NRC000063
Submitted: March 30, 2012

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket Nos. 50-247-LR/50-286-LR
	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	

NRC STAFF TESTIMONY OF JEFFREY J. RIKHOFF AND PATRICIA A. MILLIGAN REGARDING CONTENTION CW-EC-3A (ENVIRONMENTAL JUSTICE)

Q1. Please state your name, occupation, and by whom you are employed.

A1(a). [JJR][1] My name is Jeffrey J. Rikhoff. I am a Senior Environmental Scientist/Socioeconomist in the Division of License Renewal, Office of Nuclear Reactor Regulation ("NRR"), U.S. Nuclear Regulatory Commission ("NRC"), in Washington, D.C. I have been employed by the NRC for over five years. My statement of qualifications is attached to "NRC Staff Testimony of Jeffrey J. Rikhoff, Andrew Stuyvenberg, and John P. Boska Concerning Contentions NYS-17, 17A and 17B (Land Use)" as Exhibit ("Ex.") NRC000082.

A1(b). [PAM] My name is Patricia A. Milligan. I am employed as a Senior Level Advisor for Emergency Preparedness and Response in the Office of Nuclear Security and Incident Response ("NSIR"), NRC, in Washington, D.C. I have been employed by the NRC for over 13 years. My statement of qualifications is attached as Ex. NRC000064.

Q2. Please describe the nature of your current responsibilities.

[1] In this testimony, answers provided by specific witnesses are identified by denoting those witnesses' initials in brackets at the beginning of the answer. Where an answer is provided by all witnesses, the witnesses' initials are not provided.

A2(a). [JJR] I conduct land use, socioeconomic, cultural resource, and environmental justice impact assessments in support of license renewal environmental reviews. I have been working on National Environmental Policy Act ("NEPA") environmental reviews for 23 years. Prior to working for the NRC, I worked for over 17 years as a government contractor preparing environmental NEPA documentation for the U.S. Department of Energy ("DOE") and Department of Defense ("DoD"). I specialize in preparing environmental impact statements ("EISs") and environmental assessments ("EAs"); cost analyses; socioeconomics and environmental justice impact analyses; comprehensive land-use and facility development planning studies; regulatory review and permitting; and consultations with American Indian tribal representatives. I have been conducting environmental justice impact assessments for the Federal government for the past 11 years.

A2(b). [PAM] I am a Senior Level Advisor for Emergency Preparedness and Response. I have held this position since November 2004. In this position, I am responsible for technical leadership in the application of emergency preparedness and response activities and regulations at fixed nuclear facilities as well as in the development and documentation of NRC staff positions and technical guidance on regulatory aspects of emergency preparedness and response. I provide technical review and oversight in development and finalization of agency emergency preparedness regulations and guidance as well as develop technical bases for regulations and guidance. I support other NRC offices, including the Regional offices as well as other Federal, State and local government agencies. I function as an NRC point of contact for emergency preparedness in the international community and serve on international committees dedicated to emergency preparedness and response. Prior to assuming the position of Senior Level Advisor, I served as a Senior Emergency Preparedness Specialist for the NRC from 1998 until 2004. Before joining the NRC, I was employed in the nuclear power industry working on health physics and emergency preparedness issues. Additionally, I worked as a nuclear pharmacist for a private radiopharmaceutical laboratory.

Q3. Please explain what your duties have been in connection with the NRC staff's review of the license renewal application ("LRA") submitted by Entergy Nuclear Operations, Inc. (Entergy or Applicant) for Indian Point Nuclear Generating Units 2 and 3 ("IP2 and IP3" or "Indian Point").

A3(a). [JJR] From approximately May 2007 until January 2008, I served as an Environmental Scientist/Socioeconomist in the Division of License Renewal. From January 2008 until the present, I have served as Senior Environmental Scientist/Socioeconomist in the Division of License Renewal. As part of my responsibilities, I served as the principal reviewer of the environmental justice portions of Entergy's environmental report for the IP2/IP3 LRA. In this regard, I was also responsible for preparing Section 4.4.6 of the "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report," NUREG-1437, Supplement 38, issued on December 3, 2010 ("Final SEIS" or "FSEIS") (Ex. NYS000133A-J).

A3(b). [PAM] I was not involved in the review of the environmental report.

Q4. What is the purpose of your testimony?

A4. The purpose of our testimony is to address Clearwater Environmental Contention-3A ("CW-EC-3A"). The contention asserts that the environmental justice impact assessment in Entergy's Environmental Report ("ER") in the Indian Point License Renewal Application (Ex. ENT000015), filed on April 30, 2007, and the NRC Staff's FSEIS are inadequate.

Q5. What documents did you review in order to prepare your testimony?

A5(a). [JJR] In order to prepare my testimony, I reviewed Clearwater's Petition to Intervene and Request for Hearing related to Contention CW-EC-3A (Ex. CLE000043). I also reviewed Clearwater's Initial Statement of Position for CW-EC-3A (Ex. CLE000002) and the accompanying testimony and exhibits. Additionally, I reviewed the following guidance documents: Frequently Asked Questions on License Renewal of Nuclear Power Reactors,

NUREG-1850, March 2006 (“NUREG-1850”) (Ex. ENT000011); Council on Environmental Quality (CEQ) Environmental Justice Guidance Under the National Environmental Policy Act, (Dec. 1997) (“CEQ EJ Guidance”) (Ex. ENT000266); and Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions, 69 Fed. Reg. 52,040 (Aug. 24, 2004) (“EJ Policy Statement”) (Ex. ENT000260). I also reviewed Executive Order 12898 entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which was issued on February 11, 1994. 59 Fed. Reg. 7,629 (Feb. 16, 1994) (“E.O. 12898”) (Ex. ENT000259). Additionally I reviewed Summary File 1, 2000 Census of Population and Housing: Technical Documentation, specifically the Abstract and Appendix C. (“Census SF-1”) (Ex. ENT000265). Finally, I reviewed NRC environmental protection regulations related to license renewal environmental reviews in 10 CFR Part 51, as well as NUREG-1555, Supplement 1: Standard Review Plans for Environmental Reviews for Nuclear Power Plants – Supplement 1: Operating License Renewal (October 1999) (“ESRP Supp. 1”) (Ex. NYS00019B); NRR Office Instruction LIC-203, Revision 2, Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues (“LIC-203”) (Ex. ENT000264); and NRC Regulatory Guide 4.2, Supplement 1: Preparation of Supplemental Environmental Reports for Applications To Renew Nuclear Power Plant Operating Licenses (September 2000) (“RG 4.2, Supp. 1”) (ENT000136).

A5(b). [PAM] In order to prepare my testimony in this case, I reviewed the Staff’s Environmental Justice analysis in Section 4.4.6 of the FSEIS (Ex. NYS000133A-J) and Clearwater’s Petition to Intervene and Request for Hearing related to Contention CW-EC-3A (Ex. CLE000043). I also reviewed Clearwater’s Initial Statement of Position for CW-EC-3A (Ex. CLE000002) and the accompanying testimony and exhibits. In addition, I reviewed the Memorandum of Understanding between Federal Emergency Management Agency (“FEMA”) and NRC, 44 CFR Appendix A to Part 353; 58 Fed. Reg. 47,997 (Sept. 14, 1994) (“FEMA/NRC MOU”) (Ex. NRC000065). Additionally, I reviewed the following NRC guidance documents:

NUREG-0654/FEMA-REP-1, Rev. 1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants ("NUREG-0654/FEMA-REP-1") (Ex. NRC000066); NUREG-0654/FEMA-REP-1, Rev. 1, Supplement 3, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, Guidance for Protective Action Strategies (2011) ("NUREG-0654/FEMA-REP-1 Supp. 3") (Ex. NRC000067); NUREG/CR-6864, Vol. 1, Identification and Analysis of Factors Affecting Emergency Evacuations ("NUREG/CR-6864") (Ex. NRC000068). Additionally, I reviewed 10 CFR 50.47, which defines the NRC obligation to make a finding on the adequacy of emergency plans before the NRC can issue an initial operating license. I also reviewed Part 50 Appendix E, which contains the criteria that all emergency plans must satisfy prior to issuance of an initial operating license. I reviewed 10 CFR 50.54(q), (s), (t), (u), (w), (x), (gg), and (hh) which contains the general emergency planning requirements for nuclear power reactor licensing conditions. Finally, I reviewed 10 CFR 51.53 (c)(3)(ii)(I), (J), and (L) as well as Table B-1 which pertain to environmental impacts on populations.

Additionally, I reviewed the emergency plans for New York State and the Counties surrounding Indian Point and the following Indian Point emergency guides: 2010-2011 Westchester County Indian Point Emergency Guide ("Westchester IP Emergency Guide") (Ex. ENT000287); Rockland County Emergency Planning for Indian Point 2011-2012 ("Rockland IP Emergency Guide") (Ex. ENT000288); 2010-2011 Putnam County Indian Point Emergency Guide ("Putnam IP Emergency Guide") (Ex. NRC000069); 2011-2012 Orange County Indian Point Emergency Guide ("Orange IP Emergency Guide") (Ex. NRC000070). I also reviewed the following documents: National Institute for Chemical Studies, Sheltering in Place as a Public Protective Action (June 2001). Available at http://www.nicsinfo.org/docs/shelter%20in%20place.pdf. ("NICS Study") (Ex. NRC000071); U.S. Environmental Protection Agency ("EPA"), Office of Radiation Programs, Manual of Protective

Action Guides and Protective Actions for Nuclear Incidents (May 1992) ("EPA Dose Guidelines") (Ex. ENT000284); U.S. Department of Homeland Security ("DHS") in cooperation with the U.S. Department of Transportation, Nationwide Plan Review Phase 2 Report (June 2006) ("DHS Report") (Ex. NRC000072); Jeffrey A. Schwartz & David Webb, Hurricanes Katrina and Rita and the Louisiana Dept. of Public Safety and Corrections: A Chronicle and Critical Incident Review (May 2006) ("Hurricanes Katrina and Rita Incident Review") (Ex. NRC000073); The Chernobyl Forum, Chernobyl's Legacy: Health, Environmental and Socio-economic Impacts and Recommendations to the Governments of Belarus, the Russian Federation and Ukraine (September 2005) ("Chernobyl Recommendations") (Ex. NRC000074); US Department of Health and Human Services, Food and Drug Administration, Center for Drug Evaluation and Research, Guidance: Potassium Iodide as a Thyroid Blocking Agent in Radiation Emergencies (Dec. 2001) ("FDA Thyroid Guidance") (Ex. NRC000075); and Federal Emergency Management Agency Program Manual, Radiological Emergency Preparedness (Oct. 2011) ("FEMA REP Manual") (Ex. ENT000295).

Q6. Are you familiar with Contention CW-EC-3A?

A6. Yes. Contention CW-EC-3A states as follows:

> Entergy's environmental report and the Final Supplemental Environmental Impact Statement contain seriously flawed environmental justice analyses that do not adequately assess the impacts of relicensing Indian Point on the minority, low-income and disabled populations in the area surrounding Indian Point.

Clearwater generally asserts that the environmental report and the FSEIS do not sufficiently discuss the environmental impacts of license renewal on minority, low-income, and disabled populations near IP2 and IP3. Specifically, Clearwater contends that the environmental impacts from a severe accident at Indian Point and the effects of an evacuation on special needs populations and prisoners housed in facilities located within 50 miles of the IP facility, compared to the impacts on the general population were not adequately assessed in the environmental report and FSEIS. Clearwater also states that Census blocks should have been

used instead of Census block groups in identifying the location of minority and low-income populations. In addition, Clearwater suggests that Entergy's environmental report did not present enough raw data for the Census block groups.

Q7. Do you agree with Contention CW-EC-3A?

A7(a). [JJR] No. We are not required to consider the impacts of a severe accident at Indian Point and the impacts of evacuation on special needs populations and prisoners housed in facilities located within 50 miles of IP2 and IP3 in the license renewal environmental review. The finding for severe accidents from Table B-1, Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants, in 10 CFR Part 51, states, "The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are small for all plants." We therefore do not conduct a detailed analysis of the consequences of an accident in our site-specific license renewal environmental reviews, because the nuclear plant is expected to operate safely during the renewal term. In license renewal environmental reviews, we address the environmental effects of an additional 20 years of nuclear reactor operations on minority and low-income populations. With respect to the potential human health and environmental effects of license renewal on minority and low-income populations that we are required to address, Entergy provided the needed demographic information in the environmental report, the effects from continued nuclear operations on minority and low-income populations were analyzed in the FSEIS, and we determined there would be no disproportionately high and adverse impacts to minority and low-income populations from the continued operation of IP2 and IP3 during the license renewal term.

A7(b). [PAM] No. Clearwater's contention assumes that a radiological emergency will occur at Indian Point, causing the onsite and offsite emergency plans to take effect. Further Clearwater also assumes that the comprehensive emergency plans both onsite and in the counties surrounding Indian Point are deficient and that emergency response personnel will be

unable to fulfill their duties or take actions necessary to mitigate a possible event. However, Clearwater's assumptions that the emergency plans are deficient and that State officials will fail to perform their duties are unreasonable. Due to the importance of emergency response for the nuclear power plant communities, emergency planning and preparedness is evaluated on an ongoing basis. Emergency preparedness is an operating license issue. The NRC Staff reviews existing emergency preparedness plans throughout the life of any facility, keeping up with changing demographics and other site-related factors to ensure the adequate protection of public health and safety in the very unlikely event of an accident at the Indian Point Energy Center ("IPEC"). These reviews have consistently indicated that the emergency response plans for the area surrounding Indian Point provide a sound framework for effective decision-making and implementation of essential emergency preparedness functions, regardless of the initiating event.

Q8. Why is the environmental justice analysis in the environmental report adequate?

A8. [JJR] The environmental report's environmental justice analysis is adequate because it provided the requested demographic information identified in Regulatory Guide (RG) 4.2, Supplement 1, Section 4.22 (ENT000136), Environmental Justice, which is needed to support the environmental justice impact assessment in the FSEIS. RG 4.2, Supplement 1, provides guidance to license renewal applicants on the format and content of the environmental report and describes what information the applicant should submit in its environmental report with respect to the assessment of environmental justice impacts. That information included the composition of minority and low-income persons within 80 kilometers (50 miles) of IP2 and IP3. Entergy provided this information in Section 2.6.2 of the environmental report in addition to the requisite discussion of environmental impacts in Chapters 4, 5, and 6 (Ex. ENT000015). Accordingly, Entergy's environmental report provided the demographic information requested in RG 4.2, Supplement 1, Section 4.22.

Q9. Why is the environmental justice discussion in the FSEIS adequate?

A9. [JJR] The environmental justice discussion in the FSEIS is adequate because it meets the regulatory requirements at 10 CFR § 51.95(c). This regulation describes the requirements for preparing the FSEIS at the operating license renewal stage as follows:

> In connection with the renewal of an operating license or combined license for a nuclear power plant under parts 52 or 54 of this chapter, the Commission shall prepare an environmental impact statement, which is a supplement to the Commission's NUREG–1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (May 1996), which is available in the NRC Public Document Room, 11555 Rockville Pike, Rockville, Maryland.
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> (1) The supplemental environmental impact statement for the operating license renewal stage shall address those issues as required by § 51.71. In addition, the NRC staff must comply with 40 CFR 1506.6(b)(3) in conducting the additional scoping process as required by § 51.71(a).
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> (2) The supplemental environmental impact statement for license renewal is not required to include discussion of need for power or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such benefits and costs are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. In addition, the supplemental environmental impact statement prepared at the license renewal stage need not discuss other issues not related to the environmental effects of the proposed action and the alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b). The analysis of alternatives in the supplemental environmental impact statement should be limited to the environmental impacts of such alternatives and should otherwise be prepared in accordance with § 51.71 and Appendix A to subpart A of this part.
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> (3) The supplemental environmental impact statement shall be issued as a final impact statement in accordance with §§ 51.91 and 51.93 after considering any significant new information relevant to the proposed action contained in the supplement or incorporated by reference.
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> (4) The supplemental environmental impact statement must contain the NRC staff's recommendation regarding the environmental acceptability of the license renewal action. In order to make its recommendation and final conclusion on the proposed action, the NRC staff, adjudicatory officers, and Commission shall integrate the conclusions, as amplified by the supporting information in the generic environmental impact statement for issues designated Category 1 (with the exception of offsite radiological impacts for collective effects and the disposal of spent fuel and high level waste) or resolved Category 2, information developed for those open Category 2 issues applicable to the plant in accordance with § 51.53(c)(3)(ii), and any significant new information. Given this information, the NRC staff, adjudicatory officers, and Commission shall determine whether or not the adverse environmental impacts of license

renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

In accordance with 10 CFR § 51.95(c), we assessed the effects of continued nuclear plant operations on minority and low-income populations. The analysis of the human health and environmental effects of license renewal on minority and low-income populations is presented in Section 4.4.6 of the FSEIS. (Ex. NYS000133A-J). In addition, we assessed environmental justice impacts per ESRP Supp. 1, Section 4.4.6. (Ex. NYS00019B). This guidance helps NRC Staff to comply with the regulatory requirements of 10 CFR § 51.95(c). Accordingly, the assessment of impacts to minority and low-income populations in the FSEIS is adequate because it meets the requirements of 10 CFR § 51.95(c) and is consistent with NRC Staff guidance outlined in ESRP Supp. 1, Section 4.4.6. Because the factual basis did not change between the issuance of the DSEIS and the FSEIS, the analysis and conclusions in the FSEIS are the same as in the DSEIS. Any effects from continued nuclear plant operations on minority and low-income populations are not expected to be disproportionately high and adverse during the license renewal term.

Comments on the environmental justice analysis in the DSEIS were also addressed in the FSEIS. See FSEIS, Appendix A, at A-110 to 121 (Ex. NYS000133A-J).

Pursuant to 10 C.F.R. § 51.95(c)(4), we determined that the impacts of license renewal were not so great that preserving the option of license renewal for energy planning decision-makers would be unreasonable.

Q10. Please describe the Commission's requirements pertaining to environmental justice.

A10. [JJR] Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was issued on February 11, 1994 directing all Federal agencies to develop strategies for considering environmental justice in their programs, policies, and activities. *See* E.O. 12898 (Ex. ENT000259). The Executive Order

describes environmental justice as "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." *Id.* On December 10, 1997, CEQ issued environmental justice guidance which was developed to further assist Federal agencies with their NEPA procedures. *See* CEQ EJ Guidance (Ex. ENT000266). On August 24, 2004, the Commission issued a policy statement regarding the treatment of environmental justice issues in NRC regulatory and licensing actions. *See* EJ Policy Statement (Ex. ENT000260). In the EJ Policy Statement, the Commission explained that it is "committed to the general goals set forth in E.O. [Executive Order] 12898, and strives to meet those goals as part of its NEPA review process." *Id.* at 52,042. The EJ Policy Statement also summarized the guidelines for the implementation of NEPA with respect to environmental justice issues. *Id.* at 52,048. NRR's Office Instruction, LIC-203, Appendix C, "Environmental Justice in NRR NEPA Documents," incorporates the Commission's EJ Policy Statement into the licensing process. *See* LIC-203, Appendix C (Ex. ENT000264).

In accordance with the environmental justice findings in Table B–1 in Appendix B to Subpart A, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant" in 10 CFR Part 51, the analysis of environmental justice impacts are addressed in plant-specific environmental reviews. Environmental justice was not evaluated on a generic basis in the "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" ("GEIS") (Ex. NYS000131A-I), because guidance for implementing Executive Order 12898 was not available prior to its completion in 1996.

Q11. Please provide an overview of how the NRC Staff assesses environmental justice issues.

A11. [JJR] We address environmental justice matters for license renewal through (1) identifying the location of minority and low-income populations that may be affected by the continued operation of the nuclear power plant during the license renewal term and

refurbishment activities associated with license renewal, (2) determining whether there would be any potential human health or environmental effects to these populations and special pathway receptors, and (3) determining if any of the effects may be disproportionately high and adverse. *See* LIC-203, Appendix C (Ex. ENT000264). The results of the environmental justice review are presented in the plant-specific draft and final supplemental EISs (SEISs).

Figures in plant-specific SEISs identify the location of minority and low-income populations (based on modeling results using CEQ and NRC criterion) residing within a 50-mile (80-kilometer) radius of the nuclear power plant. This area of impact is consistent with the impact analysis for public and occupational health and safety, which also focuses on populations within a 50-mile (80-kilometer) radius of the nuclear plant. Chapter 4 of each SEIS presents the assessment of environmental and health impacts for each resource area. Potential impacts to minority and low-income populations would mostly consist of socioeconomic and radiological effects; however, radiation doses from continued operations during the license renewal term are expected to continue at current levels, and would remain within regulatory limits.

The special pathway receptors analysis is an important part of the environmental justice impact assessment, because consumption patterns may reflect the traditional or cultural practices of minority and low-income persons living in the area. Section 4-4 of Executive Order 12898 directs Federal agencies, whenever practical and appropriate, to collect and analyze information on the consumption patterns of populations that rely principally on fish and/or wildlife for subsistence and to communicate the risks of these consumption patterns to the public. *See* E.O. 12898 (Ex. ENT000259) In each plant-specific SEIS, we consider whether there were any means for minority or low-income populations to be disproportionately affected by examining the potential impacts to American Indian tribes and other traditional lifestyle special pathway receptors. Special pathways take into account the levels of radiological and non-radiological contaminants in native vegetation, crops, soils and sediments, surface water, fish, and game

animals on or near the nuclear power plant site.

Q12. How does the NRC Staff define minority and low-income populations for environmental justice purposes?

A12. [JJR] We use the same definitions of minority and low-income populations that CEQ uses in their Environmental Justice Guidance, except with updated Census Bureau definitions of race and ethnicity and editorial revisions for readability. The definitions are as follows:

Minority individuals—Individuals who identify themselves as members of the following population groups: Hispanic or Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or two or more races, meaning individuals who identified themselves on a Census form as being a member of two or more races, for example, Hispanic and Asian.

Minority populations—Minority populations are identified when (1) the minority population of an affected area exceeds 50 percent or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Low-income population—Low-income populations in an affected area are identified with the annual statistical poverty thresholds from the Census Bureau's Current Population Reports, Series P60, on Income and Poverty.

Q13. What license renewal impacts to minority and low-income populations did the NRC Staff consider in the FSEIS?

A13. [JJR] We considered the radiological (human health) and socioeconomic (environmental) effects, including employment and tax-revenue impacts that could affect public services that minority and/or low-income may depend on during the license renewal term.

Q14. What were the NRC Staff's conclusions regarding socioeconomic impacts of continued reactor operations during the license renewal term on minority and low-income

populations in the FSEIS?

A14. [JJR] We concluded that socioeconomic conditions in minority and low-income populations and communities would not change as a result of renewing the IP2 and IP3 operating licenses. Employment levels and tax revenues generated by the continued operation of IP2 and IP3 would remain relatively unchanged, so direct and indirect employment opportunities and public services would remain unchanged. Therefore, there would be no additional socioeconomic impact (environmental effect) on minority and low-income populations during the license renewal term beyond what is currently being experienced.

Q15. What were the NRC Staff's conclusions regarding human health impacts of continued reactor operations during the license renewal term on minority and low-income populations, including subsistence food consumption patterns and behavior, within the IP area?

A15. [JJR] Some forms of subsistence behavior food consumption patterns exist within the 50-mile (80-kilometer) radius of IP2 and IP3, most likely occurring in low-income populations. The majority of subsistence foods would come from public community-based and private vegetable gardens, hunting, and fishing. Human health effects from the continued operation of IP2 and IP3 on the offsite population would remain unchanged. Radiation doses from continued operations associated with this license renewal are expected to continue at current levels, and would remain within regulatory limits. Therefore, there would be no additional human health impact (human health effect) on minority and low-income populations during the license renewal term beyond what is currently being experienced.

Q16. Did the NRC Staff perform a special pathway receptor analysis in the FSEIS? If so, please provide conclusions and the bases for those conclusions.

A16. [JJR] Yes. A special pathway receptor assessment was performed for the DSEIS and FSEIS based on the Radiological Environmental Monitoring Program (REMP) at IP2 and IP3. To assess the impact of nuclear power plant operations, samples are collected annually from the environment and analyzed for radioactivity. A plant effect would be indicated

if the radioactive material detected in a sample was significantly larger than background levels. Two types of samples are collected. The first type, control samples, are collected from areas that are beyond the measurable influence of the nuclear power plant. These samples are used as reference data to determine normal background levels of radiation in the environment. These samples are then compared with the second type of samples, indicator samples, collected near the nuclear power plant. Indicator samples are collected from areas where any contribution from the nuclear plant will be at its highest concentration. These samples are then used to evaluate the contribution of nuclear power plant operations to radiation or radioactivity levels in the environment. An effect would be indicated if the radioactivity levels detected in an indicator sample was significantly larger than the control sample and background levels.

Indicator and control samples are collected from aquatic and terrestrial media in the vicinity of IP2 and IP3. Aquatic media includes fish, Hudson River water, ground water, aquatic vegetation, sediment, and shoreline soil. Terrestrial media includes airborne particulates, broad leaf vegetation, and direct radiation. During 2006, 1,342 samples showed no significant or measurable radiological impact from IP2 and IP3 operations.

The results from the 2006 and 2009 REMP program for IP2 and IP3 are summarized in Section 2.2.7 of the Final SEIS. (Ex. NYS000133A-J). The results demonstrated that routine reactor operations have had no significant or measurable radiological impact on the environment. No elevated radiation levels were detected in the offsite environment as a result of IP2 and IP3 operations and the storage of radioactive waste. The results demonstrate that the operation of IP2 and IP3 did not result in a significant measurable dose to a member of the general population or adversely impact the environment as a result of radiological effluents and emissions, and the dose to a member of the public from the operation of IP2 and IP3 remains significantly below the Federally required dose guidelines specified in 10 CFR Part 20 and 40 CFR Part 190, “Environmental Radiation Protection Standards for Nuclear Power Operations.”

The REMP monitoring results also showed that concentrations of contaminants in native

leafy vegetation, soils and sediments, surface water, and fish in areas surrounding IP2 and IP3 have been quite low (at or near the threshold of detection) and seldom above background levels. Based on this information, we concluded that no disproportionately high and adverse human health impacts would be expected in special pathway receptor populations in the region as a result of subsistence consumption of fish and wildlife.

Q17. What did the recent results from the 2010 REMP for the Indian Point site show on radiological impact to human health and the environment?

A17. [JJR] The results of the 2010 REMP for the Indian Point site demonstrated that routine operations at the IP2 and IP3 site continues to have no significant or measurable radiological impact on the environment. Analyses performed on 1,166 samples of environmental media showed no significant or measurable radiological impact above background levels from site operations. No elevated radiation levels were detected in the offsite environment as a result of plant operations and the storage of radioactive waste. These results continue to demonstrate that the operation of IP2 and IP3 does not result in a significant measurable dose to a member of the general population or adversely impact the environment as a result of radiological emissions and effluents. Consequently, no disproportionately high and adverse human health impacts would be expected in special pathway receptor populations in the region as a result of subsistence consumption of water, local food, fish, and wildlife.

Q18. Did these new results from the 2010 REMP affect the NRC Staff's conclusions in the environmental justice assessment?

A18. [JJR] No.

Q19. What were the NRC Staff's conclusions in the FSEIS with respect to the radiological effects of continued operation on low-income and minority populations?

A19. [JJR] Radiation doses from continued IP2 and IP3 reactor operations during the license renewal term are expected to continue at current levels, and would remain within regulatory limits. Based on this information and the assessment of human health impacts in

Chapter 4 of the FSEIS, there would be no disproportionately high and adverse impacts to minority and low-income populations from the continued operation of IP2 and IP3 during the license renewal term.

Q20. What were the NRC Staff's conclusions with respect to environmental impacts from postulated accidents and design basis accidents of continued operation on low-income and minority populations?

A20. [JJR] Chapter 5 discusses the environmental impacts from postulated accidents that might occur during the license renewal term, which include both design basis and severe accidents. In both cases, the Commission has generically determined that impacts associated with design basis accidents are small because nuclear plants are designed and operated to successfully withstand such accidents, and the probability weighted impact risks associated with severe accidents were also small. Therefore, based on this information and the analysis of human health presented in Chapter 5 of the FSEIS, there would be no disproportionately high and adverse impacts to minority and low-income populations from the continued operation of IP2 and IP3 during the license renewal term.

Q21. Did the NRC Staff consider any mitigation measures to reduce the environmental impacts associated with license renewal on low-income and minority populations?

A21. [JJR] No. Since it was determined that the impacts of license renewal would not be disproportionately high and adverse to minority and low-income populations, mitigation is not required.

Q22. Based on your review, what is your opinion regarding Clearwater's environmental justice claims in Contention CW-EC-3A with respect to the disproportionate impacts of a severe accident at Indian Point on special needs and prison populations?

A22. [JJR] The Clearwater contention assumes an accident occurring at one of the units would require the activation of the emergency plan, the consequences of which would require the evacuation of the general population around the site. Clearwater contends that special

needs populations and prisoners housed in facilities located within 50 miles of IP2 and IP3 would not be treated the same as the general population in this scenario. However, we are not required to consider such emergency planning situations during license renewal environmental reviews. As described below, the Commission previously considered this issue and determined that emergency preparedness is outside the scope of the environmental review for license renewal.

> The Commission considered the need for a review of emergency planning issues in the context of license renewal during its rulemaking proceedings on 10 CFR Part 54, which included public notice and comment. As discussed in the statement of consideration for rulemaking (56 FR 64966), the programs for emergency preparedness at nuclear power facilities apply to all nuclear power facility licensees and require the specified levels of protection from each licensee regardless of plant design, construction, or license date. Requirements related to emergency planning are in the regulations at 10 CFR 50.47 and Appendix E to 10 CFR Part 50. These requirements apply to all operating licenses and will continue to apply to facilities with renewed licenses. Through its standards and required exercises, the Commission reviews existing emergency preparedness plans throughout the life of any facility, keeping up with changing demographics and other site-related factors. Therefore, the Commission has determined that there is no need for a special review of emergency planning issues in the context of an environmental review for license renewal.

NUREG-1850 at page 4-30 (Ex. ENT000011). Decisions and recommendations concerning emergency preparedness at nuclear plants are ongoing, and therefore fall outside the regulatory scope of license renewal. In license renewal environmental reviews, we are only required to consider the environmental effects of an additional 20 years of nuclear reactor operations.

Q23. Based on your review, what is your opinion regarding Clearwater's claims that Census blocks should have been used instead of Census block groups in identifying minority and low-income populations?

A23. [JJR] Census block group data was chosen to identify the location of minority and low-income populations in proximity to a nuclear power plant. While Census block data is preferred for identifying the location of minority communities, Census block group data was chosen because it contains poverty and income information. Census block data does not contain poverty and income information. *See* LIC-203, Appendix C (Ex. ENT000264). We agree

that Census block data on race and ethnicity would further define the location of minority and low-income communities, and we do not question the existence of these populations and communities in close proximity to IP2 and IP3. *See* FSEIS at A-115 (Ex. NYS000133A-J). Nevertheless, while Census block data provides more detailed geographic information, Census block group data, which incorporates block data, also provides a sufficient level of geographic detail for identifying the location of minority and low-income populations. Additionally, the use of Census block group data is in accordance with CEQ guidance. Census block group data identifies the location of minority and low-income populations where the minority population percentage of the affected area exceeds 50 percent or "is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis." *See* CEQ EJ Guidance at 25 (Ex. ENT000266). Additionally, the CEQ's environmental justice guidance states, "The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population." *Id.* at 26. Choosing Census block group data over block data does not artificially dilute or inflate the affected minority population because it allows for the consideration of poverty and income data in identifying the location of minority and low-income populations.

Q24. Clearwater asserts that there is disagreement between New York State Department of Environmental Conservation (NYSDEC) maps and the FSEIS maps with respect to majority minority areas between 10 and 50 miles of Indian Point because of the NRC's use of census block groups. Specifically, Clearwater asserts that a large "Environmental Justice" area above Poughkeepsie to the west of the Hudson is not identified in the FSEIS map and another large area east of Rhinebeck on the 50-mile boundary is omitted from the FSEIS. Please address whether these environmental justice populations were identified in the FSEIS.

A24. [JJR] It is important to note that the environmental justice impact assessment of the effects of license renewal conducted for the FSEIS is not limited to the block groups

identified on the maps. Human health and environmental effects from continued nuclear power plant operations and refurbishment associated with license renewal were considered for all minority and low-income populations within 50 miles of IP2 and IP3 whether they appeared on the representative environmental justice population maps or not, including the environmental justice populations above Poughkeepsie to the west of the Hudson and east of Rhinebeck on the 50-mile boundary. No member of the minority and low-income population was excluded from consideration in the FSEIS environmental justice assessment.

The figures in Section 4.4.6 in the FSEIS identify the locations of minority and low-income block groups within a 50-mile radius of IP2 and IP3 based on demographic information provided in Entergy's environmental report. The shaded block groups on the maps in the FSEIS do not necessarily coincide with NYSDEC defined "potential environmental justice areas." The environmental justice population maps in the FSEIS were derived from modeling results using 2000 Census data and CEQ based NRC criterion for identifying minority populations (i.e., 50 percent or the percentage of the affected area that is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis). The maps in the FSEIS simply show block groups that exceed the percentage criterion chosen for the environmental justice assessment. The criterion can be adjusted to reveal other meaningfully greater percentages of environmental justice populations, including the environmental justice areas above Poughkeepsie to the west of the Hudson and the large area east of Rhinebeck on the 50-mile boundary. This adjustment is unnecessary, because we considered the effects of license renewal on all minority and low-income populations within 50 miles of IP2 and IP3 in the FSEIS.

Q25. Did the NRC Staff's environmental justice assessment in the FSEIS account for disabled and prison populations as environmental justice populations?

A25. [JJR] No. Only minority and low-income populations are considered in accordance with Executive Order 12898, the Commission's EJ Policy Statement, and NRC and CEQ's

Environmental Justice Guidance.

Q26. Clearwater asserts that the NRC Staff did not adequately assess disproportionate impacts on disabled and prison populations. Do NRC regulations and/or Commission's policy statement provide for specific consideration of disabled and prison populations in environmental justice assessments for NEPA purposes?

A26. [JJR] Unless individual members of disabled and prison populations consider themselves a member of a minority race and/or are living below the poverty threshold (low-income), NRC regulations and the Commission's policy statement do not require the consideration of disabled and prison populations as distinct populations in the environmental justice assessment. The environmental justice assessment only considers the effects of continued reactor operations during the license renewal term and refurbishment activities associated with license renewal on minority and low-income populations. Consistent with Executive Order 12898, and as noted in the Commission's EJ policy statement, the NRC strives to meet the goals of Executive Order 12898 through its NEPA review process. EJ Policy Statement at 52,042 (Ex. ENT000260). NRC regulations and the Commission's policy statement are consistent with Executive Order 12898 and CEQ's EJ Guidance.

Q27. Did the NRC Staff's environmental justice assessment in the FSEIS account for the environmental justice populations in prisons including Sing Sing?

A27. [JJR] Yes, the minority and low-income populations in Sing Sing and other correctional facilities (i.e., prisons) were considered in the FSEIS. All minority and low-income populations within 50-miles of IP2 and IP3 are considered in the FSEIS regardless of whether they are institutionalized. People in prisons and other correctional institutions, such as federal detention centers and local jails, were included in the 2000 Census as a component of the group quarters institutionalized population. *See* Census SF-1, Appendix C at C-2 (Ex. ENT000265). Essentially, all people living in the US (including people living in prisons) on April

1, 2000 were counted in the 2000 Census based on where they were living at the time.[2] Minority and low-income demographic data for the FSEIS environmental justice assessment including prison and other institutionalized populations was drawn from the 2000 Census SF-1. The environmental justice assessment determines whether human health or environmental effects from continued nuclear power plant operations and refurbishment associated with license renewal would affect minority and low-income populations and whether any of these effects would be disproportionately high and adverse. No member of a minority and low-income population was excluded from consideration in the FSEIS environmental justice assessment.

Q28. Did the NRC Staff's environmental justice assessment in the FSEIS account for environmental justice populations in other special facilities such as pre-schools, hospitals, homeless shelters, and nursing homes?

A28. [JJR] Yes. All minority and low-income populations within 50-miles of IP2 and IP3 are considered in the FSEIS regardless of whether they are immobilized with disabilities and/or institutionalized. Institutionalized people included in the 2000 Census consist of "People under formally authorized, supervised care or custody, such as in federal or state prisons; local jails; federal detention centers; juvenile institutions; nursing or convalescent homes for the aged or dependent; or homes, schools, hospitals, or wards for the physically handicapped, mentally retarded, or mentally ill; or in drug/alcohol recovery facilities were counted at these places." *See* Census SF-1, Appendix C at C-2 (Ex. ENT000265). Essentially, all people living in the US (including people living in institutions) on April 1, 2000 were counted in the 2000 Census based on where they were living at the time. Minority and low-income demographic data for the FSEIS environmental justice assessment including for those populations immobilized with disabilities

[2] "In accordance with census practice dating back to the first U.S. census in 1790, each person was to be enumerated [counted] as an inhabitant of his or her ''usual residence'' in Census 2000. Usual residence is the place where the person lives and sleeps most of the time." *See* Census SF-1, Appendix C at C-1 (Ex. ENT000265). "Summary File 1 (SF 1) contains the 100-percent data, which is the information compiled from the questions asked of all people and about every housing unit. Population items include sex, age, race, Hispanic or Latino, household relationship, and group quarters." *See* Census SF-1, Abstract at 1-1 (Ex. ENT000265).

and/or institutionalized was drawn from the 2000 Census SF-1. The NRC's environmental justice assessment attempts to determine whether any potential human health or environmental effects from continued nuclear plant operations and refurbishment associated with license renewal would affect minority and low-income populations and whether any of these effects would be disproportionately high and adverse. No member of a minority and low-income population was excluded from consideration in the FSEIS EJ assessment.

Q29. Please provide an overview of the NRC's role with respect to oversight of emergency preparedness for licensed nuclear power plants.

A29. [PAM] In accordance with 10 CFR 50.47, before a plant is licensed to operate, the NRC must have "reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency." Oversight of emergency preparedness for licensed nuclear power plants and surrounding communities is shared by the NRC and the FEMA. The NRC and FEMA have a Memorandum of Understanding, under which FEMA has the lead in overseeing offsite planning and response and the NRC assists FEMA in carrying out this role. FEMA/NRC MOU at 47,998 (Ex. NRC000065). FEMA reviews and evaluates the offsite emergency plans developed by the State and Counties to ensure that there is reasonable assurance that the plans as developed can be implemented to afford adequate protection to the populations in the 10- and 50-mile emergency planning zones ("EPZs"). *Id.* at 47,999-48,000. The NRC oversees the licensee's onsite emergency plan and has the statutory authority to make the final determination of reasonable assurance considering both offsite and onsite emergency preparedness. *Id.* at 48,000.

The NRC's overall decision of reasonable assurance is based on licensees complying with NRC regulations and guidance as well as the adequacy of State/local plans as determined by FEMA. The emergency preparedness plans and programs for nuclear power plant licensees and offsite authorities cover preparations for evacuation, sheltering, and other actions and to protect residents near plants in the event of a serious accident. These emergency plans are

developed and implemented to provide adequate protection to all populations within the EPZs around nuclear power plants. There are two EPZs around all nuclear power plants. The first is the 10-mile EPZ which is an area encompassing about a 10-mile radius around the nuclear power plant for which protective actions are in place to protect the public from exposure to the plume. The second is the 50-mile EPZ, which is an area encompassing about a 50-mile radius around the nuclear power plant for which protective actions are in place to protect the public from exposure from ingestion of radiologically contaminated food and milk products. The planning for the 10-mile EPZ provides a substantial basis for expansion of emergency protective measures, including evacuation, on an ad hoc basis. NUREG-0654/FEMA-REP-1 at 12 (Ex. NRC000066). For example, should an evacuation need to be expanded to include the population out to 15 miles, then the plans in place to move the populations within the 10 miles can be expanded as needed to provide for the evacuation of the populations at distances outside of the 10-mile EPZ. Non-nuclear related evacuations occur frequently and successfully in the United States. NUREG/CR-6864 at 37 (Ex. NRC000068). Nuclear power plant owners, government agencies, and State and local officials work together to create a system for emergency preparedness and response that will serve the public in the unlikely event of an emergency. These plans are regularly tested and evaluated and the NRC Staff devotes several hundred hours to emergency preparedness inspections of each facility.

NRC regulations require that comprehensive emergency plans be prepared and periodically exercised to assure that actions can and will be taken to protect all citizens in the vicinity of a nuclear power plant. Emergency response plans are periodically updated and are designed to be flexible enough to respond to a wide variety of adverse conditions, including a terrorist attack. The planning process has demonstrated its robustness and ability to evolve and improve during the years since the Three Mile Island accident. The coordinated response to contain or mitigate a threatened or actual release of radioactive material would be essentially the same whether it resulted from an accidental or terrorist act. Further, every biennial exercise

has used releases or potential releases that require an evacuation of at least a portion of the planning zone. The biennial exercise is an event involving organizational responses to a simulated commercial nuclear power plant accident with radiological and other offsite consequences. The purpose of such an exercise is to test the integrated capabilities of involved offsite response organizations to implement the emergency functions set forth in State, Tribal, and local radiological emergency response plans and procedures. These exercises typically involve hundreds of participants and last for several hours. The exercises designed to test the ingestion pathway plans can extend for several days. The licensee as well as the State and local officials are evaluated by the NRC and FEMA during these exercises.

Q30. How are deficiencies with the onsite and offsite emergency preparedness plans identified and handled by the NRC?

A30. [PAM] If serious problems (identified as deficiencies) with implementation of the offsite emergency plans are identified during the exercise process or during an event, these problems must be corrected and proficiency of the modifications must be demonstrated. If these problems are not corrected or a plan to correct the identified deficiency is not submitted within 120 days (four months) then FEMA will initiate a process which may result in a withdrawal of reasonable assurance. The withdrawal of reasonable assurance is reported to the NRC. In accordance with 10 CFR 50.54(s)(2)(ii), if the NRC finds that the state of emergency preparedness does not provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency and if the deficiencies are not corrected within four months of that finding, the Commission will determine whether the reactor shall be shut down until such deficiencies are remedied or whether other enforcement action is appropriate. In determining whether a shutdown or other enforcement action is appropriate, the Commission shall take into account, among other factors, whether the licensee can demonstrate to the Commission’s satisfaction that the deficiencies in the plan are not significant for the plant in question, or that adequate interim compensating actions have been or will be

taken promptly, or that there are other compelling reasons for continued operation. If, under 10 CFR 50.54(s)(2)(ii) and 50.54(s)(3), the NRC determines that the state of emergency preparedness does not provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency, the NRC will notify the licensee and start the 120-day clock under Section 50.54(s)(2)(ii).

The NRC oversees the licensee's performance in following and maintaining its emergency plan via the Reactor Oversight Process, through monitoring of performance indicators and direct inspections of the licensee's program and exercise and actual event observations. Should such oversight identify a performance deficiency with the licensee's program, a program of progressive enforcement actions will be initiated as necessary to correct the licensee's performance. If at any time the NRC determines that it no longer has reasonable assurance with regard to the adequacy of the licensee's plan or the licensee's ability to take appropriate protective measures in the event of an accident, and that the issues are not resolved within four months, the Commission will determine whether the reactor should be shutdown or if other actions are appropriate. The Commission may take action earlier than four months, if warranted.

Q31. Do NRC requirements for emergency preparedness provide for specific consideration of disabled and prison populations?

A31. [PAM] Yes. The requirements for emergency planning in NUREG-0654/FEMA-REP-1, Rev. 1, Section J, Protective Response element 10.d, state that plans to implement protective measures for plume exposure pathways must include, "means for protecting those persons whose mobility may be impaired due to such factors as institutional or other confinement." *See* NUREG-0654/FEMA-REP-1 (Ex. NRC000066). Moreover, as discussed above, the emergency plans developed by the utility, state and counties around Indian Point are adequate to protect the public health and safety so long as they are updated and exercised consistently with current guidelines. FEMA, with the assistance of the Regional Assistance

Committee, a panel of experts in various aspects of emergency preparedness from a number of Federal agencies, periodically reviews the state and county plans and has evaluated numerous exercises over the years. These reviews and exercise evaluations have consistently indicated that the emergency response plans for the area surrounding Indian Point provide a sound framework for effective decision-making and implementation of essential emergency preparedness functions, regardless of the initiating event.

Q32. Have you reviewed the emergency plans for New York State and the counties surrounding Indian Point discussed in Clearwater's testimony?

A32. [PAM] Yes.

Q33. Please provide a basic overview of the New York State and County emergency plans that you reviewed and explain how these plans work together.

A33. [PAM] Each of these plans is a comprehensive plan in accordance with standards detailed in NUREG-0654/FEMA-REP-1 which describe the responsibilities, authorities, preparedness, and response actions of County and State emergency management employees to a potential or actual radiological emergency at IPEC. *See generally* NUREG-0654/FEMA-REP-1 (Ex. NRC000066).

Radiological emergencies will be initially dealt with at the County level. In accordance with Article 2B of the Executive Law of the State of New York, the County Executive may proclaim a Local State of Emergency within any part or all of the territorial limits of the County. N.Y. Exec. Law § 24 (Consol. 2012). The County Executive may also request that the Governor declare a State of Emergency, or as a result of a disaster arising from a radiological accident, the Governor may direct the County Executive and emergency service organizations to notify the public that an emergency exists and take appropriate actions according to the New York State Plan. *Id.* The County(ies) will first use county resources. When such resources are exhausted or if additional assistance is required, the County will turn to the State Emergency Management Office. The State will take the necessary actions to respond to those instances

where a County does not have the capability to implement all or part of its radiological emergency plan or if the County Executive chooses not to implement the plan. If necessary, the Governor will request federal assistance. The interface between the County and State emergency management officials is routinely exercised and evaluated during the biennial exercises.

Q34. Clearwater asserts that the emergency plans call for populations within special facilities to shelter-in-place. Can you describe the shelter-in-place protective action and explain when it is used?

A34. [PAM] Shelter-in-place is a very simple process—to stay at home or other such structure and secure the ventilation so that the inflow of air is restricted. Automobiles and mobile homes or other trailers are not effective for shelter-in-place. Shelter-in-place is a preferred action when emergency events develop rapidly and/or evacuation would be problematic, such as if a roadway has been disrupted. In general, shelter-in-place is preferred over evacuation whenever it provides equal or greater protection from the hazard. Shelter-in-place is the most basic of protective actions and has been successfully implemented in ad hoc and preplanned events. *See* NICS Study at 46 (Ex. NRC000071).

Q35. Have there been any studies to determine the effectiveness of shelter-in-place?

A35. [PAM] Yes, there have been studies to examine the effectiveness of shelter-in-place. The National Institute for Chemical Studies has conducted a number of studies on the effectiveness of shelter-in-place. In their 2001 report, “Sheltering in Place as a Protective Action,” a number of case studies of real events (such as train derailments releasing large quantities of hazardous gases and pipe ruptures and chemical facility accidents resulting in atmospheric releases of hazardous gases) demonstrated that shelter-in-place is an effective strategy in protection of public health and safety. *See* NICS Study at 9-39 (Ex. NRC000071). In addition to this report, the National Institute for Chemical Studies has reviewed the work of the Department of the Army and the Federal Emergency Management Agency Chemical Stockpile

Emergency Preparedness Program plans at the request of local communities located near a chemical weapons storage depot. As part of the project, the National Institute for Chemical Studies provided technical reviews of: the area's shelter-in-place practices, shelter-in-place strategy for keeping outside chemicals from entering safe rooms, and the strategy for removing people from the at-risk area after passage of a chemical plume. In addition, the National Institute for Chemical Studies was invited to meet with stakeholders to discuss various aspects of the emergency plan for the storage depot. The National Institute for Chemical Studies also works closely with communities to manage safety, health and environmental risks associated with the manufacture, storage, transportation and disposal of chemicals. Included in this work is emergency planning.

Q36. What is your opinion regarding Clearwater's assertion that if the populations within special facilities such as prisons (including Sing Sing), hospitals, and nursing homes shelter-in-place in accordance with the emergency plans, then these populations will not be evacuated?

A36. [PAM] Protective action recommendations are implemented based upon evolving plant conditions, which allows for a series of staged evacuations for transit dependent populations. NUREG-0654/FEMA-REP-1 Supp. 3 at 7-10 (Ex. NRC000067). A decision may be made not to move some populations due to the risk versus benefit considerations. However, during a severe accident, after the plume has passed or release has ended, shelter-in-place would be accompanied by plans to evacuate or relocate out of the impacted area if conditions require such action. If such plant conditions are projected to impact Sing Sing or other such special facilities, then the facility emergency plan would recommend the evacuation of these populations.

The evacuation of the prison population is under the authority of the New York State Department of Corrections. However, State corrections officials work closely with State and county officials. In accordance with New York State Executive law,

> Whenever a local state of emergency is declared by the chief executive of a local government pursuant to this section, the chief executive of the county in which such local state of emergency is declared, or where a county is wholly contained within a city, the mayor of the city, may request the governor to remove all or any number of sentenced inmates from institutions maintained by such county in accordance with section ninety-three of the correction law.

N.Y. Exec. Law § 24 (Consol. 2012). For security reasons, the Department of Corrections does not make the emergency plans for Sing Sing or any other prison publicly available. On March 19, 2012, I spoke with Mr. Theodore J. Fisch, Chief of Radiological Emergency Preparedness Program, NYS DHSES Office of Emergency Management 1220 Washington Ave Building 22, Rm. 31B, State Office Campus Albany, New York, 12226 regarding the prison populations at Sing Sing. Mr. Fisch reiterated the sensitive nature of such evacuation but assured me that in his role as Chief of Radiological Emergency Preparedness Program, he personally is aware of the Department of Corrections plans to provide for protection of the safety of the prison population.

The Department of Corrections makes decisions on the movement of prisoners based upon their internal plans and procedures. State facilities may shift prisoners within the State system. Upon the request of county officials, the State Commission on Corrections will advise the county and the Department of Corrections as to the protective action that is to be taken relative to incarcerated individuals. The Department of Corrections routinely moves prisoners within New York State and has the capability to quickly evacuate and relocate prisoners when faced with conditions such as fires or flooding. Corrections officials are confident they will be able to relocate prisoners from Sing Sing should the need arise.

The emergency plan for Westchester County includes the provision to call on New York State resources to assist when County resources become overwhelmed. Westchester County Radiological Emergency Plan for the Indian Point Energy Center at 1-13 (Ex. CLE000014). The New York Emergency Plan includes provisions for evacuation which encompasses not only the movement of people out of a threatened area but also the resources necessary to support this

movement. *Id.* at 1-13, 1-15. Included are the movement of people from designated areas over designated routes; keeping these routes clear for travel; the identification of needs of special populations (e.g., mobility impaired, hearing impaired, school children, and transportation dependent); and the care and support of evacuees. Westchester IP Emergency Guide at 7-18 (Ex. ENT000287); Rockland IP Emergency Guide (Ex. ENT000288); Putnam IP Emergency Guide at 6-14 (Ex. NRC000069); Orange IP Emergency Guide at 5-13 (Ex. NRC000070). The evacuation plan will be implemented at the local level, using all available local resources, supplemented by available State resources as necessary. The State Office of Emergency Management coordinates and provides technical assistance to the local governments. The Division of State Police assists in notification and providing control with local law enforcement agencies, enforces emergency highway traffic regulations, and assists in ensuring the security of evacuated areas.

The Department of Transportation assists in traffic control and keeping evacuation routes clear; supplies route designations for expedient movement and control mechanisms (signs, road blocks, signals, etc.) as required; waives restrictions on transportation systems if necessary; and assists in locating buses for mass transit. The Division of Military and Naval Affairs (DMNA), on order of the Governor, aids civil authorities with ground and air evacuation capabilities.

Q37. What is your opinion regarding Clearwater's assertion that if the populations within special facilities such as prisons (including Sing Sing), hospitals, and nursing homes shelter-in-place in accordance with the emergency plans, these populations will receive higher radiation doses than the general public?

A37. [PAM] Sheltering-in-place does not mean that the affected populations will receive a higher or harmful radiation dose because they did not immediately evacuate. Protective action recommendations are implemented based upon evolving plant conditions. This allows for a series of staged evacuations for transit dependent populations. However, the decision may

be made not to move some populations due to the risk versus benefit considerations. While these populations may receive doses greater than the populations evacuated, this is carefully considered during the decision making process.

The emergency plans that are developed by State and local officials incorporate, at a minimum, the guidance from the EPA Manual of Protective Action Guides which identifies recommended dose guidelines. These EPA dose guidelines are decision points as opposed to "Federal limits" where consideration of the impact of increasing dose must be weighed against the harm that may result from the evacuation. The EPA dose guidelines state that "sheltering may be preferable to evacuation as a protective action in some situations." EPA Dose Guidelines at 2-5 (Ex. ENT000284). There are no dose limits for evacuation of the public; rather, there is a dose range (1-5 rem) proposed in the guidance that recommends careful consideration of the risks versus the benefits when undertaking a protective action. *Id.* With respect to evacuation and sheltering, the EPA dose guidelines state that:

> [E]vacuation of the public will usually be justified when the projected dose to an individual is one rem. This conclusion is based primarily on EPA's judgment concerning acceptable levels of risk of effects on public heath from radiation exposure in an emergency situation. The analysis also shows that, at this radiation dose, the risk avoided is usually much greater than the risk from the evacuation itself. However, EPA recognizes the uncertainties associated with quantifying risks associated with these levels of radiation exposure, as well as the variability of risks associated with evacuation under differing conditions.

Id.

The dose to sheltered populations will depend upon the event. The EPA dose guidelines state that sheltering may also provide protection "equal to or greater than evacuation due to the nature of the source term and/or in the presence of temporal or other site-specific conditions." *Id.* at 2-6. The guidance further states that evacuation may not be appropriate at 1 rem for situations or groups including: a) the presence of severe weather, b) competing disasters, c) institutionalized persons who are not readily mobile, and d) local physical factors which impede evacuation. *Id.* Because of the higher risk associated with evacuation of some

special groups in the population (e.g., those who are not readily mobile), the EPA dose guidelines recognize that sheltering may be the preferred alternative for such groups as a protective action at projected doses up to 5 rem. *Id.* The EPA dose guidelines further recognize that "under unusually hazardous environmental conditions use of sheltering at projected doses up to 5 rem to the general population (and up to 10 rem to special groups) may become justified." *Id.* However, during a severe accident, after the plume has passed or release has ended, shelter-in-place should be accompanied by plans to evacuate or relocate out of the impacted area if conditions require such action. NUREG-0654/FEMA-REP-1 Supp. 3 at 59 (Ex. NRC000067).

Q38. In his testimony, Dr. Edelstein claims that both shelter-in-place and evacuation proved to be inadequate protection for prisoners in the aftermath of Hurricane Katrina leading to problems including horrendous conditions for prisoners and a chaotic violent situation during evacuation. Dr. Edelstein further asserts that a severe accident at Indian Point has "the potential for adverse impacts to the prison population at Sing Sing paralleling, if not identical to, those experienced by inmates at the [Orleans Parish Prison] facility during the Katrina disaster." Do you agree?

A38. [PAM] I do not agree that a severe accident at Indian Point would result in the same conditions for the inmates as experienced during Hurricane Katrina. The emergency plans, both on and offsite for IPEC are routinely exercised and evaluated by the NRC and FEMA to ensure that the impacted populations can be safely protected from adverse effects resulting from a nuclear power plant accident. Moreover, the rigorousness of the preparedness planning for nuclear power plants is unique. As identified in the DHS Nationwide Plan Review Phase 2 Report, "Review participants with nuclear power facilities either in their jurisdiction or in neighboring jurisdictions (10-mile EPZ, 50-mile EPZ) have established evacuation procedures as required by the NRC and FEMA." DHS Report at 24 (Ex. NRC000072). In addition, the size of the potentially impacted area surrounding Indian Point Energy Center or any nuclear power

plant is small (10+/- miles) compared to the large area impacted by Hurricane Katrina (400+/- miles). Further, the type of impact from a radiological emergency at the Indian Point Nuclear Power plant (potential radioactive contamination) would be quite different than that from a hurricane (high winds and heavy rains which contribute to widespread physical damage and failures in infrastructure).

Moreover, it was the catastrophic failure of the levees and the subsequent flooding that was responsible for the horrific conditions at the Orlean Parish Prison.[3] On its own, a radiological emergency at Indian Point would not result in such conditions. Nonetheless, in spite of the significant challenges in the aftermath of Hurricane Katrina, "over 7500 prisoners were evacuated in three days out of nightmare conditions to multiple locations more than 60 miles away, with no loss of life, serious injuries or escapes." Hurricanes Katrina and Rita Incident Review at 21 (Ex. NRC000073). Such examples show that evacuations, even when ad-hoc and under extremely challenging conditions, can and do save lives.

Q39. In the event of a severe accident at IP, do you agree with Clearwater's assertion that the implementation of the emergency plans will result in a disproportionately high and adverse impact on populations at Sing Sing and other populations within special facilities?

A39. [PAM] No. I do not believe that the implementation of the emergency plans will have a disproportionately high and adverse impact on populations at Sing Sing and other populations within special facilities. Local, State and Federal emergency management officials are committed to ensuring that the emergency plans provide for adequate protection of public health and safety for the residents and others in the communities surrounding the Indian Point Energy Center. While it is possible that special populations such as those incarcerated at Sing

[3] "The situation inside the jail was very bad. Inmates on first floors had been in rising badly polluted flood waters until they were moved to higher floors. The fuel tanks for the emergency generators were in the basement so that when the floodwaters first reached the jail complex, the main power and the emergency power both went off. That meant no lights and no running water, no operable toilets, etc. Additionally, the buildings did not have opening windows and were dependent on the HVAC system for fresh air. With no power and no emergency power, the HVAC system was inoperable." Hurricanes Katrina and Rita Incident Review at 18 (Ex. NRC000073).

Sing could receive radiation doses higher than other populations that are immediately able to self-evacuate, any doses received would be within the EPA dose guidelines. It is important to remember that decisions to evacuate or shelter are made on the basis of plant conditions and projected dose. A projected dose is simply that—a dose that is "projected" based on a number of conservative inputs not an actual or measured dose. Further, it is not an instantaneous dose but rather a dose that is projected to be delivered over several days. If plant conditions indicate that such doses are projected to the populations at Sing Sing or other such special facilities, then the emergency plan would drive the evacuation of that population.

Q40. Clearwater asserts that in the event of an evacuation, transport dependent populations must wait at bus stops instead of sheltering in a building until transport is available and they must wait until after school evacuation is complete. In your opinion, would there be a disproportionately high and adverse impact on low income residents within 50 miles of Indian Point who do not have private vehicles and are reliant on public transportation (including pre-schools, nursing homes, shelters, hospitals) in the event of a severe radiological accident at IP?

A40. [PAM] No. I do not believe that there will be a disproportionately high and adverse affect on carless populations. Populations that would be considered for evacuation are those populations within the 10-mile emergency planning zone of a nuclear power plant. Populations beyond 10 miles, as seen in Japan-Fukushima Dai'ichi incident, may need to relocate at some point post-incident. It is important to note the distinction between evacuation and relocation. Evacuation is an immediate emergency response action whereas relocation can occur at some point—days, weeks or even months after the event. Not all populations within the 10-mile EPZ will need to evacuate at the same time. County officials can make the determination to evacuate school populations on a precautionary basis, well before a general emergency is declared. Relocating school populations before a general emergency declaration enables the use of school buses to assist in the transportation of the transportation dependent population.

If an evacuation is ordered, emergency messages will notify residents when the buses

will be picking up people. The County emergency planners have developed, and included in public information brochures, bus routes for those individuals without automobiles, but who are able to walk to a bus stop. Residents will be directed to leave their homes or shelters and go to the nearest bus stop at the time directed by the emergency management officials. Transportation dependent individuals who cannot easily get to a bus stop will be picked up at their homes by buses.

Individuals who are not able to utilize bus transportation are urged to register their status with the County to ensure that they are on the appropriate list for home pickup in an emergency condition. In the County emergency plan brochures, there are sections devoted to bus routes including identification of bus stops to ensure that those populations relying on public buses for evacuation are able to do so. There is considerable attention directed towards carless populations around IPEC. Therefore, I do not believe that there will be a disproportionately high and adverse impact on carless populations.

Q41. Clearwater asserts that a number of prison, nursing homes, assisted living, adult care, and rehabilitation facilities did not have potassium iodide available for distribution. Can you explain the purpose of distributing potassium iodide after a severe radiological accident and how this is addressed by the emergency plans?

A41. [PAM] Potassium iodide is a salt, much like sodium chloride. In fact, potassium iodide is the ingredient in table salt that makes it “iodized.” Potassium iodide, if taken in time and at the appropriate dosage, blocks the thyroid gland's uptake of radioactive iodine and thus could reduce the risk of thyroid cancers and other diseases that might otherwise be caused by ingestion of radioactive iodine that could be dispersed in a severe nuclear accident. In the United States and in many, but not all, parts of the world, the resident population is “iodine sufficient” which means that the thyroid gland contains an adequate amount of iodine and the amount of uptake of additional iodine (either radioactive or stable) will be small. Uptake of radioactive iodine by the thyroid gland is predominantly an ingestion pathway. Years of study of

the Chernobyl accident and the children who developed thyroid cancer confirm this pathway as the primary way radioactive iodine was taken into the body. Chernobyl Recommendations at 9 (Ex. NRC000074). The FDA recommends that potassium iodide is not necessary for people older than 40 years. FDA Thyroid Guidance at 6 (Ex. NRC000075). According to Westchester County plans, potassium iodide is made available to all hospitals and nursing homes, as well as schools, and licensed day-care facilities within the 10-mile emergency planning zone. Westchester IP Emergency Guide at 15-17 (Ex. ENT000287). The emergency plans, including potassium iodide plans, used by the Counties and State are routinely evaluated by FEMA. Discrepancies observed by FEMA are reported to the County/State authorities and must be corrected.

Q42. Clearwater asserts that "the limited ability of many Hispanic residents to speak English would impair their ability to understand instructions regarding evacuation, bus provision, and family reunification." In your opinion, would there be a disproportionately high and adverse impact on Hispanic residents in the event of a radiological emergency given their limited English proficiency?

A42. [PAM] No. I do not believe that there would be a disproportionately high and adverse impact on Hispanic residents in the communities surrounding Indian Point. Emergency planning information and brochures are made available in Spanish in both Westchester and Rockland counties. FEMA requires that emergency information materials be based on an analysis of the target population and contain information that addresses all aspects, such as language spoken, of a site-specific audience profile. FEMA REP Manual at II-41 (ENT000295). Such information on characteristics of the population is useful for choosing among possible distribution methods, including: annual mailings, community meetings, personal visits, mobile exhibits, school materials, and videos. Additionally, FEMA recognizes that "sometimes, special population groups, such as foreign language speaking populations, mobility limited or physically impaired persons, farmers, and transients, live in or commute to the EPZ and may have unique

information requirements" and directs that any such requirements be considered and integrated into the relevant information materials. *Id.* at II-41 to II-45. Moreover, local circumstances may suggest the need for written materials in a foreign language translation of Public Education Brochures, if the foreign language speaking population of voting age exceeds 5 percent of the population of a 10-mile EPZ county or its equivalent, emergency preparedness information should be translated into that foreign language. FEMA also states that the current demographic data should be used to determine if a foreign language translation is required. *Id.* at II-45. Consideration should also be given to the percentage of seasonal foreign language speaking transients and to demographic changes. Additionally, the emergency alert system messages will be broadcast in English and Spanish to ensure that the populations are alerted of problems at the plant and the actions they should take. *Id.* at IV-61.

Q43. Does this conclude your testimony?

A43. Yes.

March 30, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
ENTERGY NUCLEAR OPERATIONS, INC.	)	Docket Nos. 50-247-LR/50-286-LR
	)	
(Indian Point Nuclear Generating Units 2 and 3)	)	

AFFIDAVIT OF JEFFREY J. RIKHOFF REGARDING CONTENTION CW-EC-3A (ENVIRONMENTAL JUSTICE)

I, Jeffrey J. Rikhoff, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 CFR § 2.304(d)

Jeffrey J. Rikhoff
Senior Environmental Scientist/Socioeconomist
Division of License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop O-11 F1
Washington, DC 20555-0001
(301) 415-1090
Jeffrey.Rikhoff@nrc.gov

Executed in Rockville, MD
this 30th day of March, 2012

March 30, 2012

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AFFIDAVIT OF PATRICIA A. MILLIGAN
REGARDING CONTENTION CW-EC-3A (ENVIRONMENTAL JUSTICE)

I, Patricia A. Milligan, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 CFR § 2.304(d)

Patricia A. Milligan
Senior Level Advisor for Emergency Preparedness and Response
Office of Nuclear Security and Incident Response
U.S. Nuclear Regulatory Commission
Mail Stop TWFN/ 3 B46M
Washington, DC 20555-0001
(301) 415-2223
Patricia.Milligan@nrc.gov

Executed in Rockville, MD
this 30th day of March, 2012