines without on-site shutoff;
- High Burn Up Fuels impact on densely pack spent fuel pools.

Most importantly the GEIS does not address the lack of plan or knowledge by the nuclear industry as to how to control a spent fuel fire. Spent fuel fires at Fukushima and Chernobyl could no be controlled, yet Mr. Steets of Entergy continues to claim that in the event of a spent fuel fire Entergy plans to use fire hoses to put out a radioactive spent fuel fire. This didn't work at Fukushima and won't work here. The public is aware this is PR nonsense and the Waste Confidence Board cannot base storage of nuclear waste on this kind of fantasy.

GEIS FAILS TO CONSIDER COSTS OF NUCLEAR WASTE STORAGE

The GEIS glosses over and does not identify how funds will be made available in perpetuity to provide security for nuclear waste storage and for the replacement dry cask storage systems every 100 years.

The brief discussion in Section 3.2.2 somehow magically assumes local taxes will cover the exploding, repeating costs of nuclear waste storage. This is unfounded and unsustainable for future generations who will not receive any benefits from the lethal nuclear legacy to continue funding replacement casks every 100 years. In a 100 years or more there the current tax based structure of government and society may not even exist. There is a real risk that financial commitments made by elected bodies may be subject to de-funding as we just witnesses during the recent Federal shutdown.

Currently decommissioning funds are inadequate to safely decommission nuclear facilities throughout the country. In 2003 the GAO Report dated October 2003 found that the NRC Needs More Effective Analysis to Ensure Accumulation of Funds to Decommission Nuclear Power Plant, yet since that time the NRC irresponsibly allow Entergy to gamble Indian Point decommissioning fund on the stock market, which resulted in a significant loss in the 2008 stock market crash.

Mark Cooper, senior fellow for economic analysis, Institute for Energy and the Environment, Vermont Law School, and author of *"Renaissance in Reverse: Competition Pushes Aging U.S. Nuclear Reactors to the Brink of Economic Abandonment"* (2013) and *"Policy Challenges of Nuclear Reactor Construction, Cost Escalation and Crowding Out Alternatives"* (2009), calculated the full price tag per megawatt hour of nuclear power in terms of the cost and risks of storing and disposing of the radioactive waste from reactors. Cooper found that the "hidden" cost of nuclear waste storage is rapidly rising, and is so massive that the NRC cannot ignore it when conducting its own economic analysis about the true cost of nuclear power.

Yet the GEIS does ignore the cost impacts and realities of nuclear waste storage. Without question that cost considerations for High Burn Up fuel cannot not projected since there is no scientific basis for the methodology necessary for safe storage.

It is arbitrary, capricious and totally irresponsible for the NRC to leave funding of future replacement and repair of spent fuel storage to short term political whims. Failure to provide necessary funds for future safe storage will result in extremely dangerous situations for public health and safety and the future of the entire human race.

GEIS FAILS TO CONSIDER THE NEW, UNCONTEMPLATED OR APPROVED USE OF STATE LANDS FOR LONG TERM OR PERMANENT NUCLEAR STORAGE

Long term and/or permanent storage on reactor sites were not contemplated when the States first granted permission for siting of nuclear reactors, therefore this is NEW USE OF LAND without prior informed consent of the State, and as such a re-assessment of state and local taxes is necessary.

When nuclear power was first sited and implemented the United States government made a promise to reactor communities that it would take care of safely disposing the nuclear waste. This commitment has not and cannot be met.

Currently since there is no safe way to manage radioactive waste operators who continue producing this radioactive waste must be charged a premium compliance tariff, set by the State in which the nuclear facility is located.

The actual property values in the New York City area, within the 50 mile radius of the Indian Point reactor community are approximately 8.5 trillion dollars, not including life or business values. (*See attached Exhibit F: Indian Point Property Value Study*). Indian Point itself has been paying a reduced property tax rate for years. Under Price Anderson Indian Point and all other reactors in the nation are only 13 billion is insured.

That is clearly not enough to cover the costs of long term/permanent on site storage both from a physical and security perspective. The NRC has not established guarantees for on-going funding to protect nuclear waste now and into the future.

GEIS FAILS TO CONSIDER HEALTH IMPACTS OF LONG TERM EXPOSURE TO LOW LEVEL NUCLEAR RADIATION

Studies based on CDRC and New York State Cancer Registry Data have found significantly higher levels of thyroid cancer in the areas surrounding Indian Point and other nuclear reactor. (See [Geographic Variation in U.S. Thyroid Cancer Incidence and a Cluster Near Nuclear Reactors in New Jersey, New York, and Pennsylvania](#) published in the [International Journal of Health Services](#) Volume 39, Number 4, 2009, pages 643 - 661.
<http://radiation.org/reading/pubs/091116Thyroidcancer.pdf>.

In addition Childhood Leukaemia near nuclear plants has been proven in peer reviewed studies to be significantly higher. See http://radiation.org/reading/pubs/ecc_948.pdf

The GEIS fails to consider the long term health impacts of continued production of nuclear waste without a solution for safe and secure storage and waste disposal.

GEIS IMPROPERLY FOUND THE MOST IMPACTS TO BE SMALL

Since in the GEIS the NRC arbitrary without basis considers the vast majority of impacts of thousands of tons of nuclear waste to be SMALL, this is a red flag that the NRC is not capable to taking the required hard look necessary to comply with NEPA.

The Department of Homeland Security, FEMA, Department of the Interior Department of Agriculture, Department of Energy and Department of Defense need to be actively engaged in any and all decisions regarding long term nuclear waste storage.

IMMEDIATE AND NECESSARY ACTIONS:

- Immediately stop production of High Burn Up Waste.
- Require all spent fuel once adequately cooled to be placed in Hardened Dry Cask Storage in robust casks with leak detection, like German Castor V cask which have low visual and low infrared signatures.
- Removal of excess spent fuel being stored in spent fuel pools beyond the original approved spent fuel pool design capacity, as soon as adequate cooled.
- Require all dry casks to be bolted down and bermed or placed in other robust structures. At Indian Point the dry cask are not even attached to the pad, and in the event of an earthquake seismic scientists from Lamont Doherty have identified the risk of tipping and rolling into the Hudson River.
- Require reliable, sustainable back up power for spent fuel pools including but not limited to solar or wind systems with battery back to insure against loss of power which would result in an uncontrollable spent fuel fire.
- Fund a comprehensive, continuous independent, citizen run radiation monitoring program (reports 4 times a year are not adequate to evaluate health impacts of ongoing radioactive releases and bio-accumulation)
- Established a permanent revolving fund in perpetuity which can adequately address long term/permanent nuclear waste storage and security, including structural repairs and replacement, federal security teams, and research to reverse engineer man-made nuclear fission.
- Establish a independent Nuclear Waste Administration, whose participants must include the Reactor community. The Blue Ribbon Commission's most valuable finding was that waste storage issue need to be consent-based and include buy in by the local communities/

Reactor communities must have equal representation in any waste storage decisions. Non binding consultation with reactor communities does no provide adequate consent.

It is necessary to establish a permanent Nuclear Waste Administration Board which will include equal number of Reactor community stakeholders and industry stakeholder.

- Most importantly the NRC needs to deny any new licenses to prevent continue accumulation of unmanageable nuclear waste.

CONCLUSION

The reality of a long term solution to nuclear waste does not exist, and may very likely never exist. Since the GEIS fails address the need to stop making more nuclear waste, as an alternative it cannot be relied upon to comply with NEPA.

The answer from the nuclear industry and the NRC is always the same, it will be different next time. But the only reliability the nuclear industry has to offer is continually break promises and bust budgets.

It is time for the NRC and the nation to acknowledge nuclear power is a science experiment that has gone very wrong. Since there is not solution for the nuclear waste already produce we must stop making more unmanageable high level radioactive waste. Only a fool keeps repeating a mistake over and over again.

For all of the above reasons, the GEIS fails to satisfy the requirements of a NEPA environmental review and must be rejected as arbitrary, capricious, inaccurate, incomplete and invalid..

Sincerely yours,

Susan H. Shapiro

Susan H. Shapiro, Esq.



***Review of Emergency
Preparedness of Areas Adjacent
to Indian Point and Millstone***

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March 7, 2003

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EXECUTIVE SUMMARY

On August 1, 2002, Governor George E. Pataki announced a comprehensive and independent review of emergency preparedness to be performed by James Lee Witt Associates (JLWA) for the area around the Indian Point Energy Center ("Indian Point"), and for that portion of New York in proximity to the Millstone nuclear plant ("Millstone") in Connecticut. James Lee Witt Associates subcontracted with Innovative Emergency Management ("IEM") for portions of the review. The review encompassed many related activities that were designed, when taken together, to determine whether the existing plans and capabilities of the jurisdictions involved are sufficient to ensure the safety of the people of New York in the event of an incident at one of these plants, and how those existing plans and capabilities might be improved. In addition to an outreach effort into the surrounding communities, the review included recent exercise results and public information efforts, current radiological emergency response plans, and the data underlying the response plans, such as population data, the methodology of evacuation time estimates, alert and notification system specifications, Off-site accident impact analysis methodologies, and communication capabilities.

It should be noted that we were not asked to look at the safety of the plants themselves, the availability of alternate energy sources, the economic and environmental costs and benefits of the plants, or other factors relevant to an overall picture of the plants within their respective communities. Consequently, nowhere have we taken a position on the future status of the plants.

During our review we were frequently asked whether we were under constraints. We were guided by our experience and were unconstrained in our recommendations.

Major Findings

Plans and Exercises

- 1 The plans are built on compliance with regulations, rather than a strategy that leads to structures and systems to protect from radiation exposure.
- 2 The plans appear based on the premise that people will comply with official government directions rather than acting in accordance with what they perceive to be their best interests.
- 3 The plans do not consider the possible additional ramifications of a terrorist caused event.
- 4 The plans do not consider the reality and impacts of spontaneous evacuation.
- 5 Response exercises designed to test the plans are of limited use in identifying inadequacies and improving subsequent responses.

These planning problems are more serious because of the large population concentrations near the Indian Point plant, and when the effectiveness of the plan requires a degree of public and responder confidence that is largely absent. Thus the consequences of the five general findings above are more serious for the communities around Indian Point than for New York jurisdictions closest to Millstone.

Regulations

The Nuclear Regulatory Commission (“NRC”) has stated as recently as November 18, 2002, that a preliminary assessment of the capabilities of, and compliance by, the State and its jurisdictions by the Federal Emergency Management Agency (“FEMA”), based on the September 24, 2002 exercise, indicates the Off-site emergency plans are adequate to protect public health and safety. While under the current regulations that may be technically true, we are concerned that when plans and exercises, which omit such things as a realistic consideration of spontaneous evacuation and the unique consequences of a terrorist attack, still meet NRC and FEMA regulations, then those regulations need to be revised and updated on a national basis. We believe any plant adjacent to high population areas should have different requirements than plants otherwise situated, because protective actions are more difficult and the consequences of failure or delay are higher. The standard, to minimize the radiological dose to the public, would remain the same; its accomplishment necessitates higher requirements in some communities than others.

Some may look at our findings, conclusions, and recommendations and read them, incorrectly, as an indictment of FEMA or the State and its jurisdictions, and their staff and leadership. FEMA has recognized the need to change in the direction of a more performance-based approach in its exercise program. Although the change does not go far enough, it began with a multi-year strategic review of the Radiological Emergency Preparedness Program, and resulted in a new exercise methodology developed prior to 9/11 and published in the Federal Register on September 12, 2001. This beginning of a change in exercise theory to focus on performance outcomes was not found in the planning and exercising practices of the State of New York and its jurisdictions however. We hope our recommendations will accelerate both regulatory and cultural changes.

Also, while we do have many recommendations for further change that impact on the systems and practices of FEMA and others, we recognize that these systems and practices were developed in a different environment. Simply stated, the world has recently changed. What was once considered sufficient may now be in need of further revision. We hope that those at all levels of government with emergency management responsibilities will consider our suggestions in a manner that is consistent with their high standards and professional experience.

Major Conclusions

Indian Point Safety

In our report we discuss significant planning inadequacies, expected parental behavior that would compromise school evacuation, difficulties in communications, outdated vulnerability assessment, the use of outdated technologies, lack of first responder confidence in the plan(s), problems caused by spontaneous evacuation, the nature of the road system, the thin public education effort, and how

these issues may impact an effective response in a high population area. None of these problems, when considered in isolation, precludes effective response. When considered together, however, it is our conclusion that the current radiological response system and capabilities are not adequate to overcome their combined weight and protect the people from an unacceptable dose of radiation in the event of a release from Indian Point. We believe this is especially true if the release is faster or larger than the typical exercise scenario. Should our recommendations be successfully implemented it is possible that an improved exercise program will demonstrate that a different conclusion is warranted.

Millstone Safety

Although most of the problems mentioned above also apply to those New York jurisdictions near Millstone, their consequences are significantly less for reasons detailed in the report. The response system and capabilities of those jurisdictions, though inferior to those near Indian Point, should be able to protect New York citizens from an unacceptable dose of radiation in all but the most extreme event. Implementation of our recommendations should dramatically increase that margin of safety.

Major Recommendations

Plans

Plants adjacent to high population areas should have different requirements than plants otherwise situated, because protective actions are more difficult and the consequences of failure or delay are higher. Many of our specific recommendations are designed to assist the State and its jurisdictions in meeting the higher requirements we believe need to be developed primarily at the Federal level.

Also, the plans appear to be based on the assumption that people will comply with official directions. We recommend the implementation of a continuous effort that assesses existing attitudes and expected behaviors, and planning (and public education) that is based on the results of these efforts.

The plans are designed to allocate responsibilities for emergency functions. The current format and structure does not easily allow integration of information such as evacuation time estimates, what segments of the public believe and intend, and risk and threat assessments. The plans should discuss and evaluate strategies for protecting people in a variety of scenarios.

Terrorism

There are unique aspects of a terrorist caused incident that should be considered in planning and exercising. For example:

- The possibility of multiple obstructions of evacuation routes that are additive to those that would occur in a “normal” evacuation. Because they can be assumed to be deliberately designed to cause disruption, they may also be more difficult to address than normal evacuation problems.
- The possible targeting of responders.
- The possibility that spontaneous and/or shadow evacuation may be more of a problem than it would be in a non-terrorist event.
- The probable presence of a crime scene that may significantly change the communication and coordination aspects of a disaster response, as occurred in Oklahoma City.
- The probable diversion of those required to respond to the attack from response related law enforcement activities such as the safe evacuation of the affected populace.
- The probable involvement of agencies, such as the FBI, in both on site and off site activities in ways planners who now refuse to contemplate the unique implications of the terrorist threat have not yet considered.

It is important to note that a terrorist event need not result in a release for some of the above possible consequences to come into play. The unique aspects of a terrorist event should not be dismissed by simply asserting that they are covered in current plans and exercises.

Communications

As is often the case in emergency response, interoperability and other communications shortcomings among the response agencies and jurisdictions hinders effective response, especially in areas of hilly terrain. The adjacent counties should have a priority in any communications project the State may undertake.

Also, municipalities within and beyond the ten-mile planning zone should have access to direct notification and information on current plant conditions and projections. A one-way flow of information supplementing current notification processes would help local officials get ahead of problems and retain public confidence.

Ten-Mile Emergency Planning Zone

There is a likelihood of significant unnecessary evacuation within and beyond the ten-mile zone. Such an evacuation has serious public safety implications. Planning at all levels of government must reflect this likelihood.

Public Education

Because evacuation is often assumed to be the only effective protective action, and because spontaneous evacuation is a problem for public safety, training relative to sheltering-in-place is necessary, well beyond the ten-mile zone. Also, effective public education must be designed

and initiated if aspects of the plan that are sensitive to public response are to be effective. Because many essential personnel indicate they will take care of their families, instead of focusing on their response activities, training on emergency family protection should be a component of this public education effort.

Exercises

We observed the full-scale exercise of Indian Point held in September 24, 2002 but there was no comparable Millstone exercise for us to observe. The exercise program, of which the September 2002, exercise was a part, simply does not measure the performance outcome of the emergency response system. The results of the exercises are not as reflective of the status of preparedness as some consider them to be.

The exercise program uses a functional approach to exercise evaluation. The concept is to outline every function to be performed, analytically break down each function, and review the performance of the system using the functions and the points of review. The notion is that each atomized function can be reviewed separately and can be judged on its own merit.

The current approach to exercises is valuable in improving specific parts of plans. But an emergency response system should not be viewed functionally. It is a system where each part is connected to the whole. The system includes warning, dose assessment, protective action recommendations, instructions to the public and so forth. A break in the chain of activities may mean that the goal is not met.

The State should work with FEMA and others to develop a performance outcome-based exercise program distinctly different from the functional exercise approach. A functional approach examines each activity against regulations, guidance, or plans and looks for compliance. An outcome-based approach looks for the effects of the actions on the community.

Exercise Scenarios

The implications of a release faster or larger than those now being addressed also need to be considered. The low end of the time range specified in NUREG 0654 (as low as one-half hour) is not being sufficiently exercised. In addition, the participating organizations need to focus on measuring how quickly the population is being affected versus the speed with which protective actions are being accomplished. Similarly, in the case of larger releases, we cannot verify that the larger end of the accident spectrum is being accommodated. The vigorous debate about whether a terrorist event actually increases the probability of such releases, about which we did not offer an opinion, should not detract from the need to address faster and larger releases.

Large shadow evacuation, especially for a terrorist event, should be included. These scenarios should be selected for their ability to test varying concepts for protecting people. A broader part of the community, including those publicly skeptical of the plans, needs to be involved in the development of the exercises as well as be able to participate and observe the exercises.

Response Management Technologies

The Indian Point region is using old technologies in a number of areas. The hazard assessment process uses 25 to 30 year old map overlays for determining the area at risk. The hazard information specific to the dose assessment is communicated via phone or fax to the State and Counties. Plume information is currently not available through operable automation systems that can show the State and counties the precise areas that are at risk. Assessments do not integrate with population data and do not show the time that various zones would be at risk.

In providing warning to the people, there is an over-reliance on outdated sirens and the Emergency Alert System. Newer technologies, such as tone alert radios, have not been widely implemented.

When making protective action decisions, officials must consider what has happened, how it could affect people, the time windows available for actions, action alternatives, and the resources and constraints attendant on each action alternative. Currently, the protective action decision-making process is very simplistic, and there is virtually no technology support for these decisions.

We recommend that the Emergency Operations Centers (EOCs) and the technology supports for protective actions be significantly upgraded.

Public Review

On January 10, 2003 James Lee Witt Associates completed the draft review. Because of the importance of the subject to the citizens and stakeholders in the area, and because we thought consideration of comments would improve the report, JLWA thought it appropriate that the public have an opportunity to provide comments on any aspect of it. The State concurred in this assessment and approach.

The comments received are recorded and discussed in a new appendix, Appendix K.

FEMA also commented on our draft report. Although it was sent two weeks after the close of the comment period, and not to us, we requested additional time from the State so that we could address their comments. We requested the additional time, and it was granted, because FEMA is the federal agency with purview over many of the issues we discuss, and we felt they and others should have benefit of our responses in their subsequent actions and decisions. Our consideration of the FEMA report can be found in a second new appendix, Appendix L.

STOP the High Burnup Nuclear Experiment



For about 16 years, the Nuclear Regulatory Commission (NRC) has approved high burnup fuel, which increases nuclear industry profits. *High burnup fuel is low-enriched uranium that has burned in the reactor for **more than 45 GWd/MTU** (GigaWatt days per Metric Ton of Uranium).*¹

High burnup fuel has unresolved serious waste storage issues.

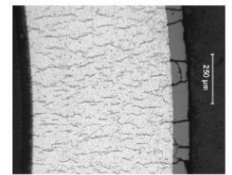
A June 2013 Department of Energy report² states “...**cladding performance issues need to be addressed before this fuel can be loaded into dry casks and transportation systems.**” And “...burnup rates **as low as 30 GWd/MTU** can present performance issues

including **cladding embrittlement** under accident conditions as well as normal operations.”

The NRC should stop approval of high burnup fuel and make solving high burnup fuel storage problems one of its highest priorities.

High burnup fuel problems

- **Dangerously unpredictable and unstable in storage – even short-term.**
- **Over twice as radioactive and over twice as hot.** *The higher the burnup rate and the higher the uranium enrichment, the more radioactive, hotter and unstable.*
- **Requires a minimum of 7 to 20 years of cooling in spent fuel pools.** San Onofre’s 1123 high burnup fuel assemblies require at least **15 years** to cool in the pools. *Years of cooling depend on burnup rate, percent of uranium enrichment and other factors as defined in the dry cask system’s technical specifications.*³ *Lower burnup fuel requires a minimum of 5 years.*
- **Requires more storage space between fuel assemblies** due to the higher heat, higher radioactivity, and instability,⁴ yet the NRC approves higher densities of fuel assemblies in dry casks systems. **San Onofre** requested use of a new dry cask system that crowds 32 fuel assemblies into the same space that currently holds 24.⁵ This new system will increase the risks of dangerous radiation releases into the environment. **The NRC should NOT approve the NUHOMS® 32PTH2 cask system** for high burnup, but is considering doing so this year. **Diablo Canyon** now uses a 32 fuel assembly cask system.
- **No transportation casks for high burnup are approved by the NRC,**⁶ so the waste cannot be relocated.
- **Approved for only 20 years in dry cask storage** and assumptions about how high burnup fuel reacts in the first 20 years of storage are proving incorrect.⁷
- **Insufficient data to approve dry casks for over 20 years, per Dr. Robert Einziger, Senior Materials Scientist, NRC Division of Spent Fuel Storage and Transportation.**⁸



Microscopic View of Fuel Clad Hydrides

¹ **GAO-12-797** SPENT NUCLEAR FUEL Accumulating Quantities at Commercial Reactors Present Storage & Other Challenges, August 2012 <http://www.gao.gov/assets/600/593745.pdf> Low-enriched uranium = up to 5% of U²³⁵

² **DOE** FCRD-NFST-2013-000132, Rev. 1; Fuel Cycle Research & Development-Nuclear Fuel Storage and Transportation-2013-000132, Rev. 1, 6/15/13 <http://www.hsdll.org/?abstract&did=739345>

³ **CoC No. 1029** Technical Specifications for Advanced NUHOMS® System Operating Controls and Limits, Appendix A Tables 2-9 to 2-16 <http://pbadupws.nrc.gov/docs/ML0515/ML051520131.pdf>

⁴ **RWMA** Marvin Resnikoff, PhD: *The Hazards of Generation III Reactor Fuel Wastes* May 2010 <http://bit.ly/19dVRsY>

⁵ **Edison** request for NUHOMS® 32PTH2 <http://pbadupws.nrc.gov/docs/ML1204/ML12046A013.pdf>

⁶ **SFPO** Interim Staff Guidance 11, Rev 3 *Cladding Considerations for the Transportation and Storage of Spent Fuel* 11/17/2003 <http://www.nrc.gov/reading-rm/doc-collections/isg/isg-11R3.pdf>

⁷ **NWTRB** Douglas B. Rigby, PhD: *The NRC approved the initial 20 year dry cask storage based on assumptions. However, no information was found on inspections conducted on high burnup fuels to confirm the predictions that were made.* U.S. Nuclear Waste Technical Review Board December 2010 report http://www.nwtrb.gov/reports/eds_rpt.pdf

⁸ **NRC** Robert E. Einziger, PhD: *insufficient data to support licensing dry casks for >20 years*, March 13, 2013. <http://1.usa.gov/15E8gX5>

RADIOLOGICAL ANALYSIS

Due to the presence of the Indian Point nuclear power plant on the eastern shore of the Hudson River in Buchanan, NY, some have expressed concern regarding the possible radiological contamination of groundwater as well as the Hudson River close to the plant. A summary of the radiological results from United Water's sampling program is provided below. Table 2-4 summarizes the analyses performed for radionuclides in water samples collected at several locations in the Hudson River in 2007 and 2008.

Table 2-4
Results of Radionuclide Sampling

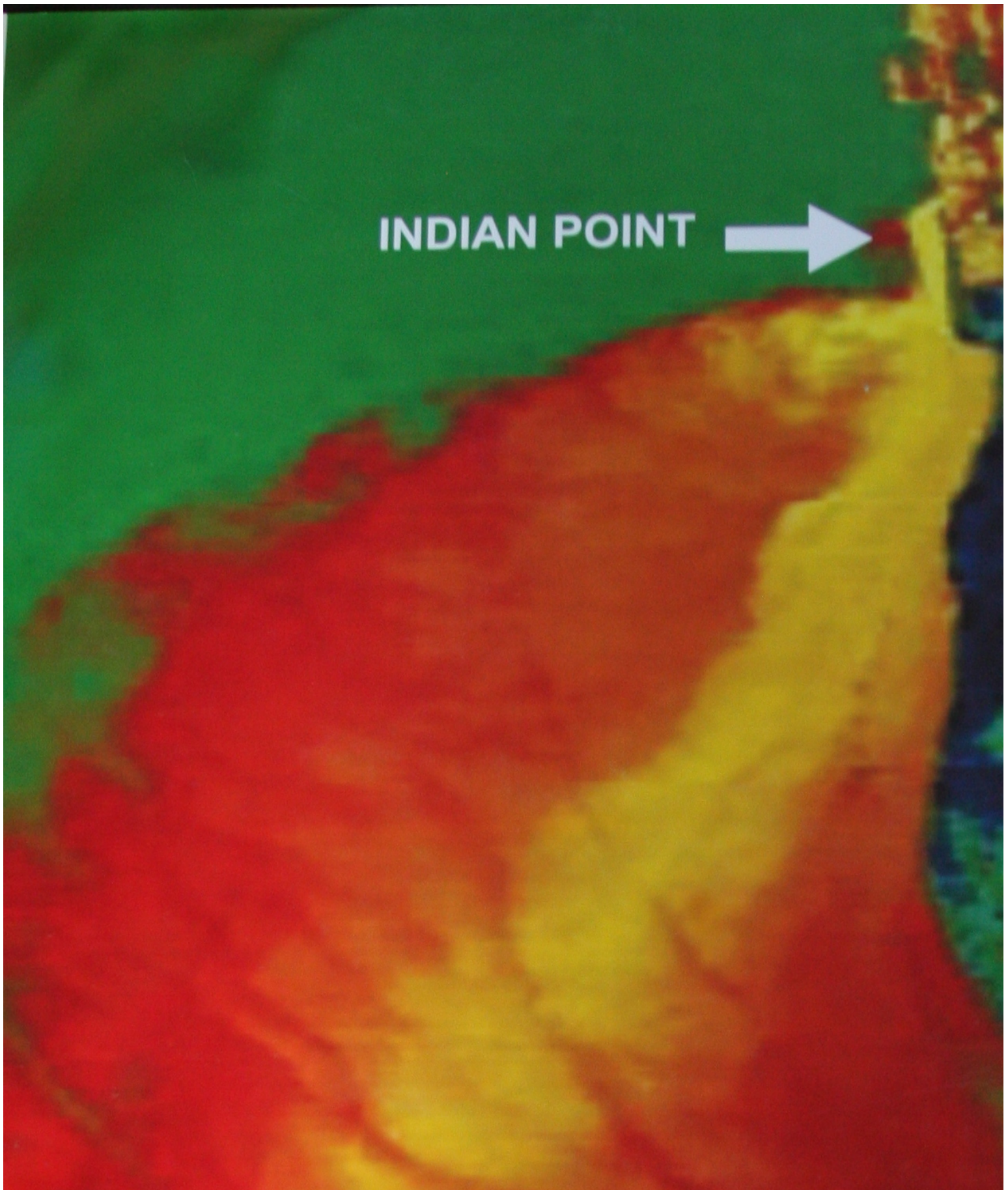
Radionuclide	<i>n</i>	Results: Range	Results: Average ¹	MCL ²	Notes
Gross alpha	18	0-20	3.5	15 pCi/L	
Gross beta	19	0-62	10.8	50 pCi/L	Dosage: 4 mrem/yr
Radium 226/228 (combined)	16	ND		5 pCi/L	
Total uranium	19	0-0.689	0.400	30 ug/L	
Strontium 90	11	0-0.82	0.680	8 ug/L ³	Not detected in 5 out of 11 samples
Tritium	11	0-397	36	20,000 pCi/L ³	Not detected in 10 out of 11 samples
Notes: <i>n</i> = Number of samples 1 Not detected treated as 0. 2 MCL = Maximum contaminant level, the standard set by EPA for these radionuclides. MCLs are calculated as the average of four quarterly samples. 3 Used as guidance when gross beta < 50 pCi/L.					

Drinking water standards for radionuclides first require the determination of “gross alpha” and “gross beta” measurements; these measurements are useful in providing an overall screening to determine if further analysis of specific radionuclides is needed. Standards of the U.S. Environmental Protection Agency (EPA) may be satisfied by testing for gross alpha and gross beta radioactivity. The standards are considered to be met when the gross beta activity is lower than or at the maximum contaminant level (MCL) set by EPA and concentrations of tritium and strontium 90 are lower than or at the MCL. (MCLs for these radionuclides are calculated as the average of four quarterly samples.) As shown in Table 2-4, both gross alpha and gross beta were well below the EPA MCLs. Also, radium, uranium, strontium 90, and tritium were well below their respective MCLs and /or guidance values.

© Aerial Photography by *Rasspilot*

Jan 25, 2012







Indian Point

Data Report

Real Property Values - 50 Mile Radius

Date: May 2011

EXECUTIVE SUMMARY

Indian Point – Data Report

Real Property Values

50 Mile Radius

The purpose of this data report is to calculate the property values in the 50 miles radius surrounding Indian Point.

This study gathered raw data from county and town tax assessors of the real property values in the 50 miles radius surrounding Indian Point. The total real property value is \$8.5 trillion for the 50 mile radius, not including the cost of life, businesses, and equipment.

In the event of a nuclear disaster at Indian Point, the federal government caps Entergy's liability at \$12.6 billion, in accordance with the Price Anderson Act. Only .148% of the property value is insured, leaving 99.8% uninsured. This severe lack of insurance may cause the bankruptcy of New York State and destroy New York's tax base.

The insurance industry refuses to cover nuclear accidents or facilities as uninsurable risks; therefore by default New York State and its taxpayers are the primary insurers of Indian Point, to the tune of \$8,487,400,000,000.

Is Indian Point a risk New Yorkers are willing to insure?

This report was prepared by Public Health and Sustainable Energy in conjunction with Westchester's Citizen Awareness Network. For more information contact (845) 294-6077.

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Indian Point

Data Report Real Property Values - 50 Mile Radius

This study gathered raw data of actual real property values in the 50 miles radius surrounding Indian Point. In the event of a nuclear disaster Entergy is only liable for \$12.6 billion dollars, in accordance with the Price Anderson Act. The insurance industry has refused to cover nuclear facilities as uninsurable risks; therefore New York State and its taxpayers are the primary insurers of Indian Point.



Indian Point

2011 REAL PROPERTY VALUES:

Connecticut	\$ 338,520,651,453*
New Jersey	\$ 541,465,383,963
New York State	\$ 6,838,960,267,346
New York City	\$ 790,991,468,750
Pennsylvania	\$ 492,812,000

Total Real Property Value	\$ 8,510,430,583,512
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Entergy Total Liability .148%	\$ 12,600,000,000
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* Connecticut's total includes real estate, personal property and motor vehicle values.

Connecticut*

	Total Assessed Value	Equalization Rate	Actual Value
Fairfield County			
Bethel	2,314,918,220	70.00	3,307,026,028.57
Bridgeport	6,990,000,000	70.00	9,985,714,285.71
Brookfield	2,617,715,187	70.00	3,739,593,124.29
Danbury	10,224,943,601	70.00	14,607,062,287.14
Darien	18,796,876,533	70.00	26,852,680,761.43
Easton	1,767,492,683	70.00	2,524,989,547.14
Fairfield	11,958,790,923	70.00	17,083,987,032.86
Greenwich	30,527,142,870	70.00	43,610,204,100.00
Monroe	2,456,807,622	70.00	3,509,725,174.29
New Canaan	8,203,738,624	70.00	11,719,626,605.71
New Fairfield	12,005,407,450	70.00	17,150,582,071.43
Newtown	3,849,381,487	70.00	5,499,116,410.00
Norwalk	12,865,882,589	70.00	18,379,832,270.00
Redding	2,075,876,108	70.00	2,965,537,297.14
Ridgefield	5,631,701,370	70.00	8,045,287,671.43
Shelton	5,304,610,269	70.00	7,578,014,670.00
Sherman	750,816,768	70.00	1,072,595,382.86
Stamford	27,484,235,591	70.00	39,263,193,701.43
Stratford	5,171,396,501	70.00	7,387,709,287.14
Trumbull	5,241,739,499	70.00	7,488,199,284.29
Weston	2,637,085,459	70.00	3,767,264,941.43
Westport	9,553,989,667	70.00	13,648,556,667.14
Wilton	5,078,227,560	70.00	7,254,610,800.00
Fairfield Subtotal			276,441,109,401.43
Litchfield County			
Bantam (Litchfield)	1,101,894,343	70.00	1,574,134,775.71
Bethlehem	410,425,445	70.00	586,322,064.29
Bridgewater	416,521,811	70.00	595,031,158.57
Cornwall Bridge	455,792,130	70.00	651,131,614.29
Kent	660,042,506	70.00	942,917,865.71
Morris	371,368,026	70.00	530,525,751.43
New Milford	3,191,203,455	70.00	4,558,862,078.57
Roxbury	747,823,780	70.00	1,068,319,685.71
Sharon	922,620,147	70.00	1,318,028,781.43
Washington	1,255,250,050	70.00	1,793,214,357.14

	Total Assessed Value	Equalization Rate	Actual Value
Watertown	1,925,262,288	70.00	2,750,374,697.14
Woodbury	1,222,726,720	70.00	1,746,752,457.14
<i>Litchfield Subtotal</i>			<i>18,115,615,287.14</i>
New Haven County			
Ansonia	1,165,382,074	70.00	1,664,831,534.29
Beacon Falls	588,754,827	70.00	841,078,324.29
Derby	910,598,371	70.00	1,300,854,815.71
Middlebury	1,084,519,272	70.00	1,549,313,245.71
Milford	5,400,000,000	70.00	7,714,285,714.29
Naugatuck	2,027,434,087	70.00	2,896,334,410.00
New Haven	5,973,512,384	70.00	8,533,589,120.00
Orange	1,441,904,051	70.00	2,059,862,930.00
Oxford	1,396,806,051	70.00	1,995,437,215.71
Seymour	1,410,588,460	70.00	2,015,126,371.43
Southbury	2,611,205,336	70.00	3,730,293,337.14
Waterbury	5,522,760,942	70.00	7,889,658,488.57
Woodbridge	1,241,282,880	70.00	1,773,261,257.14
<i>New Haven Subtotal</i>			<i>43,963,926,764.29</i>

CONNECTICUT

Grand Total **\$338,520,651,452.86***

* Connecticut's total includes real estate, personal property and motor vehicle values.

New Jersey

	Total Assessed Value	Equalization Rate	Actual Value
Bergen County			
Allendale	1,310,013,800	71.75	1,825,803,206
Alpine	1,914,068,900	81.76	2,341,082,314
Bergenfield	2,666,578,700	88.62	3,009,003,272
Bogota	832,493,600	92.27	902,236,480
Carlstadt	954,210,535	35.42	2,693,987,959
Cliffside Park	2,469,463,000	70.77	3,489,420,658
Closter	2,057,087,000	92.91	2,214,064,148
Cresskill	1,772,611,100	71.41	2,482,300,938
Demarest	1,218,863,500	82.69	1,474,015,600
Dumont	2,084,670,900	92.44	2,255,161,077
Elmwood Park	2,069,044,500	83.13	2,488,926,380
East Rutherford	2,018,829,100	105.49	1,913,763,485
Edgewater	2,960,618,900	106.64	2,776,274,287
Emerson	1,400,335,050	101.95	1,373,550,809
Englewood	5,253,745,800	95.27	5,514,585,704
Englewood Cliffs	3,422,518,800	99.94	3,424,573,544
Fair Lawn	5,058,935,300	98.97	5,111,584,622
Fairview	622,808,600	43.12	1,444,361,317
Fort Lee	6,109,242,320	92.83	6,581,107,745
Franklin Lakes	4,948,484,700	105.29	4,699,862,000
Garfield	1,174,531,000	45.46	2,583,658,161
Glen Rock	2,298,315,000	88.65	2,592,571,912
Hackensack	5,984,191,300	99.16	6,034,884,328
Harrington Park	1,088,235,000	97.89	1,111,691,695
Hasbrouck Heights	1,870,925,100	97.35	1,921,854,237
Hanworth	795,601,600	75.58	1,052,661,551
Hillsdale	1,959,799,300	96.72	2,026,260,649
Hohokus	1,371,742,900	97.87	1,401,596,914
Leonia	1,352,111,000	92.35	1,464,115,864
Little Ferry	1,213,377,900	97.13	1,249,230,825
Lodi	1,951,459,900	82.53	2,364,546,104
Lyndhurst	3,496,730,200	100.82	3,468,290,220
Mahwah	4,143,215,800	60.19	6,883,561,721
Maywood	1,420,430,900	104.52	1,359,003,923
Midland Park	862,783,700	66.41	1,299,177,383
Montvale	2,354,465,100	106.27	2,215,550,108
Moonachie	784,754,590	98.62	795,735,743
New Milford	1,962,948,400	96.21	2,040,274,816
North Arlington	817,669,000	46.6	1,754,654,506

	Total Assessed Value	Equalization Rate	Actual Value
Northvale	1,003,594,986	98.61	1,017,741,594
Norwood	1,482,244,100	98.72	1,501,462,824
Oakland	2,545,212,400	95.46	2,666,260,633
Old Tappan	1,303,991,300	68.27	1,910,050,242
Oradell	1,619,228,300	89.91	1,800,943,499
Palisades Park	2,291,286,700	83.58	2,741,429,409
Paramus	8,007,921,000	86.81	9,224,652,690
Park Ridge	1,729,243,419	88.58	1,952,182,681
Ramsey	2,819,834,800	74.27	3,796,734,617
Ridgefield	1,838,124,000	87.49	2,100,953,252
Ridgefield Park	1,559,596,600	106.94	1,458,384,702
Ridgewood Village	6,675,391,600	99.9	6,682,073,674
Riveredge	1,627,683,100	88.88	1,831,326,620
River Vale	2,111,131,200	97.12	2,173,734,761
Rochelle Park	984,812,500	93.28	1,055,759,541
Rockleigh	222,216,442	124.77	178,100,859
Rutherford	2,834,208,200	92.72	3,056,738,783
Saddle Brook	2,288,777,400	95.82	2,388,621,791
Saddle River	2,183,778,200	79.81	2,736,221,276
South Hackensack	651,321,200	90.06	723,208,083
Teaneck	6,085,656,900	99.75	6,100,909,173
Tenafly	3,078,316,000	71.9	4,281,385,257
Teterboro	380,769,939	74.39	511,856,350
Upper Saddle River	2,190,321,100	71.28	3,072,841,049
Waldwick	1,556,630,000	93.04	1,673,076,096
Wallington	1,198,616,100	103.15	1,162,012,700
Washington	1,915,156,300	98.96	1,935,283,246
Westwood	1,701,563,580	83.81	2,030,263,191
Woodcliff Lake	1,712,369,100	73.14	2,341,221,083
Wood Ridge	783,287,200	60.57	1,293,193,330
Wyckoff	4,771,432,894	100.55	4,745,333,559

Bergen Subtotal

181,778,942,774

Essex County

Belleville	3,279,971,702	93.1	3,523,063,053
Bloomfield	4,362,672,000	85.39	5,109,113,479
Caldwell	1,030,989,750	91.92	1,121,616,351
Cedar Grove	2,284,053,200	90.24	2,531,087,323
East Orange	3,499,779,175	101.43	3,450,437,913
Essex Fells	767,581,800	92.62	828,743,036
Glen Ridge	1,423,126,600	91.61	1,553,462,067

	Total Assessed Value	Equalization Rate	Actual Value
Irvington	3,122,043,900	101.44	3,077,724,665
Livingston	7,518,010,574	95.24	7,893,753,228
Maplewood	2,047,108,000	52.27	3,916,410,943
Millburn	8,210,005,000	91.76	8,947,259,154
Montclair	7,310,753,000	99.3	7,362,289,023
Newark	11,020,624,100	59.66	18,472,383,674
Nutley	3,731,607,500	86.47	4,315,493,813
Orange City	1,591,181,300	89.8	1,771,916,815
Roseland	1,815,553,246	92.25	1,968,079,399
South Orange	2,831,468,440	100.7	2,811,785,938
Verona	2,189,364,800	89.33	2,450,872,943
West Orange	1,506,512,200	22.81	6,604,612,889
Essex Subtotal			87,710,105,707
Hudson County			
Bayonne	2,379,942,160	37.65	6,321,227,517
East Newark	39,511,100	21.22	186,197,455
Guttenberg	401,838,800	35.45	1,133,536,812
Harrison	504,522,244	35.43	1,423,997,302
Hoboken	3,035,024,800	29.79	10,188,065,794
Jersey City	6,021,170,366	26.12	23,051,953,928
Kearny	1,068,090,500	26.09	4,093,869,299
North Bergen	2,522,580,000	45.14	5,588,347,364
Secaucus	2,526,731,575	45.38	5,567,940,888
Union City	1,471,051,840	38.63	3,808,055,501
Weehawken	1,183,868,735	48.87	2,422,485,646
West New York	957,735,996	35.29	2,713,901,944
Hudson Subtotal			66,499,579,449
Middlesex County			
Carteret	1,028,309,863	37.18	2,765,760,793
Middlesex Subtotal			2,765,760,793

	Total Assessed Value	Equalization Rate	Actual Value
Morris County			
Boonton Town	1,109,786,100	90.85	1,221,558,723
Boonton TWP	965,178,400	95.09	1,015,015,669
Butler	753,951,500	74.61	1,010,523,388
Chatham Boro	2,058,322,500	90.8	2,266,875,000
Chatham TWP	2,981,072,900	92.68	3,216,522,335
Denville	2,280,491,100	67.37	3,385,024,640
Dover	1,517,017,200	101.59	1,493,274,141
East Hanover	2,462,236,197	65.58	3,754,553,518
Florham Park	3,290,579,450	98.7	3,333,920,415
Lincoln Park	1,561,035,700	101.3	1,541,002,665
Madison	2,089,161,400	58.36	3,579,783,071
Mendham Boro	1,289,339,800	91.76	1,405,121,840
Mendham TWP	1,888,478,300	90.75	2,080,967,824
Mine Hill	438,868,000	88.72	494,666,366
Montville	2,828,344,700	54.84	5,157,448,395
Morris	3,743,462,520	67.16	5,573,946,575
Morris Plains	1,449,909,300	93.78	1,546,075,176
Morristown	2,208,729,642	76.02	2,905,458,619
Mountain Lakes	1,201,853,900	95.32	1,260,862,253
Netcong	333,606,700	105.66	315,736,040
Hills	7,333,031,800	79.34	9,242,540,711
Pequannock	2,887,001,250	105.29	2,741,951,990
Randolph	2,914,924,600	63.8	4,568,847,335
Riverdale	903,318,850	102.54	880,942,900
Rockaway Boro	780,809,730	84.71	921,744,458
Rockaway TWP	2,825,969,600	67.1	4,211,579,136
Wharton	733,825,700	93.95	781,081,107
Morris Subtotal			69,907,024,291
Passaic County			
Bloomington	420,407,614	42.11	998,355,768
Clifton City	5,309,045,000	50.23	10,569,470,436
Haledon	329,522,100	48.38	681,112,236
Hawthorne	1,226,206,200	44.67	2,767,410,521

	Total Assessed Value	Equalization Rate	Actual Value
Wayne	5,298,408,600	47.58	11,135,789,407
West Milford	1,495,337,900	40.77	3,667,740,741
<i>Passaic Subtotal</i>			<i>49,995,311,273</i>
Sussex County			
Andover Boro	45,437,600	52.99	85,747,500
Andover Twn	617,516,069	70.23	879,276,761
Branchville	147,131,650	99.81	147,411,732
Franklin	487,271,700	91.95	529,931,158
Green	554,444,400	97.64	567,845,555
Hamburg	208,234,750	58.8	354,140,731
Lafayette	472,614,100	105.42	448,315,405
Montague	227,942,260	50.4	452,266,389
Newton	812,124,500	100.65	806,879,781
Ogdensburg	241,605,100	99.16	243,651,775
Sparta	2,448,013,900	67.79	3,611,172,592
Stanhope	350,361,100	84.26	415,809,518
Sussex Boro	78,777,300	49.59	158,857,229
Vernon	2,799,904,380	88.1	3,178,098,048
Walpack	2,331,700	95.42	2,443,618
<i>Sussex Subtotal</i>			<i>11,881,847,792</i>
Union County			
Berkeley Heights	1,852,981,420	52.67	3,518,096,488
Clark	729,003,900	28.86	2,526,001,040
Cranford	1,651,326,400	40	4,128,316,000
Elizabeth City	921,129,400	11.8	7,806,181,356
Fanwood	228,972,800	19.86	1,152,934,542
Garwood	187,545,100	27.76	675,594,741
Hillside	917,655,744	46.19	1,986,697,865
Kenilworth	882,512,100	53.83	1,639,442,876
Linden	2,791,936,300	48.33	5,776,818,332
Mountainside	488,405,200	28.58	1,708,905,528
New Providence	1,291,177,665	50.94	2,534,702,915
Plainfield City	1,254,323,721	41.27	3,039,311,173
Rahway City	1,545,974,600	45.3	3,412,747,461
Roselle	779,123,400	47.07	1,655,244,105
Roselle Park	288,004,200	23.46	1,227,639,386
Scotch Plains	993,589,300	24.96	3,980,726,362
Springfield	1,099,794,400	37.78	2,911,049,232

	Total Assessed Value	Equalization Rate	Actual Value
Summit	3,122,634,500	45.94	6,797,201,785
Union	1,053,705,300	14.87	7,086,114,997
Westfield	1,904,221,200	25.92	7,346,532,407
Winfield	1,382,200	8.36	16,553,293
<i>Union Subtotal</i>			<i>70,926,811,884</i>

NEW JERSEY

Grand Total **\$541,465,383,963**

New York (excluding New York City)

	Total Assessed Value	Equalization Rate	Actual Value
Dutchess County			
Beacon	1,468,036,306	100.00	1,468,036,306.00
Poughkepsie	2,850,017,593	100.00	2,850,017,593.00
Amenia	729,540,947	100.00	729,540,947.00
Beekman	1,662,141,811	100.00	1,662,141,811.00
Clinton	832,753,665	100.00	832,753,665.00
Dover	410,711,608	47.00	873,854,485.11
East Fishkill	4,959,299,469	100.00	4,959,299,469.00
Fishkill	3,211,904,861	100.00	3,211,904,861.00
Hyde Park	1,178,958,848	54.00	2,183,257,125.93
La Grange	2,416,379,472	100.00	2,416,379,472.00
Milan	475,529,422	100.00	475,529,422.00
Northeast	627,767,831	96.00	653,924,823.96
Pawling	606,315,129	38.50	1,574,844,490.91
Pleasant Valley	629,910,568	59.00	1,067,645,030.51
Poughkeepsie	5,719,709,633	100.00	5,719,709,633.00
Rhinebeck	1,851,296,275	100.00	1,851,296,275.00
Stanford	510,392,543	57.60	886,098,164.93
Union Vale	817,270,445	100.00	817,270,445.00
Wappinger	3,200,500,901	100.00	3,200,500,901.00
Washington	1,784,424,367	100.00	1,784,424,367.00
Dutchess Subtotal			39,218,429,288.34
Nassau County			
Glen Cove	3,649,456,546	100	3,649,456,546.00
Long Beach	220,974,614	4.02	5,496,880,945.27
Hempstead	10,428,197,918	.33	3,160,059,975,151.52
North Hempstead	3,947,755,195	.33	1,196,289,453,030.30
Oyster Bay	6,561,562,236	.33	1,988,352,192,727.27
Nassau Subtotal			6,353,847,958,400.36
Orange County			
Middletown	228,111,447	14.75	1,546,518,284.75
Newburgh	1,213,408,215	100.00	1,213,408,215.00
Port Jervis	172,824,766	35.00	493,785,045.71
Blooming Grove	286,607,600	15.40	1,861,088,311.69
Chester	814,961,462	57.00	1,429,756,950.88

	Total Assessed Value	Equalization Rate	Actual Value
Cornwall	961,018,347	61.33	1,566,962,900.70
Crawford	332,722,246	35.10	947,926,626.78
Deerpark	289,234,176	47.00	615,391,863.83
Goshen	966,407,305	59.50	1,624,213,957.98
Greenville	254,449,015	54.37	467,995,245.54
Hamptonburgh	744,380,182	99.40	748,873,422.54
Highlands	306,296,592	53.00	577,918,098.11
Minisink	207,308,327	42.00	493,591,254.76
Monroe	512,550,313	18.00	2,847,501,738.89
Montgomery	1,325,051,143	60.00	2,208,418,571.67
Mount Hope	269,702,558	50.00	539,405,116.00
Newburgh	1,328,743,111	32.80	4,051,046,070.12
New Windsor	392,980,617	17.31	2,270,251,975.74
Tuxedo	204,542,246	14.50	1,410,636,179.31
Wallkill	562,826,116	19.00	2,962,242,715.79
Warwick	532,677,965	13.00	4,097,522,807.69
Wawayanda	504,343,688	61.00	826,792,931.15
Woodbury	631,431,980	39.17	1,612,029,563.44

Orange Subtotal

36,413,277,848.07

Putnam County

Carmel	2,947,425,869	58.00	5,081,768,739.66
Kent	1,924,909,832	100.00	1,924,909,832.00
Patterson	1,546,594,067	100.00	1,546,594,067.00
Philipstown	1,173,524,506	45.80	2,599,744,142.67
Putnam Valley	1,883,516,828	100.00	1,883,516,828.00
Southeast	3,180,053,902	100.00	3,180,053,902.00

Putnam Subtotal

16,216,587,511.32

Rockland County

Clarkstown	4,695,998,827	30.50	15,396,717,465.57
Haverstraw	3,901,667,068	108.85	3,584,443,792.37
Orangetown	4,845,384,297	48.95	9,898,640,034.73
Ramapo	1,643,238,290	14.15	12,064,891,997.06
Stony Point	295,795,128	12.98	2,370,153,269.23

***Rockland
Subtotal***

43,314,846,558.97

Suffolk County

Amityville	14,529,718	2.55	569,792,862.75
	Total Assessed Value	Equalization Rate	Actual Value
Lingenhurst	28,915,696	1.35	2,141,903,407.41
Bell Terre	3,615,143	1.01	357,934,950.50
Huntington	334,313,198	0.88	37,990,136,136.36
Smithtown	247,279,482	1.33	18,592,442,255.64
<i>Suffolk Subtotal</i>			<i>59,652,209,612.65</i>
Sullivan County			
Fallsburgh	848,113,248	50.00	1,696,226,496.00
Forestburgh	20,557,718	8.75	234,945,348.57
Lumberland	412,355,026	100.00	412,355,026.00
Mamakating	593,514,069	52.86	1,122,803,762.77
Thompson	1,449,142,378	71.60	2,023,941,868.72
<i>Sullivan Subtotal</i>			<i>5,490,272,502.06</i>
Ulster County			
Kingston	2,280,176,391	100.00	2,280,176,391.00
Esopus	1,154,289,162	100.00	1,154,289,162.00
Gardiner	760,829,762	82.00	927,841,173.17
Hurley	936,032,877	98.00	955,135,588.78
Kingston	79,914,429	85.00	1,444,042,372.94
Lloyd	1,227,436,017	100.00	1,227,436,017.00
Marbletown	1,024,000,892	100.00	1,024,000,892.00
Marlborough	916,832,173	100.00	916,832,173.00
New Paltz	1,030,518,174	100.00	1,030,518,174.00
Olive	1,321,148,339	100.00	1,321,148,339.00
Plattekill	704,495,047	91.50	769,939,942.08
Rochester	856,929,259	96.00	892,634,644.79
Rosendale	603,944,654	100.00	603,944,654.00
Shawangunk	237,483,117	19.00	1,249,911,142.11
Ulster	1,174,357,647	74.50	1,576,318,989.26
Wawarsing	17,815,984	1.65	1,079,756,606.06
Ellenville	4,249,412	6.10	69,662,491.80
<i>Ulster Subtotal</i>			<i>18,523,588,752.99</i>
Westchester County			
Mt Vernon	204,984,041	3.14	6,528,154,171.97
New Rochelle	390,782,562	2.67	14,636,051,011.24

Peekskill	124,972,993	3.50	3,570,656,942.86
Rye	167,709,288	2.16	7,764,318,888.89

	Total Assessed Value	Equalization Rate	Actual Value
White Plains	427,559,697	3.17	13,487,687,602.52
Yonkers	762,775,337	2.84	26,858,286,514.08
Bedford	652,450,465	10.30	6,334,470,533.98
Cortlandt	187,791,777	1.82	10,318,229,505.49
Eastchester	136,352,216	1.54	8,854,040,000.00
Greenburgh	710,434,927	3.35	21,207,012,746.27
Harrison	193,132,434	1.61	11,995,803,354.04
Lewisboro	340,209,788	10.05	3,385,172,019.90
Mamaroneck	178,938,884	1.79	9,996,585,698.32
Mount Pleasant	202,019,959	1.52	13,290,786,776.32
New Castle	1,169,799,958	18.47	6,333,513,578.78
North Castle	142,065,841	2.13	6,669,757,793.43
North Salem	174,539,799	9.85	1,771,977,654.82
Ossining	317,163,275	5.56	58,230,927,985.61
Pelham	3,237,639,596	100.00	3,237,639,596.00
Pound Ridge	379,045,281	16.07	2,358,713,634.10
Rye	7,996,075,112	100.00	7,996,075,112.00
Scarsdale	155,057,579	1.84	8,427,042,336.96
Somers	586,653,199	12.15	4,828,421,390.95
Yorktown	153,168,857	2.49	6,151,359,718.88
Mount Kisco	370,099,421	18.05	2,050,412,304.71

***Westchester
Subtotal***

266,283,096,872.11

NEW YORK STATE (excluding NYC)

Grand Total

\$557,705,662,646.87

New York City

	Total Assessed Value	Equalization Rate	Actual Value
Manhattan	92,088,300,000	64	143,887,968,750.00
Bronx	8,910,800,000	5	178,216,000,000.00
Brooklyn	19,400,900,000	12	161,674,166,666.67
Queens	22,797,500,000	15	151,983,333,333.33
Staten Island	4,656,900,000	3	155,230,000,000.00
New York City Grand Total			790,991,468,750.00

NEW YORK CITY

Grand Total **\$790,991,468,750**

Pennsylvania

	Total Assessed Value	Equalization Rate	Actual Value
Pike County			
Matamoras	21,096,880	25	84,387,520.00
Milford Boro	22,922,950	25	91,691,800.00
Milford Township	31,206,640	25	124,826,560.00
Millrift (Westfall)	47,976,530	25	191,906,120.00
<i>Pike Subtotal</i>			<i>492,812,000.00</i>

PENNSYLVANIA

Grand Total	\$492,812,000
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Resources and Bibliography

Information for this study was obtained by Autumn Saleski from the following:

<http://bearsystems.com/Indian-Point/50-miles-by-name.html>

<http://www.daftlogic.com/projects-google-maps-distance-calculator.htm>

City of New York:

http://www.nyc.gov/html/dof/html/pdf/07pdf/assessment_report_08.pdf

State of Connecticut:

Assessors office for each town and city. Information is from their individual Grand List totals. Amounts are the total assessed values for real estate, motor vehicles, and personal property combined, before exemptions.

State of New Jersey:

Abstract of Ratables for each of the included counties. These were obtained from the assessors offices in each of the counties.

State of New York:

<http://www.orps.state.ny.us/>

Assessors offices and Real Property offices for each county. The counties in New York State we able to provide the information for each city, town, and village contained within.

State of Pennsylvania:

County assessors office for Pike County.

**** All rates and amounts are based on data from 2008-2011 ****