SUPREME COURT OF THE STATE OF NEW YORK
COUNTY OF ALBANY

In the Matter of

HUDSON RIVER SLOOP CLEARWATER, INC., GOSHEN GREEN FARMS, LLC, NUCLEAR INFORMATION AND RESOURCE SERVICE, INDIAN POINT SAFE ENERGY COALITION, and PROMOTING HEALTH AND SUSTAINABLE ENERGY, INC.

Petitioners-Plaintiffs,

For a Judgment pursuant to Article 78 of the CPLR,

-against-

NEW YORK STATE PUBLIC SERVICE COMMISSION, along with KATHLEEN BURGESS in her official capacity as Secretary, AUDREY ZIBELMAN, in her official capacity as Chair, PATRICIA L. ACAMPORA, GREGG C. SAYRE, and DIANE X. BURMAN, in their official capacities as Commissioners,

Respondents-Defendants,

and

CONSTELLATION ENERGY NUCLEAR GROUP, LLC, With subsidiaries and affiliates EXELON GENERATION COMPANY, LLC, R.E. GINNA NUCLEAR POWER PLANT, LLC, NINE MILE POINT NUCLEAR STATION, LLC,

Nominal Respondents-Defendants.

Index No. 07242-16

DECLARATION OF MARVIN RESNIKOFF

I, MARVIN RESNIKOFF, declare as follows:

1. I am a PHD, please see attached my CV.

2. I submit this Declaration in further support of Petitioners' effort, pursuant to Article 78 of the New York State Civil Practice Law and Rules to annul, vacate, and set aside Tier 3 of the Public Service Commission's August 1, 2016 Order (the "Order").

3. Fitzpatrick nuclear reactor emits 12.4 Ci/GW-yr carbon (2.77 g/GW-y), 95% is $^{14}C02$ and 5% of hydrocarbons ($^{14}CH_4$ –methane and others) (see EPRI Estimations of Carbon-14 in Nuclear Plant Gaseous Effluents Final Report, December 2010/1021106 at Table 3-14).

4. Nine Mile Point 1 nuclear reactor emits 8 Ci/yr carbon (1.8 g/yr), 10% is $^{14}C02$ and 90% is hydrocarbons ($^{14}CH_4$ and others)(see EPRI at Table 3-20).

5. R.E. Ginna nuclear reactor emits 11.6 Ci/GW(e)-yr of carbon (2.6 g/GW(e)- yr). 10% is $^{14}C02$ and 90% of hydrocarbon ($^{14}CH_4$)(see EPRI at Table 4-13).

6. Indian Point nuclear reactors emit 9.6 Ci/GW(e)-yr of carbon (2.15 g/GW(e)-y) 26% is $^{14}C02$ and 74% is hydrocarbon ($^{14}CH_4$)(see EPRI at Table 4-13)

7. All New York States nuclear reactors emit carbon based greenhouse gases – carbon dioxide ($^{14}C02$) and methane.

8. Carbon dioxide ($^{14}C02$) and methane carbon based greenhouse gases, which are known as climate change accelerators.

9. According to the EPA Methane is more than 25 times as potent as carbon dioxide at trapping heat in the atmosphere. https://www.epa.gov/gmi/importance-methane).

10. In addition to the release of carbon emissions from operating reactors in New York State, CO2 is emitted to produce nuclear fuel. Natural uranium, containing 0.711% by weight U-235, must be mined and converted to yellowcake, U3O8. Since nuclear fuel in operating reactors contains 3.5% to 5 0%, natural uranium must be converted to

a gaseous form, UF6, and enriched in centrifuges. For 30 tons of enriched uranium, approximately 180 tons of natural uranium must be mined. All these stages, mining, conversion and enrichment require vehicles, machinery and electric motors, all producing CO2.

I certify under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated December 13, 2018

MARVIN RESNIKOFF

Table 3-14
Carbon-14 Gaseous Release Rate, Chemical Form and Discharge Pathways for the J. A. FitzPatrick BWR (Kunz, 1985)

Parameter	Value
Gaseous Release Rate	Ci/GW_e-yr
Off-gas Stack	12.0
Turbine Building Vent	0.05
Reactor Building Vent	0.02
Radwaste Building Vent	0.06
Refuel Floor Vent	0.25
Total:	12.4
Chemical Form	
$^{14}CO_2$	95%
$^{14}CH_4$, $^{14}C_2H_6$, etc.	5%
Discharge Pathway	
Building Ventilation	3%
Off-gas Venting	97%

Table 3-20
Summary of Observed Gaseous Release Rates at BWRs

		Gaseous Release Rates	
Reference	**Unit**	**Ci/yr**	**Ci/GW$_e$-yr**
Kunz (1976)	Nine Mile Point 1, 1850 MW$_{th}$	**8**	
Blanchard (1976)	Oyster Creek	**13.3**	
Fowler (1976)	3579 MW$_{th}$ BWR/6 at 80% capacity		**9.0**
Evaluation of NUREG/CR-4245 (1985)	Brunswick, BWR/4 2436 MW$_{th}$	**14.5**	
Kunz (1985)	FitzPatrick, 850 MW$_e$		**12.4**
Magnusson (2008)	Oskarshamn 3, 3300 MW$_{th}$	**10.8**	
Magnusson (2008)	Forsmark 3, 3300 MW$_{th}$	**22.6**	
Magnusson (2008)	Ringhals 1, 2500 MW$_{th}$	**13.1**	

Table 4-13
^{14}C Gaseous Release Rate, Chemical Form and Discharge Pathways at Ginna and Indian Point 3 (Kunz, 1985)

Parameter	R. E. Ginna	Indian Point 3
Total Gaseous Release Rate, Ci/GW(e)-yr	11.6	9.6
Chemical Form		
$^{14}CO_2$	10%	26%
$^{14}CH_4$, $^{14}C_2H_6$, etc.	90%	74%
Discharge Pathway		
Gas Decay Tanks	42%	7%
Containment Venting	23%	78%
Auxiliary Building Venting	35%	15%

Kunz (1985) measured total ^{14}C release and chemical form of ^{14}C at the 490 MWe R. E. Ginna PWR and the 1,000 MWe Indian Point Unit 3 PWR. Results are provided in Table 4-13.

Table 4-13
"C Gaseous Release Rate, Chemical Form and Discharge Pathways at Ginna and Indian Point 3 (Kunz, 1985)

Parameter	R. E. Ginna	Indian Point 3
Total Gaseous Release Rate, Ci/GW(e)-yr	11.6	9.6
Chemical Form		
,.co2	10%	26%
$^{14}CH_4$, $^{14}C_2H_{,,}$ etc.	90%	74%
Discharge Pathway		
Gas Decay Tanks	42%	7%
Containment Venting	23%	78%
Auxiliary Building Venting	35%	15%

Resumes

Dr. MARVIN RESNIKOFF is an international consultant on radioactive waste issues. A nuclear physicist and a graduate of the University of Michigan, Dr. Resnikoff has worked on radioactive issues since his first project at West Valley, New York in 1974. Throughout his career, he has assisted public interest groups and state and local governments across the US in order to identify and create solutions for radioactive waste storage and transportation issues. His recent research focus has been on the risk of transporting and storing radioactive waste and the health impact of radioactive waste from oil and uranium production. Dr. Resnikoff has also co-authored four books on radioactive issues, including *Deadly Defense* and *Danger Below*, both regarding contamination at DOE facilities. In June 2000, he was appointed by DOE secretary Bill Richardson to a Blue Ribbon Panel on Alternatives to Incineration. In August 2010, he was an invited panelist to President Obama's Blue Ribbon Commission on Nuclear Safety. In October 2011, he was an invited panelist at the annual conference of the Water Environment Federation on the subject of radioactivity in Marcellus shale wastes. In November 2013, he was an invited panelist before the Nuclear Waste Technical Review Board on the subject of the implication of high burnup nuclear fuel on decommissioning and transportation.

Since 1992, he has researched NORM issues, continuing to serve as an expert witness in personal injury cases in Mississippi, Louisiana and Texas on behalf of workers injured while cleaning radium-contaminated oil pipes. In 2009, he served as an expert witness for a Texas rancher whose land was contaminated by natural gas operations. He also served as an expert witness for public interest groups concerned with Marcellus shale rock cuttings going to the Chemung County, New York solid waste landfill. In 2012, he prepared a report for public interest groups on the NORM situation in Ohio. He is presently preparing a report on the impact of natural gas exploration and production in Pennsylvania.

He has conducted studies on the remediation and closure of the leaking Maxey Flats, Kentucky radioactive landfill for Maxey Flats Concerned Citizens, Inc. and of the leaking uranium basin on the NMI/Starmet site in Concord, Massachusetts under grants from the Environmental Protection Agency. He co-authored a study on the cost of remediating the former West Valley, New York reprocessing plant site. He also conducted studies of the Wayne and Maywood, New Jersey thorium Superfund sites and proposed low-level radioactive waste facilities at Martinsville (Illinois), Boyd County (Nebraska), Wake County (North Carolina), Ward Valley (California) and Hudspeth and Andrews Counties (Texas). He investigated phosphogypsum plants in Florida, Texas and Alberta, Canada, and served as an expert witness in a personal injury case involving a Texas phosphogypsum worker. He also served as an expert witness for CRPE, a public interest group, regarding the proposed expansion of the Buttonwillow, California NORM landfill. He was an expert witness for Earthjustice re. the licensing of an irradiation facility near the Honolulu airport in Hawaii. He is serving as an expert witness for Niagara County, New York, in a licensing hearing re. an application by CWM to expand its hazardous waste landfill.

RADIOACTIVE WASTE
MANAGEMENT ASSOCIATES

Marvin Resnikoff, Ph.D.
Curriculum Vitae

EDUCATION:

Ph.D., Physics	1965, University of Michigan
M.S., Physics	1962, University of Michigan
B.A., Physics/Math	1959, University of Michigan

SUMMARY OF PROFESSIONAL EXPERIENCE:

Marvin Resnikoff is Senior Associate at Radioactive Waste Management Associates and is an international consultant on radioactive waste management issues. He is Principal Manager at Associates and is Project Director for dose reconstruction and risk assessment studies of radioactive waste facilities and transportation of radioactive materials. Dr. Resnikoff has concentrated exclusively on radioactive waste issues since 1974. He has authored or co-authored four books on radioactive waste issues.

He has conducted dose reconstruction studies of oil pipe cleaners in Mississippi and Louisiana, residents of Canon City, Colorado near a former uranium mill, residents of West Chicago, Illinois near a former thorium processing plant, and residents and former workers at a thorium processing facility in Maywood, New Jersey. He has also served as an expert witness for plaintiffs in Karnes County, Texas, Milan, New Mexico and Uravan, Colorado, who were exposed to radioactivity from uranium mining and milling activities. He is continuing to work on personal injury cases involving former workers and residents at the ITCO and other oil pipe cleaning yards in Louisiana and Texas. He also evaluated radiation exposures and risks in worker compensation cases involving former workers at Maywood Chemical Works thorium processing plant. He also served as an expert witness in a case involving the Port St. Lucie reactors and brain cancer developed by two children and in a case involving clean-up of an abandoned radioactive materials processing facility in Webster, Texas. He is presently working on several land contamination cases in Louisiana, Texas and New York. In June 2000, he was appointed to a Blue Ribbon Panel on Alternatives to Incineration by DOE Secretary Bill Richardson.

In addition to dose reconstruction and land contamination cases, Dr. Resnikoff also works on the risk of transporting radioactive material. Under a contract with the State of Utah, Dr. Resnikoff was a technical consultant to DEQ on the proposed dry cask storage facility for high-level waste at Skull Valley, Utah. He assisted the State on licensing proceedings before the Nuclear Regulatory Commission. He has also prepared studies on transportation risks and consequences for the State of Nevada and the Nevada counties: Clark, White Pine, Lander and Churchill. In addition, at hearings before state commissions and in federal court, he investigated proposed dry storage facilities at the Point Beach (WI), Prairie Island (MN), Palisades (MI), Maine Yankee, Connecticut Yankee and Vermont Yankee reactors. He is presently working for the State of Nevada on Yucca Mountain repository issues before the Nuclear Regulatory Commission (NRC). He is also serving as an expert witness for Earthjustice on a proposed NRC license for a food irradiator at the Honolulu, Hawaii airport.

He has conducted studies on the remediation and closure of the leaking Maxey Flats, Kentucky radioactive landfill for Maxey Flats Concerned Citizens, Inc. and of the leaking uranium basin on the NMI/Starmet site in Concord, Massachusetts under grants from the Environmental Protection Agency. He co-authored a study on the cost of remediating the former West Valley, New York reprocessing plant site. He also conducted studies of the Wayne and Maywood, New Jersey thorium Superfund sites and proposed low-level radioactive waste facilities at Martinsville (Illinois), Boyd County (Nebraska), Wake County (North Carolina), Ward Valley (California) and Hudspeth County (Texas). He investigated phosphogypsum plants in Florida, Texas and Alberta, Canada, and served as an expert witness in a personal injury case involving a Texas phosphogypsum worker. He also served as an expert witness for CRPE, a public interest groups, regarding the proposed expansion of the Buttonwillow, California NORM landfill. He is presently working for Earthjustice re. the licensing of an irradiation facility near the Honolulu airport in Hawaii.

In Canada, he conducted studies on behalf of the Coalition of Environmental Groups and Northwatch for hearings before the Ontario Environmental Assessment Board on issues involving radioactive waste in the nuclear fuel cycle and Elliot Lake tailings and the Interchurch Uranium Coalition in Environmental Impact Statement hearings before a Federal panel regarding the environmental impact of uranium mining in Northern Saskatchewan. He also worked on behalf of the Morningside Heights Consortium regarding radium-contaminated soil in Malvern and on behalf of Northwatch regarding decommissioning the Elliot Lake tailings area before a FEARO panel. He conducted a study for Concerned Citizens of Manitoba regarding transportation of irradiated fuel to a Canadian high-level waste repository. He is presently working for Greenpeace reviewing the environmental assessment for a proposed intermediate level waste repository under Lake Huron, and for the Provincial Womens Council of Ontario on radioactive waste management costs in a proceeding before the Ontario Energy Board.

In February 1976, assisted by four engineering students at State University of New York at Buffalo, Dr. Resnikoff authored a paper that, according to *Science*, changed the direction of power reactor decommissioning in the United States. His paper showed that power reactors could not be entombed for long enough periods to allow the radioactivity to decay to safe enough levels for unrestricted release. The presence of long-lived radionuclides meant that large volumes of decommissioning waste would still have to go to low-level or high-level waste disposal facilities. He assisted public interest groups on the decommissioning of the Yankee-Rowe, Diablo Canyon, Big Rock Point and Haddam Neck reactors.

He was formerly Research Director of the Radioactive Waste Campaign, a public interest organization conducting research and public education on the radioactive waste issue. His duties with the Campaign included directing the research program on low-level commercial and military waste and irradiated nuclear fuel transportation, writing articles, fact sheets and reports, formulating policy and networking with numerous environmental and public interest organizations and the media. He is author of the Campaign's book on "low-level" waste, *Living Without Landfills*, and co-author of the Campaign's book, *Deadly Defense, A Citizen Guide to Military Landfills*.

Between 1981 and 1983, Dr. Resnikoff was a Project Director at the Council on Economic Priorities, a New York-based non-profit research organization, where he authored the 390-page study, *The Next Nuclear Gamble, Transportation and Storage of Nuclear Waste*. The CEP study details the hazard of transporting irradiated nuclear fuel and outlines safer options.

Dr. Resnikoff is an international expert in nuclear waste management, and has testified often before State Legislatures and the U.S. Congress. He has extensively investigated the safety of the West Valley, New York and Barnwell, South Carolina nuclear fuel reprocessing facilities. His paper on reprocessing economics (Environment, July/August, 1975) was the first to show the marginal economics of recycling plutonium. He completed a more detailed study on the same subject for the Environmental Protection Agency, "Cost/Benefits of U/Pu Recycle," in 1983. His paper on decommissioning nuclear reactors (Environment, December, 1976) was the first to show that reactors would remain radioactive for several hundred thousand years. In March 2004, Dr. Resnikoff was project director and co-author of a study of groundwater contamination at DOE facilities, Danger Lurks Below.

Dr. Resnikoff has prepared reports on incineration of radioactive materials, transportation of irradiated fuel and plutonium, reprocessing, and management of low-level radioactive waste. He has served as an expert witness in state and federal court cases and agency proceedings. He has served as a consultant to the State of Kansas on low-level waste management, to the Town of Wayne, New Jersey, in reviewing the cleanup of a local thorium waste dump, to WARD on disposal of radium wastes in Vernon, New Jersey, to the Southwest Research and Information Center and New Mexico Attorney General on shipments of plutonium-contaminated waste to the WIPP facility in New Mexico and the State of Utah on nuclear fuel transport. He has served as a consultant to the New York Attorney General on air shipments of plutonium through New York's Kennedy Airport, and transport of irradiated fuel through New York City, and to the Illinois Attorney General on the expansion of the spent fuel pools at the Morris Operation and the Zion reactor, to the Idaho Attorney General on the transportation of irradiated submarine fuel to the INEL facility in Idaho and to the Alaska Attorney General on shipments of plutonium through Alaska. He was an invited speaker at the 1976 Canadian meeting of the American Nuclear Society to discuss the risk of transporting plutonium by air. As part of an international team of experts for the State of Lower Saxony, the Gorleben International Review, he reviewed the plans of the nuclear industry to locate a reprocessing and waste disposal operation at Gorleben, West Germany. He presented evidence at the Sizewell B Inquiry on behalf of the Town and Country Planning Association (England) on transporting nuclear fuel through London. In July and August 1989, he was an invited guest of Japanese public interest groups, Fishermen's Cooperatives and the Japanese Congress Against A- and H- Bombs (Gensuikin).

Between 1974 and 1981, he was a lecturer at Rachel Carson College, an undergraduate environmental studies division of the State University of New York at Buffalo, where he taught energy and environmental courses. The years 1975-1977 he also worked for the New York Public Interest Group (NYPIRG).

In 1973, Dr. Resnikoff was a Fulbright lecturer in particle physics at the Universidad de Chile in Santiago, Chile. From 1967 to 1973, he was an Assistant Professor of Physics at the State University of New York at Buffalo. He has written numerous papers in particle physics, under grants from the National Science Foundation. He is a 1965 graduate of the University of Michigan with a Doctor of Philosophy in Theoretical Physics, specializing in group theory and particle physics. Dr. Resnikoff is a member of the American Public Health Association and the Health Physics Society.

PROFESSIONAL EXPERIENCE:

April 1989 - present **Senior Associate**, Radioactive Waste Management Associates, management of consulting firm focused on radioactive waste issues, evaluation of nuclear transportation and military and commercial radioactive waste disposal facilities.

1978 - 1981; 1983 - April 1989 **Research Director**, Radioactive Waste Campaign, directed research program for Campaign, including research for all fact sheets and the two books, *Living Without Landfills*, and *Deadly Defense*. The fact sheets dealt with low-level radioactive waste landfills, incineration of radioactive waste, transportation of high-level waste and decommissioning of nuclear reactors. Responsible for fund-raising, budget preparation and project management.

1981 - 1983 **Project Director**, Council on Economic Priorities, directed project which produced the report *The Next Nuclear Gamble*, on transportation and storage of high-level waste.

1974 - 1981 **Instructor**, Rachel Carson College, State University of New York at Buffalo, taught classes on energy and the environment, and conducted research into the economics of recycling of plutonium from irradiated fuel under a grant from the Environmental Protection Agency.

1975 - 1976 **Project Coordinator**, SUNY at Buffalo, New York Public Interest Research Group, assisted students on research projects, including project on waste from decommissioning nuclear reactor.

1973 **Fulbright Fellowship** at the Universidad de Chile, conducting research in elementary particle physics.

1967 - 1972 **Assistant Professor of Physics**, SUNY at Buffalo, conducted research in elementary particle physics and taught a range of graduate and undergraduate physics courses.

1965 - 1967 **Research Associate**, Department of Physics, University of Maryland, conducted research into elementary particle physics.

PROFESSIONAL ORGANIZATIONS:

Health Physics Society
Water Environment Federation

SPECIAL SPEAKING ENGAGEMENTS:

1967	Invited Speaker, w/ O.W. Greenberg, Meeting of the American Physical Society, Washington, D.C., "Symmetric Quark Model of Baryon Resonances," Conf-670414—6.
1976	Invited Speaker, Meeting of the American Nuclear Society, Toronto, Canada, "Comparison of risk assessments of Pu released during transport."
1976	Statement before the Subcommittee on Energy and the Environment of the Interior Committee, House of Representatives, on recycling of plutonium.
1977	Statement before the Subcommittee on Government Operations, House of Representatives, on Nuclear Power Costs
1979	Chaired panel w/Dr. Karl Morgan and Dr. Alice Stewart, Gorleben International Review, on the health effects of radiation, Hanover, Germany.
2000	Invited day-long seminar presentation to the California Department of Health on the health effects of radiation
2002	Testimony before the Committee on Transportation & Infrastructure, United States House of Representatives, on transportation of nuclear materials.
2003	Presentation before the National Academy of Sciences Study Committee on Transportation of Radioactive Waste, Las Vegas, NV, "Baltimore Tunnel Fire: Implications for SNF Transportation Safety."
2006	Biglin, K. and Resnikoff, M, Emergency Response to a Nuclear Waste Shipment Accident, Inyo County, June 15, 2006, paper presented at ESRI Annual Conference, August 2006.
2008	Invited Speaker, Meeting of the American Nuclear Society, Anaheim, CA, "State of Nevada Recommendations for Yucca Mountain Transportation Safety and Security."
2008	Presentation at Waste Management 2008, Phoenix, AZ, "Fugitive Dust Emissions from Uranium Haul Roads."
2008	Presentation at Waste Management 2008, Phoenix, AZ, "State of Nevada Perspective on the US DOE Yucca Mountain Transportation Program."

Books and Articles

Resnikoff, M, "Expensive Enrichment," *Environment*, July/August 1975, pp. 28–35.

Harwood, S *et al*, "The Cost of Turning It Off," *Environment*, December 1976, pp.17-26.

M. Resnikoff, "Environmental Perspective." Chapter 7 in "The Politics of Nuclear Waste," edited by William Colglazier, Pergamon Press, 1982

M. Resnikoff, *et al*, "The Next Nuclear Gamble, Transportation and Storage of Nuclear Waste," Council on Economic Priorities, 1983.

M. Resnikoff, "Shipping Flasks in Severe Rail Accidents," Chapter 18 in "The Urban Transportation of Irradiated Fuel," edited by John Surrey, Macmillan Press, London, 1984.

M. Resnikoff, "Living Without Landfills," Radioactive Waste Campaign, 1988.

M. Resnikoff, *et al*, "Deadly Defense, A Citizen Guide to Military Landfills," Radioactive Waste Campaign, 1989.

M. Marvin Resnikoff, "The Generation Time Bomb: Radioactive and Chemical Wastes." Chapter in "Hidden Dangers: Environmental Consequences of Preparing for War," edited by Anne Ehrlich and John Birks, Sierra Club Books, San Francisco, 1990.

I. Fairlie and M. Resnikoff, "No Dose Too Low," The Bulletin of Atomic Scientists, Nov/Dec 1997.

M. Resnikoff, "Danger Lurks Below," Alliance for Nuclear Accountability, 2004.

M Resnikoff, "Radon in Natural Gas from Marcellus Shale," Ethics in Biology, Engineering & Medicine, Vol. 2, Issue 4, 2011, pp. 317- 331.