

U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

In the Matter of)	
Carolina Power & Light Company)	Docket No. 50-400
(Shearon Harris Nuclear Power Plant, Unit 1))	
)	

PETITION FOR LEAVE TO INTERVENE AND REQUEST FOR A HEARING
WITH RESPECT TO RENEWAL OF FACILITY OPERATING LICENSE NO. NPF-63
BY THE NORTH CAROLINA WASTE AWARENESS AND REDUCTION NETWORK
AND THE NUCLEAR INFORMATION AND RESOURCE SERVICE

NOW COME the North Carolina Waste Awareness and Reduction Network, Inc. (“NC WARN”) and the Nuclear Information and Resource Service, Inc. (“NIRS”) (collectively the “Petitioners”), by and through the undersigned attorney, with a petition to intervene and request that the U.S. Nuclear Regulatory Commission (“NRC” or the “Commission”) hold an adjudicatory hearing on the application for a renewal of the license to operate the Shearon Harris Nuclear Power Plant, Unit 1 (“SHNPP”) by the Carolina Power & Light Company (“CPL”), currently doing business as Progress Energy. This Petition and Hearing Request is made pursuant to the notice of opportunity for a hearing published at 72 Fed. Reg. 13,139 (March 20, 2007), Section 189a of the Atomic Energy Act (“AEA”) at 42 U.S.C. § 2239(a) and the NRC regulations at 10 C.F.R. § 2.309. This Petition and Hearing Request further requests backfits as required by the NRC regulations at 10 C.F.R. §50.109(a)(5).

INTRODUCTION

Through its application, CPL seeks early approval to operate the SHNPP for an additional 20 years past the permit's expiration date of 2027. As a basic position, Petitioners maintain that it is inappropriate, if not reckless, to extend the operating license for the SHNPP for the simple reason that the present license will not expire for another 20 years. If the license extension is granted, by the time the current license term expires in 2027, the safety components crucial to safe operation and safe shutdown will have deteriorated further, safe shutdown will become increasingly more difficult, population around the plant will have continued to grow significantly and the consequences of deliberate malicious actions will remain unabated. Any age-related problems that arise during the next 20 years will not be assessed or analyzed to determine whether they will impact the safe operation of the plant for an additional 20 years. The additional 20 years in a license renewal will only further compound these unresolved problems. This is the basic flaw with the early license renewal process and allowing CPL to extend its license only halfway through the current license is an egregious abuse of this process.

Of primary importance, the AEA prohibits the NRC from issuing a license to operate a nuclear power plant if it would be "inimical to the common defense and security or to the health and safety of the public." 42 U.S.C. § 2133(d). Public safety is "the first, last, and a permanent consideration in any decision on the issuance of a construction permit or a license to operate a nuclear facility." *Petition for Emergency and Remedial Action*, 7 NRC at 404, citing *Power Reactor Development Corp. v. International Union of Electrical Radio and Machine Workers*, 367 U.S. 396, 402 (1961).

Given the need to protect the health and safety of the public, the Petitioners

specifically oppose the approval of the extension of the operating license in that the application for the license renewal and the NRC do not address the allegations presented in the contentions below: (a) the SHNPP is currently not in compliance with fire protection regulations; (b) the SHNPP is susceptible to aircraft attacks; (c) the SHNPP is susceptible to a significant fire caused by aviation attacks; and (d) the 1987 evacuation plan is insufficient to protect public health and safety in light of the significant population increases around the SHNPP. As such, the Petitioners have petitioned to intervene to ensure that the NRC does not grant the license renewal before these risks are fully addressed. CPL's application fails to satisfy the AEA's fundamental requirement to ensure safe operation of the SHNPP during the license renewal term because it does not include immediate compliance with the fire protection regulations or adequate design measures to prevent the occurrence of fires or to reduce the consequences from aviation attacks.

As detailed below in the Petitioners' contentions, CPL's license renewal application fails to comply with the National Environmental Policy Act ("NEPA") requirement that it address significant new information bearing on the environmental impacts of operating the SHNPP during a license renewal term. That new information, not addressed in any previous Environmental Impact Statement ("EIS") for the SHNPP or any other nuclear power plant, demonstrates that the continued operation of the SHNPP poses a significant and reasonably foreseeable environmental risk of a severe fire and offsite release of a large amount of radioactivity directly caused by noncompliance with current fire regulations and compounded by aviation attack. The direct possibility of fires, and the impacts of aviation attacks will considerably diminish the ability for safe shutdown at the plant. This will directly and adversely impact the significantly increased population around the plant.

The failure to take account of this new information is inconsistent with NEPA's major requirement that environmental decisions must take new information into account if the information shows that a proposed action will affect the quality of the human environment "in a significant manner or to a significant extent not already considered." *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 374 (1989).

Regarding the contentions below on aviation attacks and the fires created by those attacks, the NRC must prepare an EIS that addresses significant new information regarding the safety, health and environmental impacts associated with this threat. This information was not available to the NRC when earlier EISs relevant to license renewal were prepared. Under NEPA, the EIS must also weigh reasonably available alternatives for avoiding or mitigating the effects of fires from the aviation attacks and the impact damage of the aviation attack itself.

The threats to public health and safety from fires, are compounded by the aviation threats, and are further compounded by the dramatic increase of population around the SHNPP. As discussed below, since 1987 when the plant has been licensed, the population in the 10-mile emergency planning zone ("EPZ") has increased dramatically, more than a fourfold increase, and even conservative projections show that by 2047, there will be more than a tenfold increase of population in the EPZ from the 1987 levels, with and similar increases in population in the communities outside the EPZ. The original application for an operating license and the EIS prepared at that time did not envision this magnitude of increased risk to the public. The 1987 evacuation plan is insufficient to protect public health and safety.

As a result, the Petitioners maintain that based on the legal standards discussed

below and the contentions presented below, along with the evidence and testimony forecast to be available at a hearing on the relicensing application, the extension of the operating license for the SHNPP should be DENIED. At the same time, the NRC should require the backfitting of safety-related measures to prevent or mitigate the impacts of fires and aviation threats.

STANDING

Section 189a of the AEA requires the NRC to provide interested members of the public with a prior opportunity for a hearing on any decision regarding the issuance or amendment of a nuclear facility license. 42 U.S.C. § 2239(a)(1)(A). While the AEA does not establish a specific right to a hearing for license renewal proceedings, the Commission has determined that a hearing should be granted because renewal of an operating license “is essentially the granting of a license.” Proposed Rule, Nuclear Power Plant License Renewal, 55 Fed. Reg. 29,043, 29,052 (July 17, 1990). In order to be admitted as an intervenor to an NRC adjudicatory licensing proceeding, including a license renewal proceeding, a petitioner must file “contentions” that provide “sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.” 10 C.F.R. § 2.309(f)(vi).

The Petitioners herein clearly meet the required showing of standing:

a. NC WARN is a grassroots nonprofit using science and activism to tackle climate change and reduce hazards to public health and the environment from nuclear power and other polluting electricity production, and working for a transition to safe, economical energy in North Carolina. It has more than 1,000 members and supporters in North

Carolina, and many near the Shearon Harris Nuclear Power Plant. Its address is P.O. Box 61051, Durham, NC 27715-1051.

b. NIRS is the not-for-profit information and networking center for citizens and environmental organizations concerned about nuclear power, radioactive waste, radiation, and sustainable energy issues. It has 6,000 members in the United States and is affiliated with organizations worldwide. Its office is 6930 Carroll Avenue, Suite 340, Takoma Park, MD 20912.

Both of these membership organizations bring this action on behalf of their members. It is settled law that a corporation may bring an action on behalf of its members and represent their rights and interests, if any of those members have standing. *Sierra Club v. Morton*, 405 U.S. 727 (1972). Further, it has been the routine practice in NRC licensing matters to allow an organization to represent its members.

The members of the Petitioners have a direct interest in the relicensing of the SHNPP in that the risk of the accidental or intentional release of radioactive material will endanger their health and the health of their family members, damage their homes and severely limit their use and enjoyment of their property. The members of the Petitioners are deeply concerned about the lack of an adequate evacuation plan and how it will impact them and their families. The members of the Petitioners will be affected if the SHNPP cannot safely shut down in case of a fire or an aviation attack.

NC WARN has supplied affidavits from some of their members that live in the Town of Moncure, in close proximity to the SHNPP. ATTACHMENT1. Many of these members are African-Americans with limited incomes, several of whom are disabled or have family members who are disabled. Others have children in schools in the area. Interviews with

the members show that they have little or no knowledge of the evacuation plans and what they should do in case of an emergency. NIRS has supplied an affidavit from one of its members living less than 15 miles from the plant. ATTACHMENT 2. The impacts of the SHNPP extend far beyond the 10-mile EPZ and possible could injure millions of people in the Triangle Region of North Carolina.

Both of the Petitioners have as their primary purpose to eliminate as much of the risks as possible from nuclear power plants and agree that the consequences of a reactor accident are unacceptable and must be prevented. Both of the Petitioners have participated in rulemaking proceedings before the NRC, and have brought emergency petitions pursuant to Section 2.206 on safety matters, including one currently pending before the Commission on fire safety at the SHNPP. NIRS has intervened before the NRC in many licensing matters for nuclear plants across the United States.

STATUTORY AND REGULATORY FRAMEWORK

The two statutes that govern this Petition and Hearing Request are NEPA and the AEA. The AEA sets minimum standards for safe and secure operation of nuclear facilities, while NEPA requires NRC to consider and attempt to avoid or mitigate significant adverse environmental impacts of licensing those facilities. Although the statutes have some overlapping concerns, they establish independent requirements. *Limerick Ecology Action v. NRC*, 869 F.2d 719, 729-30 (3rd Cir. 1989) (“*Limerick Ecology Action*”) (holding that the AEA does not preclude NEPA). It is “unreasonable to suppose that [environmental] risks are automatically acceptable, and may be imposed upon the public by virtue of the AEA, merely because operation of a facility will conform to the Commission’s basic health and

safety standards.” *Limerick Ecology Action*, quoting *Citizens for Safe Power v. NRC*, 524 F.2d 1291, 1299 (D.C. Cir. 1975). NEPA goes beyond the AEA, by requiring the consideration of alternatives for reducing or avoiding adverse environmental impacts of NRC licensing actions. *Limerick Ecology Action*, citing 10 C.F.R. § 51.71(d).

Section 2133(c) of the AEC allows the NRC to renew nuclear power licenses. Although the AEA does not set a safety standard for license renewal, the Commission generally interprets the AEA to require that it “must have ‘reasonable assurance’ that public health and safety are not endangered by its licensing actions.” *Petition for Emergency and Remedial Action*, 7 NRC at 404, citing *Power Reactor Development Corp.*, 367 U.S. at 402. In the license renewal rulemaking, the Commission made a determination that:

With the exception of age-related degradation unique to license renewal and possibly some few other issues related to safety only during extended operation, the regulatory process is adequate to ensure that the licensing bases of all currently operating plants provide and maintain an acceptable level of safety for operation so that operation will not be inimical to public health and safety or common defense and security.

56 Fed. Reg. at 64,946. Thus, other than with respect to aging issues and issues that arise when significant new information becomes available, the NRC does not inquire into safety issues in the license renewal process but presumes that the current regulatory process is adequate. This presumption is rebuttable if it is shown that the current regulatory process is not adequate to protect public health and safety or if the plant is not in compliance with the relevant regulations or provisions of its license.

In the context of the proposed licensing decision, the NRC presumes that the applicant is in compliance with all of the relevant fire protection regulations, but again this is a rebuttable presumption if it is shown that the plant is not in compliance. In the matter

sub judice, the SHNPP has been out of compliance with the NRC fire protection regulations at 10 C.F.R. 50, Appendix R, Section III.G.2., and its operating license since 1992. This is presented in the Contentions TC-1 and EC-2 below.

The timeline of events clearly shows that despite numerous notices by the NRC staff about the failures of fire barriers and the need to comply with the Section III.G.2. standards, CPL has not done so. As is clearly stated in NRC Bulletin 92-01, issued as the result of SHNPP and widespread industry noncompliance with duly promulgated fire protection regulations, 10 C.F.R. 50.48(a) requires that each operating nuclear power plant have a fire protection plan that satisfies 10 C.F.R. Part 50, Appendix A, General Design Criterion 3, "Fire Protection." General Design Criterion 3 requires that structures, systems, and components important to safety, specifically post-fire safe shutdown systems, are designed and located to minimize, in a manner consistent with other safety requirements, the probability and effects of fires and explosions. In 10 C.F.R. 50.48(b), the NRC states that 10 C.F.R. Part 50, Appendix R, establishes fire protection features required to satisfy General Design Criterion 3 for certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979. Therefore Sections III.G, III.J, and III.O of Appendix R are applicable to nuclear power plants licensed to operate prior to January 1, 1979. In 10 C.F.R. 50.48(e), the NRC requires that all plants licensed to operate after January 1, 1979, complete all fire protection modifications needed to satisfy General Design Criterion 3 in accordance with the provisions of their operating licenses. The details of the fire protection programs for these later plants, including the SHNPP, are required to comply with NRC Standard Review Plan, NUREG-0800, Section 9.5.1, a document that parallels 10 C.F.R. 50 Appendix R for the protection of post-fire safe shutdown systems.

NRC-approved plant fire protection programs as referenced by the Plant Operating License Conditions and 10 C.F.R. Part 50 Appendix R, Section III.G.1.a, "Fire Protection of Safe Shutdown Capability," require one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control stations to be maintained free from fire damage. To ensure that such electrical cabling and components remain free from fire damage so that no single fire can destroy the safe shutdown of the reactor from the control room, Appendix R, Section III.G.2 requires the separation of safe shutdown trains by separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-hour rating or enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition to providing the 1-hour barrier, fire detection and an automatic fire suppression system are required in the fire area. Alternately, the licensee may separate redundant safe shutdown cables with a minimum distance of 20 feet with no intervening combustibles and in conjunction with fire detection and automatic fire suppression systems.

NRC Bulletin 92-01 further identifies that under certain fire conditions, the thermal degradation of inoperable electrical raceway fire barrier systems could lead to both trains of safe shutdown systems being damaged by fire. These inoperable fire barriers clearly include Thermo-Lag, HEMYC and MT fire barrier systems that are widely deployed throughout SHNPP. NRC Bulletin 92-01 concludes that these practices may significantly affect the plant's ability to achieve and maintain hot standby/shutdown conditions. The continued existence of such conditions is in violation of the SHNPP Current Licensing Basis.

The Petitioners contend that since at least 1992, CPL has not been in compliance with duly promulgated law governing fire protection requirements. Instead CPL has made repeated commitments to the NRC that it would come into compliance with the fire protection standard but has repeatedly failed to fulfill those commitments. Without seeking the required NRC safety analysis and approval through the exemption process, it has substituted inadequate compensatory measures, such as unanalyzed, unapproved and therefore illegal operator manual actions that do little to reasonably and reliably assure that in a manner consistent with other safety requirements, the probability and effects of fire have been minimized to protect plant workers and the public when the safe shutdown of the plant is required in emergency situations. Contrary to promulgated regulations, in the event of a fire these OMAs allow for fire damage to destroy the safe shutdown and maintenance from the reactor control room, and attempt to compensate for this by sending plant workers throughout the reactor complex. The workers are potentially hindered or halted by smoke, fire, radiation, or security risks and are required to manually operate circuit breakers, fuses and valves that are vital to safely shutdown and maintain the reactor. In many instances, the unauthorized OMAs at SHNPP involve multiple actions requiring tools, keys, ladders and other equipment in critically time-sensitive and potentially heroic actions to prevent reactor core damage.

Instead of coming into compliance immediately by complying with the Appendix R, Section III.G.2 standards, the current plan at the SHNPP is apparently to study the problem for another year or two, seek a license amendment and bring the plant into compliance by 2015 or later. At the present, there is no "reasonable assurance" that the plant can be operated safely. The lack of compliance with safety-related regulations presumes that the

structures, systems and components of the plant are not adequate, but over the last past 15 years, the NRC has allowed CPL to violate the fire regulations through an overextended enforcement discretion policy. The alternative regulatory scheme to study the risks under NFPA 805 is currently an unassessed pilot project and cannot be relied upon to provide immediate safe operation of the plant. NRC further is not even inspecting the fire protection structures, systems and components to determine their adequacy because NRC staff knows they are out of compliance. Assurance cannot be credited for continuing regulatory noncompliance or the alleged verifications of areas that are deliberately not examined.

Similarly, the evacuation plan for the SHNPP does not meet the minimum criteria for protecting the public health and safety. This evacuation plan was licensed in 1987 as part of the current license to operate. As presented in Contention EC-3 below, there were only 15,000 people living in the 10-mile EPZ at that time; currently there are at least four times that many, and the population is predicted to grow significantly from the present to 2027, the end of the current license, and continue to grow significantly until 2047, the license extension period. Before a nuclear 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.”¹ Although the NRC found that the 1987 Plan provided “reasonable assurances,” it is apparent that this determination cannot be relied upon for the 60-year period until the license and its proposed extension would ultimately expire.

¹ 10 C.F.R. Part 50, Appendix E and NUREG-0654, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” March 2002.

NRC regulations for implementation of the AEA provide that a nuclear power plant must be designed against accidents that are “anticipated during the life of the facility.” 10 C.F.R. § 50.34(a)(4) provides that a construction permit application for a nuclear power plant must include:

a preliminary analysis and evaluation of the design and performance of structures, systems, and components of the facility with the objective of assessing the risk to public health and safety resulting from operation of the facility and including determination of the margins of safety during normal operations and transient conditions anticipated during the life of the facility, and the adequacy of structures, systems, and components provided for the prevention of accidents and the mitigation of the consequences of accidents.

Again, the NRC relies in large part on the “adequacy of structures, systems and components” to prevent and mitigate the “anticipated” accidents, i.e., the “design-basis accidents.”² Design-basis accidents include low-frequency but credible events. The applicant for a license renewal and the resulting EIS prepared by the NRC must analyze and evaluate the adequacy of the plant to protect the public health and safety from these accidents.

The NRC designates accidents that are more complex and less likely than design basis accidents as “severe accidents.” The License Renewal GEIS at page 5-1 states that severe accidents are “those involving multiple failures of equipment or function and, therefore, whose likelihood is generally lower than design-basis accidents but whose consequences may be higher.” Although severe accidents are “beyond the substantial coverage of design-basis events,” they constitute “the major risk to the public associated

² NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants at 5-1 (1996) (“License Renewal GEIS”).

with radioactive releases from nuclear power plant accidents.”³

The Commission has made a generic determination that nuclear plants can be operated safely, despite the potential for severe accidents. Nevertheless, the Commission has an ongoing program to address severe accidents in the context of its regulatory program for protection of public health and safety under the AEA, and pledges to act upon any new information that calls the safety finding into question. As provided by the Severe Accident Policy Statement at 50 Fed. Reg. at 32,139:

Should significant new safety information become available, from whatever source, to question the conclusion of ‘no undue risk,’ then the technical issues thus identified would be resolved by the NRC under its backfit policy and other existing procedures, including the possibility of generic rulemaking where this is justified.

NEPA procedures require the NRC to prepare an EIS for any major licensing action significantly affecting the quality of the human environment. 10 C.F.R. §§ 51.71 and 51.91. The goal of the EIS is to analyze and evaluate the ability of the plant to operate safely; first that the plant is in compliance with safety rules, and protects against “anticipated” accidents and design basis accidents, and the “reasonably foreseeable” impacts which have “catastrophic consequences, even if their probability of occurrence is low.” 40 C.F.R. § 1502.22(b)(1). In licensing hearings, the Commission has required that the EIS address the probability of severe accidents and how to prevent them if at all possible, or mitigate them if they cannot be prevented. See, e.g., Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant), CLI-01-11, 53 NRC 370, 387 (2001).

³ “Policy Statement on Severe Accidents Regarding Future Designs and Existing Plants,” 50 Fed. Reg. 32,138, 32,139 (August 8, 1985) (“Severe Accident Policy Statement”).

NRC regulations for the implementation of NEPA do not require the preparation of a complete Environmental Review (“ER”) by the applicant and EIS by the NRC for every nuclear power plant license renewal application. Instead, the NRC relies on the License Renewal GEIS, prepared in 1996, to evaluate most of the environmental impacts of license renewal. See 10 C.F.R. §§ 51.53(c)(3)(i) and 51.71(d). *Limerick Ecology Action*, 869 F.2d 719, 726, citing 36 Fed. Reg. 22,851 (1971). While recognizing the possibility that the likelihood of some severe accidents may be so low as to be “remote and speculative” and therefore not necessary to discuss in an EIS, the License Renewal GEIS does not exclude any severe accidents on the ground of their estimated probability. 10 C.F.R. Part 51, Subpart A, Appendix B.

The License Renewal GEIS does not include any discussion of how deliberate malicious attacks on nuclear power plants may increase the likelihood or consequences of severe accidents. The NRC has previously declined to address the topic on the grounds that: (a) NRC security regulations provide reasonable assurance that the risk from deliberate malicious actions is small; (b) although their probability is not quantifiable, these actions are “not reasonably expected”; and (c) even if such an event were to occur, resultant core damage and radiological releases would be “no worse than those expected from internally initiated events.” License Renewal GEIS at 5-18.3. On the other hand, 10 C.F.R. § 51.53(c)(3)(iv) requires that an environmental report “must contain any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware.” Thus, the conclusions of the License Renewal GEIS are subject to modification in individual license renewal proceedings if new and significant information, not evaluated in the License Renewal GEIS, shows that the environmental impacts of

license renewal are greater than concluded in the License Renewal GEIS.

Significant new information shows that the Commission's factual basis for refusing to consider the environmental impacts of deliberate and malicious acts in the License Renewal GEIS is no longer viable, and therefore may be challenged in this proceeding under 10 C.F.R. § 51.53(c)(3)(iv). In this matter, the NRC cannot rely on the GEIS rationale for not analyzing deliberate malicious actions, such as aviation attacks, and how those attacks compound fire risks. Just as in *Limerick Ecology Action, supra*, the Court recognized the Intervenor's right to challenge the NRC's policy pronouncement regarding consideration of intentional attacks on a nuclear facility in the specific licensing proceeding in which it had intervened.

Significant new information, including the attacks of September 11, 2001, and the NRC's response to those attacks, shows that the environmental impacts of intentional destructive acts against the SHNPP are reasonably foreseeable. Additionally, a recent decision in the U.S. Supreme Court, arising from a case in the Federal 9th Circuit, declared that the NRC is required to consider the environmental impacts of intentional attacks on the proposed dry cask storage installation at Diablo Canyon Plant. *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. den. 549 US ___ (06-466, January 16, 2007). This case has been cited in other relicensing and licensing proceedings to demand additional analysis, and when the U.S. Supreme Court denied *certiorari* earlier this year, it is clear that deliberate malicious actions must be considered by the NRC in licensing decisions. It is further clear that given the state of world affairs, aviation attacks are design basis threats that must be addressed.

In the EIS for the present operating license extension, 10 C.F.R. 51.53(c)(ii)(L)

requires that the license renewal applicant and the NRC consider alternatives to mitigate severe accidents if the NRC staff has not previously evaluated Severe Accident Mitigation Alternatives (“SAMAs”) for the applicant’s plant in an EIS document. The EIS and ER also must present “alternatives for reducing adverse impacts,” including the severe accidents. 10 C.F.R. § 51.53(c)(3)(iii), citing 10 C.F.R. § 51.45(c). As the Commission explained in the preamble to the final rule for environmental review of license renewal applications, the alternatives that must be considered include all SAMAs. Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28,467, 28,480-81 (June 5, 1996). This requirement is:

based on the Commission’s NEPA regulations that require a review of severe [accident] mitigation alternatives in its environmental impact statements (EISs) and supplements to EISs, as well as a previous court decision that required review of severe mitigation alternatives (referred to as SAMAs) at the operating license stage. See, *Limerick Ecology Action v. NRC*, 869 F.2d 719 (3d Cir. 1989).

61 Fed. Reg. at 28,481.

Lastly, as required by the NRC regulations:

The Commission shall always require the backfitting of a facility if it determines that such regulatory action is necessary to ensure that the facility provides adequate protection to the health and safety of the public and is in accord with the common defense and security.

10 C.F.R. §50.109(a)(5). The choice of design measure for the backfit should be informed by the consideration of backfit design alternatives in the EIS.

In summary, the AEA and NEPA, along with the NRC regulations and case law, indicate strongly that the ER and EIS for the SHNPP relicensing should address the threat of fires compounded by aviation threats, and the inability for the 1987 evacuation plan to protect the health and safety of the public.

CONTENTIONS

In the contentions below, the Petitioners present a significant body of evidence and as an offer of proof, forecast additional evidence and testimony that would be presented at a hearing on the merits.⁴ Each of the contentions further adopts the legal arguments made above in the section on the Statutory and Regulatory Framework that provide the legal basis for admitting them as valid contentions. The four contentions overlap in that the SHNPP's lack of compliance with fire protection regulations is compounded by aviation threats, and the ability to safely evacuate the population in case of accidents from fire and/or aviation threats is compounded by the increased population in the EPZ.

TECHNICAL CONTENTION T-1 (Fire Protection)

Contention – Given that the SHNPP has been out of compliance since at least 1992 with requirements to maintain the post-fire safe shutdown systems of the reactor that minimize the probability and effects of fires and explosions as required in its Current License Basis and is not expected to come into compliance until approximately 2015 or later, extending into the license renewal period, and given that in the event of a significant fire, continued non-compliance can lead to the loss of the operators' ability to achieve and maintain hot standby/shutdown conditions further resulting in significant accidental release of radiation and posing a severe threat to public health and safety, it is therefore imprudent

⁴ While the labeling of the contentions as either an “environmental contention” or a “technical contention” is based on Petitioners’ preliminary assessment of the contention, each of the contentions have technical aspects as well as environmental impacts that must be fully addressed by the applicant and the NRC.

and improper to even consider extending the operating license for the SHNPP for an additional 20 years until the plant comes into full compliance with all relevant fire protection regulations.

Support of contention – The risk from fire at nuclear plants has been quantified repeatedly by the NRC staff. As early as 1990, staff reported that “based on plant operating experiences over the last 20 years it has been observed that typical nuclear power plants will have three to four significant fires over their operating lifetime. Previous Probabilistic Risk Assessments have shown that fires are significant contributors to the overall core damage frequency, contributing anywhere from 7 percent to 50 percent of the total, considering contributions from internal, seismic, flood, fire, and other events. There are many reasons for these findings. The foremost reason is that like many other external events, a fire event not only acts as an initiator but can also compromise mitigating systems because of its common-cause effect.”⁵

The present License Renewal Application at Section 2.3.3.31, in the technical information section of the system description of the "Fire Protection Systems," describes the SHNPP fire protection system as encompassing a number of systems including “[c]ertain types of fire barriers, i.e., Fire Doors and penetrations for pipes, electrical cable/conduits, and HVAC ducts.” The "certain types of fire barriers" described in Section 2.3.3.31 include extensive applications of inoperable fire barrier systems consisting of Thermo Lag, HEMYC and MT. These fire barrier materials were originally designated for the fire protection of electrical cables and conduits vital to the post fire safe shutdown

⁵ “Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants, “ US NRC, NUREG-1150, Vol. 2, Appendix C, October 1990; p. C-128.

systems. However, subsequent fire tests have identified that these fire barrier systems do not provide the level of required fire protection on standardized time and temperature industry fire tests under ASTM E 119.

As discussed above in the Section on Statutory and Regulatory Framework, NRC regulations mandate that nuclear power station operators physically protect emergency backup electrical systems, such as power, control and instrumentation cables, that are used to remotely shut down the reactor from the control room. The regulatory provisions require the physical fire protection of electrical cabling to include independently tested to ASTM standards for rating as qualified fire barriers. Such fire protection systems are to be designed, installed and maintained to resist the passage of flame and hot gas to protect encased electrical cables from excessive temperatures to allow them to operate for safe shutdown.

Pursuant to 10 C.F.R. 50.48(e), NRC regulations require that all plants licensed to operate after January 1, 1979, shall complete all fire protection modifications needed to satisfy of 10 C.F.R. Part 50, Appendix A, Criterion 3 in accordance with the provisions of their operating licenses. The details of the fire protection program for SHNPP plant are required to be in accordance with NRC Standard Review Plan, NUREG-0800, Section 9.5.1, a document which parallels 10 C.F.R. 50 Appendix R for the protection of post-fire safe shutdown systems. 10 C.F.R. 50, Appendix R, III.G.2 provides the three acceptable methods of protecting at least one shutdown train to remain free from fire damage during a postulated fire when redundant trains are located in the same fire area, those being:

1. Separation of the redundant system by a passive barrier able to withstand a fire for at least three hours; or

2. Separation of the redundant system by a distance of twenty feet containing no intervening combustible material, together with fire detectors and an automatic fire suppression system; or
3. Separation of the redundant system by a passive barrier able to withstand a fire for one hour, coupled with fire detectors and an automatic fire suppression system.

This prescriptive fire code was put in place for US nuclear power plants following the fire at the Browns Ferry nuclear plant in 1975 to provide the best assurance that no single fire can destroy a control room's ability to safely and remotely shut down the reactor.⁶ The Browns Ferry fire demonstrated that a high number of circuit failures can occur in a relatively short time period, in this case within 15 minutes from the ignition of the foam insulating material in the cable trays.

One of the basic principles in the relicensing of a nuclear power plant is that the plant is substantially in compliance with all relevant regulations. As discussed above in the section on the Statutory and Regulatory Framework, this presumption that the regulatory system works is a rebuttable presumption. In this matter, the SHNPP has been out of compliance since 1992 so there is absolutely no reasonable assurance against cable and conduit fires and consequential impairment of the ability of the plant to safely operate, and in particular, to safely shutdown and maintain the reactor in emergency situations.

On September 20, 2006, NC WARN, NIRS and several other petitioners documented the fire protection noncompliance at the SHNPP in the report, "Delaying with Fire: The Shearon Harris Nuclear Plant and 14 Years of Fire Safety Violations." The "Delaying with Fire" report contains attachments providing additional documentation of the

⁶ NRC Bulletin 75-04, "Cable Fire at Browns Ferry Nuclear Power Station."

SHNPP's noncompliance with the fire regulations.⁷ It documents a long series of NRC notices, bulletins and enforcement actions that have been in large part ignored by CPL; promises to come into compliance have been repeatedly made and then postponed.

The organizations then submitted an emergency petition pursuant to 10 C.F.R. §2.206 to the NRC and urged it to immediately shut down the plant and fine CPL the maximum fine for each violation, and to investigate the fire protection problems.⁸ The Petition Review Board held a hearing on the 2.206 Petition and investigated the allegations further. On March 2, 2007, the NRC issued the Proposed Director's Decision under 10 C.F.R. 2.206, which Petitioners therein responded to, agreeing with the Director's proposed conclusion that the SHNPP was out of compliance with the fire regulations, but objecting to the Director's proposed conclusion that the NRC staff was adequately enforcing these regulations.⁹

In the Petition Review Board meeting of November 13, 2006, NRC's Nuclear Reactor Regulation Fire Protection Branch Chief, Sunil Weerakkody, stated that the Harris

⁷ It is important to note that Attachment 1 to this report, the Shearon Harris Fire Protection Abridged Chronology, documents the lack of compliance with fire safety rules and CPL's continuing noncompliance in the face of NRC actions, notices and guidance documents. These documents are incorporated herein by reference.

⁸ The 2.206 Petition and additional supporting documents, the Proposed Director's Decision are in the ADAMS system at the following: Petition, Accession Nos. ML06240550 and ML062830089; the transcript, ML063210488; supplements, ML062980107, ML063200168, ML063450098, and ML070510497; the Proposed Director's Decision, ML070780537; and Petitioners' Response, ML071230046. These documents are incorporated herein by reference in support of the present Petition and Hearing Request.

⁹ To date, the Director has not made his final decision on the 2.206 Petition but is expected to do so by the hearing on the licensing application.

unit is not in compliance with federal regulations for protecting post-fire safe shutdown systems that would be relied upon for as part of its Defense in Depth mitigation strategy for post-fire safe shutdown.¹⁰ From the Official Transcript of Proceedings at page 49:

This is Sunil Weerakkody. For Sharon [sic] Harris and all other plants that are transitioning to 805 [National Fire Protection Association or NFPA 805] we have a revised inspection procedure. And at a high level what I can say is, we have told inspectors to focus on the fire inspection infrastructure, like for example when inspectors go, you have the fire brigade, you have the suppression systems you know, and if the plant is transitioning to 805, in areas where we have basically said, our position is that they are not in compliance, we enable them to transition. In other words, there is no reason to go and reinspect things like operator manual actions where we believe that the licensee is not in compliance.

Not only is the SHNPP out of compliance, the NRC does not inspect the OMAs used at the plant because NRC staff knows that the OMAs are not in compliance. Just as there can be no presumption of compliance for noncomplying structures, systems and components, the Petitioners maintain that absolutely no assurance can be credited for alleged verifications of areas and programs that are deliberately not examined. The showing of noncompliance and lack of further inspection clearly rebuts any presumption that the plant is operating safely.

The concern about the lack of compliance with the fire regulations has lead Congressman David Price (D-NC) to request a study by the Government Accountability Office for an investigation of the SHNPP.¹¹ The issues to be examined are:

(1) the frequency and causes of recent fire emergencies at U.S. nuclear

¹⁰ ADAMS, Accession No. ML063210488.

¹¹ Letter of Congressman Price to Mr. Walker, Comptroller General of the U.S., May 11, 2007. ATTACHMENT 3. Petitioners herein project that the results of this study will be available at a hearing on the relicensing of the SHNPP.

power plants; (2) the adequacy and acceptable duration of interim compensatory measures; and (3) whether the transition to risk-based fire safety standards has led to an over-reliance on such measures during the transition period.

As they relate to the SHNPP license extension, these are the same issues that are at the heart of this contention.

CPL has relied on inoperable and inadequate fire safety systems for at least fifteen years at the SHNPP and has indicated that it may resolve some of the fire protection problems by 2015 or later. People living around the SHNPP remain subject to severe and undue risks from these noncompliant practices. No assurance can be given by CPL or the NRC that public health and safety will be protected. Therefore, as a matter of law, the decision on the relicensing of the SHNPP should be denied until the plant is fully in compliance with the fire regulations.

ENVIRONMENTAL CONTENTION EC-1 (Aviation attacks)

Contention – The Environmental Report for the SHNPP license extension fails to satisfy NEPA because it does not address the environmental impacts of a successful attack by the deliberate and malicious crash of a fuel laden and/or explosive laden aircraft and the severe accident consequences of the aircraft's impact and penetration on the facility. It is unreasonable for the NRC to dismiss the possibility of an aviation attack on the SHNPP in light of the studies by the NRC that this is a real possibility that could have devastating results.

Support for contention – The EIS for the original SHNPP license did not evaluate the consequences of an aviation attack and the resulting impact, penetration, explosion

and fire. The potential for accidents caused by deliberate malicious actions and the resulting equipment failures is not only reasonably foreseeable, but is likely enough to qualify as a "design-basis accident," i.e., an accident that must be designed against under NRC safety regulations.

In its 1982 analysis, the Argonne National Laboratory submitted its "Evaluation of Aircraft Hazards Analysis for Nuclear Power Plants," NUREG-2859, to the NRC.¹² This study focused on accidental aircraft crashes but the same threat analysis can and should be made for the impacts of deliberate malicious actions at the SHNPP. NUREG 2859 at page 5 identifies that:

The major threats associated with an aircraft crash are the impact loads resulting from the collision of the aircraft with power plant structures and components and the thermal and/or overpressure effects which can arise due to the ignition of the fuel carried by the aircraft.

Page 11 continues that:

It appears that for all U.S. plants currently under construction it has been found that it is not necessary to require containments designed to take the impact of a large commercial jet aircraft. This practice is contrasted by the experience in the Federal Republic of Germany where it has been found necessary to design essentially all nuclear containments to withstand the crash of certain types of military and commercial aircraft.

It is important to note that the Construction Permit for the SHNPP was issued January 27, 1978, so that over the last approximately 30 years, both CPL and the NRC have known about this inadequacy in design. NUREG-2859 continues on page 42 that:

¹² After being made public for almost two decades, NUREG-2859 was apparently removed from the public ADAMS system and elsewhere on the NRC website after the terrorist attacks of September 11, 2001, because of the sensitive nature of some of the specifics described in it. At a hearing on the relicensing Petitioners may introduce the entire document into the record because it remains relevant to aircraft attacks, both accidents and deliberate malicious actions.

Niyogi et al ... numerically weight the effective areas of their identified susceptible targets by assumed conditional release probabilities as follows: a value of 1.0 for the containment, fuel storage building, and control room; 0.1 for the primary auxiliary building and equipment vault; 0.01 for the diesel generator building, cooling tower, and waste-processing building, refueling water storage tank, circulating water pump house, and service water pump house; and 0.0 for the turbine building.

NUREG-2859 continues on p. 50 with the following

The results of an aircraft crash on a nuclear power plant are not limited to the effects of the impact of heavy parts (such as a jet engine) on civil engineering structures. Numerous systems are required in order to provide reactor shutdown and adequate long-term cooling of the core. Although many of these safety-related systems are well protected within hardened structures (containment system, auxiliary building), some are not.

As described above, the various structures, systems and components of the plant cannot be relied upon if the plant is not in compliance with safety-related rules, such as the 10 C.F.R. 50, Appendix R, Section III.G.2 regulations for fire protection, that leave all of the post-fire safe shutdown systems vulnerable.

Given accidents at various nuclear plants, such as San Onofre, Rancho Seco, and Crystal River facilities, it is clear that electrical failures lead to the inability for safe shutdown. NUREG-2859 continues at Page 51 through 53:

A crash of an aircraft on a switchyard would very likely eliminate the plant's offsite power. Furthermore, although there exist protective design features against propagation of electrical failures from the switchyard into the rest of the plant, the probability for such electrical failure propagation is not zero: Past experience has shown that the electrical failures may propagate unexpectedly from nonsafety systems to safety systems . . .

An aircraft crash on a PWR nuclear power plant resulting in rapid depressurization of the plant's secondary cooling system, combined with total loss of electrical power (impact on the turbine building and the switchyard), would result in an accident sequence in which the fission power in the core would remain at some considerable level: Initially, upon dropping of the control rods, the fission power would decrease; however, the rapid depressurization of the secondary system would result in a rapid cooldown

of the primary system, thus resulting in recriticality; since the primary system would remain pressurized (preventing discharge of the accumulators with borated water), and since the safety injection system (SIS) would not be functioning due to loss of electric power, there would be no way to shut down the reactor. Furthermore, since the loss of electrical power and the damage to the secondary system would preclude any cooling other than short-term boil-off of the primary coolant inventory, the core would most probably be headed for serious damage if not total meltdown. Core meltdown, without the availability of electric power, would probably result in containment overpressurization and release of radioactive materials to the environment far in excess of 10 C.F.R. 100 guidelines. Note that the above sequence of events does not depend in any way on the breach of a hardened structure due to the impact of a heavy segment of the aircraft at some optimum (i.e., most damaging) angle, which seems up to now to have had the greatest attention in the evaluation of nuclear power reactor safety with respect to aircraft crashes . . .

An aircraft crash affecting the ultimate heat sink (cooling tower, water intakes, etc.) would leave core cooling dependent on the feed-and-bleed cooling mode, provided a sufficient water supply and electrical power remain available.

Compared to other causes of accidents, aviation attacks are some of the most severe. NUREG-2859 states on page 70 that "[o]n the other hand, the effect due to the impact of the Boeing 707-320 at 103 m/s is clearly more severe than that due to an earthquake." On page 79, NUREG-2859 concludes with:

Major criticisms that may be made of typical aircraft hazards analyses are the lack of clear and supported statements on many key underlying assumptions and comprehensive treatments of the overall hazard. Thus, both the open literature and documentation concerning specific power plants abound with studies of the impact phenomena of aircraft or aircraft missiles on substantial concrete structures. These analyses are pursued to the virtual exclusion of other aircraft crash scenarios. . . . It is possible to envision a chain of events that involves nonhardened plant systems, e.g., a switchyard-turbine hall, which could lead to severe consequences.

These same concerns about the inadequacy of nuclear plants to withstand aircraft accidents and attacks were raised in at least two more recent studies. In March 2000, the NRC requested that the Turkey Point nuclear plant respond to agency questions about the

expanded aircraft operations at the nearby Homestead Air Force Base. In the response, the owner of the plant informed that a number of postulated aircraft impacts would lead to fuel damage, i.e., conditional core damage probability, and core failure.¹³ In October 2000, the NRC released a study of the spent fuel pool hazard at nuclear power plants undergoing decommissioning.¹⁴ That study determined that the impacts of an aircraft attack were possible, and the results devastating.

In response to a rulemaking petition to amend 10 C.F.R. § 73.1 and to fulfill its Congressional mandate under Section 651 of the Energy Policy Act of 2005, the NRC initiated and completed a review of its Design Basis Threats.¹⁵ On January 29, 2007, the NRC voted to revise its security regulations and adopt the modifications. The purpose of the rulemaking was to see if the nuclear plants were safe from attacks because “the need for enhancement was recognized due to the escalation of domestic threat levels.” The NRC did not address active protection measures against aviation attacks as it considered the “passive measures already in place . . . are appropriate for protecting nuclear facilities from an aerial attack.”¹⁶

A key premise in the modified security rules is the NRC’s belief that the nuclear

¹³ Letter from R.J. Hovey, Vice President – Turkey Point Plant to NRC, “Response to Request for information Regarding the Potential Risk of the Proposed Civil and Government Aircraft Operation at Homestead Air Force Base on the Turkey Point Plant,” May 2, 2000.

¹⁴ NRC, “Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants,” October 2000.

¹⁵ “Final Rulemaking to Revise 10 C.F.R. 73.1, Design Basis Threat (DBT) Requirements,” SECY-06-0219, October 30, 2006.

¹⁶ *Ibid.*, page 4.

plants need to rely on “passive measures” in the regulatory requirements to mitigate fires and explosions. As part of the release of this rulemaking, NRC Chairman Dale Klein stated that

Nuclear power plants are inherently robust structures that our studies show provide adequate protection in a hypothetical attack by an airplane. The NRC has also taken actions that require nuclear power plant operators to be able to manage large fires or explosions - no matter what caused them.

The assertions in the Proposed Director's Decision and by Chairman Klein are contrary to the findings in a long series of studies on security issues that have been undertaken by the NRC beginning with the Argonne National Laboratory study in 1982, NUREG-2859, that show that the plants cannot withstand an aerial attack.¹⁷ Nothing has been demonstrated by CPL or the NRC that the SHNPP is “inherently robust” enough to withstand an aviation attack.

10 C.F.R. 51.53(c)(ii)(L) requires that the license renewal applicant consider alternatives to mitigate severe accidents if the staff has not previously evaluated SAMAs for the applicant's plant in an EIS or related supplement or in an environmental assessment. The purpose of this consideration is to ensure that plant changes, i.e., structural fortifications, hardening of vital safe shutdown systems and hardware, procedures and training, with the potential for improving severe-accident safety performance are identified and evaluated. SAMAs for aircraft impact have not been previously considered for the SHNPP. The ER in CPL's application for license renewal in Appendix E does not address any such alternatives. The ER also fails to satisfy 10 C.F.R.

¹⁷ Union of Concerned Scientists Issue Brief: THE NRC'S REVISED SECURITY REGULATIONS, February 1, 2007; www.ucsusa.org/assets/documents/clean_energy/20070201-ucs-aircraft-fire-hazards.pdf. Adopted herein by reference.

§ 51.53(c)(3)(iii) because it does not consider reasonable alternatives for avoiding or reducing the environmental impacts of this class of accidents. Therefore, the application is insufficient.

Therefore, the application for the SHNPP relicensing cannot be approved without a full study of the threats from aviation attacks and implementation of the SAMAs required to prevent or mitigate the impacts from those attacks.

ENVIRONMENTAL CONTENTION EC-2 (Aviation attacks and fires)

Contention – The Environmental Report for the SHNPP license extension fails to satisfy NEPA because it does not address a significant fire involving noncompliant fire protection features for both primary and redundant safe shutdown electrical circuits caused by a deliberate malicious action using a fuel-laden and/or explosive-laden aircraft on the facility.

Support for Contention – The SHNPP is required to comply with all existing NRC regulations associated with the Current Licensing Basis as well as those additional activities as a result of a license renewal. Such compliance includes physically protecting the power, instrumentation and control circuitry from the control room to safe shutdown systems for the reactor so that no single fire can result in loss of cable functionality for post-fire safe shutdown. Alternately, the SHNPP can provide an analysis for NRC review and approval for post-fire safe shutdown through application of the exemption process.

As described in Contention EC-1 above, the potential consequences of a successful aviation attack on the SHNPP have not been evaluated for fire and explosion resulting from a deliberate aircraft strike. As described in Contention TC-1 above, the SHNPP has been

in violation of NRC regulations since at least 1992 and is not currently in regulatory compliance with the requirements for post-fire protection of reactor safe shutdown systems. CPL has not demonstrated that it can or will bring post-fire reactor safe shutdown systems at the SHNPP into regulatory compliance in a timely fashion.

As described in Contention TC-1, the discovery of inoperable Thermo-Lag, HEMYC and MT fire barrier systems throughout the SHNPP post-fire safe shutdown system puts the plant at risk of not being able to safely shut down and maintain the reactor if needed. In its 1982 analysis, the Argonne National Laboratory submitted its "Evaluation of Aircraft Hazards Analysis for Nuclear Power Plants," NUREG-2859, to the NRC.¹⁸ NUREG-2859 states on pages 76 - 77 that "[i]f only one percent of the fuel, say 500 lb. for the FB-111 fighter plane, is involved in such an event, the blast environment will be equivalent to the detonation of approximately 1000 lb. of TNT." NUREG-2859 continues on page 78 that

Based on the review of past licensing experience, it appears that fire and explosion hazards have been treated with less care than the direct aircraft impact and the resulting structural response. Therefore, the claim that these fire/explosion effects do not represent a threat to nuclear power plant facilities has not been clearly demonstrated.

More recent studies, discussed in Contention EC-1 above, point out that an aviation attack is possible and potentially devastating.

The present License Renewal Application at Section 2.3.3.31, in the technical information section of the system description of the "Fire Protection Systems," describes the SHNPP fire protection system as encompassing a number of systems including "[c]ertain types of fire barriers, i.e., Fire Doors and penetrations for pipes, electrical

¹⁸ Cited at length in Contention EC-1 above; included herein by reference.

cable/conduits, and HVAC ducts."¹⁹ It should be noted that the "certain types of fire barriers" described in Section 2.3.3.31 include extensive applications of inoperable fire barrier systems consisting of Thermo-Lag, HEMYC and MT. These fire barrier materials were originally designated for the fire protection of electrical cables and conduits vital to the post-fire safe shutdown systems. However, subsequent fire tests have identified that these fire barrier systems do not provide the level of required fire protection on standardized time and temperature industry fire tests.

The SHNPP has not been in compliance with the established fire protection regulations since at least 1992 when NRC declared Thermo-Lag fire barriers "inoperable" through a series of Bulletins, Generic Letters and Information Notices.²⁰ As described in Contention T-1 above, HEMYC/MT was similarly relied upon as a fire barrier at the SHNPP, and it too has been shown to be ineffective. Subsequent to the discovery of noncompliance through applications of Thermo-Lag, the SHNPP was discovered to be in noncompliance because of substantial reliance on failed HEMYC and MT fire barriers. Again this is described in more detail in Contentions TC-1 and EC-1 above.

CPL's response to the continuing noncompliance and violations has been to initiate OMA's as substitutes for the ineffective fire barriers, but instead of investigating the problem and proposing workable solutions and then allowing the NRC staff to analyze and agree to

¹⁹ Shearon Harris License Renewal Application, ML0633502700, Section 2.3.3.31, page 2.3-115.

²⁰ <http://www.nrc.gov/reactors/operating/ops-experience/fire-protection/fire-barriers.html>. The specific notices directly relevant to the SHNPP are outlined in the 2.206 Petition cited in Contention TC-1 above.

the corrective action programs, noncomplying OMAs are still being used.²¹ The compensatory actions, such as roving fire patrols and OMAs, are not intended for long-term compliance and cannot be used in lieu of the required compliance with the fire regulations. Compensatory actions that include unapproved OMAs that have not been analyzed for safety or authorized through the NRC exemption process as feasible and reliable do not constitute an indefinitely acceptable substitute.

As of today's date, CPL does not intend to have its study of the unsafe fire conditions completed for several years and compliance with the rules to bring the station's post-fire safe shutdown system into compliance appears to be put off until 2015. As regarding fire caused by aviation attacks, this delay is unreasonable. After its rulemaking to the Design Basis Threats, the NRC recognized that the plants could only be protected by passive measures.²² As discussed in Contention EC-1 above, the key to the modified security rules is that the nuclear plants need to rely on "passive measures" and are required to follow the regulations to mitigate fires and explosions. In this matter, the SHNPP is not in compliance with the fire regulations and cannot show that the present policies can manage small fires, let alone the potentially large fires cause by aircraft attacks.

As described in Contention EC-1 above, significant fires caused by deliberate malicious acts are credible. The aviation attacks of September 11, 2001 successfully destroyed both towers of the World Trade Center as the result of structural damage from

²¹ See also NRC Regulatory Issue Summary 2006-10, "Regulatory Expectations with Appendix R Paragraph III.G.2 Operator Manual Actions," <http://www.nrc.gov/reactors/operating/ops-experience/fire-protection/manual-actions.html>

²² Reference in footnote 15.

fire induced by deliberately crashing aircraft into the structures. The structures protecting the electric circuits for the control operation of the safe shutdown systems at SHNPP are similarly vulnerable. Control room operation of safe shutdown systems for the reactor in the event of explosion and fire is the preferred method and is prioritized by NRC regulations.

The fire protection regulations, even if met in full and nonexempted, are intended to deal with a single fire in a single room or area. No other equipment damage is presumed to occur, other than the components within that room or area damaged by the single fire itself. The fire protection regulations are not designed for and are not adequate to deal with fires in multiple rooms and areas that can easily result from an aircraft crash. The noncompliance and violations of the fire protection regulations at the SHNPP would be compounded by deliberate malicious actions. OMAs have not been proven to adequately address one fire, let alone multiple fires in the face of a real threat.

Similarly to Contention EC-1 above, 10 C.F.R. 51.53(c)(ii)(L) requires that the license renewal applicant consider alternatives to mitigate severe accidents if the staff has not previously evaluated SAMAs for the applicant's plant in an EIS or related supplement or in an environmental assessment. The purpose of this consideration is to ensure that plant changes, i.e., structural fortifications, hardening of vital safe shutdown systems and hardware, procedures and training, with the potential for improving severe-accident safety performance are identified and evaluated. SAMAs for fires caused by aircraft impact have not been previously considered for the SHNPP. Appendix E of the ER in CPL's application for license renewal does not address any such alternatives. The ER also fails to satisfy 10 C.F.R. § 51.53(c)(3)(iii) because it does not consider reasonable alternatives for avoiding or reducing the environmental impacts of this class of accidents.

Therefore, the application for the SHNPP relicensing cannot be approved without a full study of the risks associated with fires and explosions caused by aviation attacks and implementation of the SAMAs required to prevent or mitigate the impacts.

ENVIRONMENTAL CONTENTION EC-3 (Evacuation plan)

Contention – Due to highly significant and unforeseen changes in circumstances, through dramatically increased populations and changing land uses, the evacuation plan for the SHNPP does not adequately protect the health and safety of the residents, students and workers around the plant.

Support for contention – Before a nuclear 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.”²³ The SHNPP evacuation plan was licensed in 1987 and as part of the license to operate, the NRC found that the 1987 Plan provided “reasonable assurances” that it would protect public health and safety. It is apparent that this assurance cannot be relied upon for the entire 60-year period until the proposed relicensing period would expire. The opportunity to reassess the adequacy of the evacuation plan should be in the present ER and EIS as part of the relicensing review, and should focus on the significant changes with the plant and its environment, including the human environment.

As discussed in the section on the Statutory and Regulatory Framework above, the presumption that the present rules protect public health and safety, i.e., provide reasonable

²³ Reference in footnote 1.

assurance, can be rebutted with the presentation of significant new information. At the SHNPP, there have been significant changes in circumstances surrounding the plant that impact the adequacy of the evacuation plan.

As presented in the affidavit of Steven Wing, Ph.D., Associate Professor of Epidemiology, at the University of North Carolina at Chapel Hill School of Public Health, there have been significant population increases surrounding SHNPP and within the 10-mile EPZ. ATTACHMENT 4. These increases have occurred from 1987 when the plant was licensed to the current date, and projections of population increases from 2007 to 2027 when the present license expires, and projections of population increases from 2027 to 2047 for the early relicensing period. Similarly, the population within the 50-mile area around the plant has also increased dramatically and is projected to continue to increase significantly. The original evacuation plan did not foresee the magnitude of these increases and is inadequate today, let alone in the future, and certainly cannot be relied upon until 2047, the end of the licensing period.

Dr. Wing also is concerned that there are numbers of children, women of childbearing age, senior citizens and nursing home residents who may have special difficulties in the event of an evacuation and may be more susceptible to radiation emissions and other hazards that could occur in connection with evacuation and relocation. He is further concerned that other susceptible populations, such as homebound persons and number of children attending schools within the 10-mile, 20-mile and 50- mile radii around the plant are not adequately covered in the evacuation plan. He concludes that "in my opinion, the evacuation plan for the Shearon Harris nuclear plant must provide care for all persons around the plant, and make special provisions for the susceptible populations.

The 1987 evacuation plan needs to be close reexamined to meet the current and projected population increases.”

Other relevant changes in circumstances surrounding the SHNPP are the increased vehicle use on the highways in the area to the point that the major thoroughfares used as evacuation routes may be impassible at most times of day. This increase in vehicle use reflects the significant increases in population as well as changes in land uses and a trend for increased use of automobiles, tempered by rising fuel costs. The forecasts that the vehicle use on the state-maintained highways that will be used for evacuation routes within the 10-mile EPZ and the surrounding 50-mile area may be completely useless by 2027 without extensive new spending on highway expansions and improvements.²⁴

The local governments that have jurisdiction in the 10-mile and 50-mile EPZs have criticized the current emergency planning efforts because they do not have adequate planning, resources, training and staff to safely evacuate people within the EPZ during an emergency. The local governments that are expected to provide shelter and health care to the evacuees are not part of the emergency planning process and do not have adequate planning, resources, training and staff for these purposes. The Orange County Board of Commissioners, in its October 3, 2006 resolution, concluded that “there is no coordinated emergency management and evacuation planning for the portion of the ingestion pathway beyond the area defined by the ten-mile radius around Shearon Harris.”²⁵ Other local

²⁴ NC Department of Transportation, NC Statewide Transportation Plan, September 2004; available at <http://www.ncdot.org/doh/preconstruct/tpb/statewideplan/pdf/NCStatewideTransportationPlan.pdf>.

²⁵ Orange County Board of Commissioners, “A Resolution Calling for Coordinated Emergency Management and Evacuation Planning Within the 60-mile

governments have express the same concerns.

The inability of local governments to meet the requirements for prompt and effective evacuation during an emergency was recently highlighted by events in North Carolina. The response by the company and State and local officials to an accidental fire at a hazardous waste storage facility in Apex, North Carolina, part of which is within the EPZ, shows the flaws in evacuating nearby residents, even in potentially critical situations.²⁶ The local evacuation plan was woefully ineffective and it was apparent that the government officials and the members of the public had no knowledge of the evacuation plans.

The application for the SHNPP relicensing cannot be approved without a full study of the current and forecasted populations, including susceptible populations, and the ability of the evacuation plan to provide "reasonable assurance" that all of these people will be provided adequate care in case of an accident.

BACKFIT REQUIREMENT

It is evident, in light of the above and in the projected evidence to be given at the hearing, that a backfit is needed for all applications of inoperable fire barrier systems including the rerouting of electrical cables out of fire zones as identified in NUREG-0800 BTP 9.5.1 and 10 C.F.R. 50 Appendix R Paragraph III.G.2 and upgrading inoperable fire

Radius Ingestion Pathway for Potential Discharge of Airborne Nuclear Waste Material from the Shearon Harris Nuclear Power Plant," October 3, 2006. ATTACHMENT 5.

²⁶ The official study of the fire and evacuation by the State of North Carolina has not been completed. The newspaper articles attached to this Petition and Request for Hearing point to evidence that will become available in the near future. ATTACHMENT 6. Petitioners project that the official report will be introduced at a hearing on the merits.

barrier systems with qualified, maintainable and inspectable fire barrier systems to assure that post-fire safe shutdown systems will be maintained to be free of fire damage.

It is also evident, in light of the above and in the evidence projected to be given at the hearing, that backfits are needed to prevent aviation attacks and the fires and explosions caused by those attacks or at least, to minimize the risk to public health and safety from these deliberate malicious actions.

CONCLUSION

For these reasons, the Commission should allow the Petitioners to intervene in this proceeding, grant a hearing regarding the issues raised in the contentions above and require backfits for fire protection and aviation attacks.

Respectfully submitted this the 18th day of May, 2007.



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LIST OF ATTACHMENTS

1. Declarations for NC WARN – Worth Glover Jr., Elbert Green, Tony A. Hackney, Judy Hogan, Derry J. Smith Jr., Robert L. Smith. [NOTE: notarized original of these declarations are submitted in the written filing.]
2. Declaration for NIRS – Beverly Ann D'Aquanni. [NOTE: notarized original of this declaration is submitted in the written filing.]
3. Letter of Congressman Price to Mr. Walker, Comptroller General of the U.S., May 11, 2007.
4. Affidavit of Steven Wing, with attached information sheet, "Population Living Near the Harris Nuclear Plant, North Carolina," and Wing curriculum vitae. [NOTE: notarized original of this affidavit is submitted in the written filing.]
5. Orange County Board of Commissioners, "A Resolution Calling for Coordinated Emergency Management and Evacuation Planning Within the 60-mile Radius Ingestion Pathway for Potential Discharge of Airborne Nuclear Waste Material from the Shearon Harris Nuclear Power Plant," October 3, 2006.
6. Apex chemical fire, October 5, 2006 – newspaper reports.

Note that this list does not include the documents that were adopted by reference or directly cited in this Petition and Request for Hearing.

U.S. NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of)
)
Carolina Power & Light Company) Docket No. 50-400
)
(Shearon Harris Nuclear Power Plant, Unit 1))
_____)

DECLARATION OF WORTH GLOVER JR.

1. My name is Worth Glover Jr.
2. I live at 71 Seymour Avenue, Moncure, North Carolina 27559. I have lived at that address for two years. It is approximately 7 miles from Shearon Harris.
3. I am 50 years old and work as an outside laborer..
4. My wife, my three children (ages 17, 20 and 24) and my grandson (age 5) live there with me. My 17-year old daughter has cerebral palsy and is in a wheel chair; she goes to school in Pittsboro.
5. I am concerned that my family will not have enough time to get out of the way if there is an accident at Shearon Harris. I am concerned that my daughter will not be safely evacuated.
6. I am a member of NC WARN.

x Worth Glover Jr

Acknowledged before me this the 16th of May, 2007.

John Munkle
Notary Public
my commission expires: July 22, 2007

U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

In the Matter of)
)
Carolina Power & Light Company) Docket No. 50-400
)
(Shearon Harris Nuclear Power Plant, Unit 1))
_____)

DECLARATION OF ELBERT GREEN

1. My name is Elbert Green.
2. I live at 7508 Moncure-Pittsboro Road, Moncure, North Carolina 27559. I have lived at that address more than 42 years. It is approximately 8 miles from Shearon Harris.
3. I am 62 years old and retired.
4. My wife Claudia Green lives there with me.
5. I am concerned that my wife and I will not have enough time to get out of the way if there is an accident at Shearon Harris.
6. I am a member of NC WARN.

x Elbert Green

Acknowledged before me this the 16th day of May, 2007.

John Thumli
Notary Public
my commission expires: July 22, 2007

U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

In the Matter of)
)
Carolina Power & Light Company) Docket No. 50-400
)
(Shearon Harris Nuclear Power Plant, Unit 1))
_____)

DECLARATION OF TONY A. HACKNEY

1. My name is Tony A. Hackney.
2. I live at 7648 Moncure-Pittsboro Road, Moncure, North Carolina 27559. I have lived at that address my entire life. It is approximately 8 miles from Shearon Harris.
3. I am 54 years old and am a double amputee.
4. I am concerned about the evacuation plan because it will take me time to get ready to leave. I do not have an emergency radio.
5. I am a member of NC WARN.

x Tony Hackney

Acknowledged before me this the 16th day of May, 2007.

John Munkle
Notary Public
my commission expires: July 22, 2007

U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

In the Matter of)
)
Carolina Power & Light Company) Docket No. 50-400
)
(Shearon Harris Nuclear Power Plant, Unit 1))
_____)

DECLARATION OF JUDY HOGAN

1. My name is Judy Hogan.
2. I live at 7598 Moncure-Pittsboro Road, Moncure, North Carolina 27559. I have lived at that address since December 1998. It is approximately 8 miles from Shearon Harris.
3. I am 70 years old. I am a writer and editor.
4. I keep chickens at my residence.
5. I am hard of hearing and should be on a list to receive the automated phone call in case of an accident at Shearon Harris.
6. I am concerned about Shearon Harris because of fire safety and airplanes flying near the plant. The evacuation plans are not good and the people in the community do not know them. We cannot hear the warning sirens in our house. The evacuation plan has never been practiced. If an accident happens, I expected to be stuck in traffic and die.
7. I have been a member of NC WARN since the summer of 1998.

x Judy Hogan

Acknowledged before me this the 16th day of May, 2007.

John W. Munkle
Notary Public

my commission expires: July 22, 2007

U.S. NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of)
)
Carolina Power & Light Company) Docket No. 50-400
)
(Shearon Harris Nuclear Power Plant, Unit 1))
_____)

DECLARATION OF DERRY J. SMITH, JR.

1. My name is Derry J. Smith Jr..
2. I live at 375 Moncure Loop Road, Moncure, North Carolina 27559. I have lived in the Moncure area all of my life. It is approximately 7 miles from Shearon Harris.
3. I am 61 years old and work in landscaping.
4. My wife Cathy lives there with me.
5. I am concerned that my wife and I will not have enough time to get out of the way if there is an accident at Shearon Harris.
6. I am a member of NC WARN.

x Derry J. Smith Jr.

Acknowledged before me this the 16th day of May, 2007.

John Thumbe
Notary Public

my commission expires: July 22, 2007

U.S. NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of)
)
Carolina Power & Light Company) Docket No. 50-400
)
(Shearon Harris Nuclear Power Plant, Unit 1))
_____)

DECLARATION OF ROBERT L. SMITH

1. My name is Robert L. Smith.
2. I live at 7586 Moncure-Pittsboro Road, Moncure, North Carolina 27559. I have lived at that address more than 11 years. It is approximately 8 miles from Shearon Harris.
3. I am 53 years old and work at a truck parts store.
4. My wife Emma Lee Smith lives there with me. She is disabled with a bad back.
5. I am concerned that my wife and I will not have enough time to get out of the way if there is an accident at Shearon Harris.
6. I am a member of NC WARN.

x Robert L. Smith

Acknowledged before me this the 16th day of May, 2007.

John Thumbe
Notary Public
my commission expires: July 22, 2007

U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

In the Matter of)
)
Carolina Power & Light Company) Docket No. 50-400
)
(Shearon Harris Nuclear Power Plant, Unit 1))
_____)

DECLARATION OF BEVERLY ANN D'AQUINNI

1. My name is Beverly Ann D'Aquinni.
2. I live at 856 Millcroft, Pittsboro, North Carolina 27312. I have lived at that address more than 2 ½ years. It is less than 15 miles from Shearon Harris.
3. I am 69 years old. I am a retired school teacher and real estate broker.
4. I am concerned that I will not be able to find out when an accident happens at Shearon Harris. If there is an accident, the only safe thing to do will be to get away as soon as possible.
5. I am a member of NIRS.

x Beverly Ann D'Aquinni

Acknowledged before me this the 17th day of May, 2007.

John Thunberg

Notary Public
my commission expires: July 22, 2007

DAVID PRICE
4TH DISTRICT
NORTH CAROLINA

COMMITTEE ON APPROPRIATIONS
CHAIR, HOMELAND SECURITY
COMMERCE, JUSTICE AND SCIENCE
TRANSPORTATION, HOUSING AND
URBAN DEVELOPMENT



CONGRESS OF THE UNITED STATES
HOUSE OF REPRESENTATIVES
WASHINGTON, DC 20515

May 11, 2007

ATTACHMENT 3

2162 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-1784

5400 TRINITY ROAD, SUITE 205
RALEIGH, NC 27607-3815
(919) 859-5999

88 VILCOM CENTER, SUITE 140
CHAPEL HILL, NC 27514-1660
(919) 967-7924

N.C. MUTUAL PLAZA
411 WEST CHAPEL HILL STREET
DURHAM, NC 27701-3642
(919) 688-3004

www.price.house.gov

Mr. David M. Walker
Comptroller General of the United States
441 G Street N.W.
Washington, DC 20548

Dear Mr. Walker,

I am writing to request that the Government Accountability Office (GAO) conduct a review of the enforcement of fire safety standards at nuclear power plants.

Stakeholder groups, including a number in my district, have expressed concerns about the adequacy of Nuclear Regulatory Commission (NRC) policies for preventing and mitigating cable and conduit fires and facilitating the safe shutdown of a plant in the case of a fire emergency. In particular, these groups have questioned the long term use of interim compensatory measures to meet fire safety requirements. The situation is complicated by the fact that the Agency is working with several nuclear power plants to transition to new risk-based fire safety standards.

To address these concerns, I am requesting that GAO conduct a review to examine: (1) the frequency and causes of recent fire emergencies at U.S. nuclear power plants; (2) the adequacy and acceptable duration of interim compensatory measures; and (3) whether the transition to risk-based fire safety standards has led to an over-reliance on such measures during the transition period.

Thank you for your time and attention to this request.

Sincerely,

A handwritten signature in black ink that reads "David Price".

David Price
Member of Congress

U.S. NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

_____)	
In the Matter of)	
)	
Carolina Power & Light Company)	Docket No. 50-400
)	
(Shearon Harris Nuclear Power Plant, Unit 1))	
_____)	

AFFIDAVIT OF STEVEN WING

I, Steven Wing, verify that the following is true to the best of my knowledge, except as to those matters stated on information and belief, and as to those matters, I believe them to be true:

1. My name is Steven Wing.
2. I am an Associate Professor of Epidemiology at the University of North Carolina at Chapel School of Public Health. I have held that position since 1995.
3. My business address is 2101F McGavran-Greenberg Hall, UNC-CH, Chapel Hill, NC 27599-7435.
4. I received my Ph.D. in Epidemiology from UNC-CH in 1983. I received an M.A. in Sociology from Duke University in 1980, and a B.A. in Psychology from Vassar College in 1975.
5. I have attached my curriculum vitae to this affidavit.
6. Among other topics, I have examined cancer incidence near the Three Mile Island nuclear plant and the cancer mortality of nuclear workers in relation to their radiation doses.
7. I studied population data for the area surrounding the Shearon Harris nuclear plant in June 2002 using the US Census Bureau, Census 2000 Summary File 1. I have attached the information sheet I compiled.
8. In preparing this affidavit, I reexamined those data and made projections of the future population growth within the 10-mile emergency planning zone (EPZ). The Raleigh NEWS &

OBSERVER reported that in 1987 the population of the EPZ was approximately 15,000; this had increased to approximately 60,000 by 2000. If the population in the EPZ continues to grow at the average annual rate experienced between 1987 and 2000, it will reach almost 155,000 in 2027, and more than 220,000 in 2047. Given recent increases in population growth rates in central North Carolina, using growth rates based on changes between 1987 and 2000 is conservative.

9. The areas outside the 10-mile EPZ have shown similar growth in population. The Triangle area of North Carolina has shown rapid growth in the past 20 years and is expected to continue growth.

10. As shown in the 2002 analysis, there were more than five thousand young children and about four thousand persons aged 65 and over living within 10 miles of the Harris plant. The survey showed significant numbers of persons in nursing homes and correctional facilities within a 20-mile radius. It is likely that the percentage of persons aged 65 and over will increase in the future.

11. Numbers of children, women of childbearing age, senior citizens and nursing home residents may have special difficulties in the event of an evacuation and may be more susceptible to radiation emissions and other hazards that could occur in connection with evacuation and re-location. Other susceptible populations, such as homebound persons and number of children attending schools within the 10, 20 and 50 mile radius were not available from the Census.

12. In my opinion, the evacuation plan for the Shearon Harris nuclear plant must provide care for all persons around the plant, and make special provisions for the susceptible populations. The 1987 evacuation plan needs to be closely reexamined to meet the current and projected population increases.

x Steven Wing

Acknowledged before me this the 18^m day of May, 2007.

John T. Mumber
Notary Public

my commission expires: July 22, 2007

CURRICULUM VITAE

STEVEN BENNETT WING

ADDRESS

Department of Epidemiology, School of Public Health
CB# 7400, 2101F McGavran-Greenberg Hall
University of North Carolina
Chapel Hill, NC 27599-7400
phone: (919) 966-7416
fax: (919) 966-2089
e-mail: steve_wing@unc.edu

EDUCATION

University of North Carolina Chapel Hill, NC	Ph.D. in Epidemiology 1983
Duke University Durham, NC	M.A. in Sociology 1980
Vassar College Poughkeepsie, NY	B.A. in Psychology 1975

PROFESSIONAL EXPERIENCE

1995- Associate Professor, Department of Epidemiology, University of North Carolina, Chapel Hill.

1993 Visiting Professor, Department of Preventive Medicine, Federal University of Bahia, Salvador, Brazil.

1991-95 Assistant Professor, Department of Epidemiology, University of North Carolina, Chapel Hill.

1990 Visiting Professor, Faculty of Theoretical Medicine, University of Ulm, Germany.

1985-91 Research Assistant Professor, Department of Epidemiology, University of North Carolina.

1983-85 Post-doctoral Fellow, Department of Epidemiology, University of North Carolina, Chapel Hill.

FELLOWSHIPS AND HONORS

- 2004 Bernard G. Greenberg Alumni Endowment Award for Outstanding Teaching, Service and Practice, University of North Carolina School of Public Health
- 2003 Certificate of Honor, Alliance for Nuclear Accountability
- 1997 A Man Called Mathew Award, Concerned Citizens of Tillery and Land Loss Fund
- 1993 Brazilian National Research Council Visiting Professor Fellowship
- 1983-85 National Heart, Lung and Blood Institute Post-doctoral Traineeship
- 1983 Delta Omega, National Honorary Public Health Society
- 1981-83 National Heart, Lung and Blood Institute Pre-doctoral Traineeship
- 1980-81 United States Public Health Service Pre-doctoral Traineeship
- 1978-80 National Institute for General Medical Sciences Pre-doctoral Traineeship

PUBLICATIONS (*indicates first author was an advisee when the work was conducted)

Book Chapters

Wing, S. Environmental justice, science and public health. In: Goehl TJ (ed.) *Essays on the Future of Environmental Health Research: A Tribute to Dr. Kenneth Olden*. Research Triangle Park, NC: National Institute of Environmental Health Sciences, 2005.

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Wing, S. Social responsibility and research ethics in community driven studies of industrialized hog production. In: Brugge D, and Hynes HP (eds.) *Community Collaborative Research in Environmental Health: Studies in Science, Advocacy and Ethics*. Oxon, UK: Ashgate, 2005. (from *Environmental Health Perspectives*, 2002)

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*Farquhar S, Wing S. Methodological and ethical considerations in community-driven environmental justice research: Two case studies from rural North Carolina. In: Minkler M, and Wallerstein N (eds.) *Community Based Participatory Research for Health*. Jossey-Bass, 2002.

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Richardson D, Wing S. Evidence of increasing sensitivity to radiation at older ages among workers at Oak Ridge National Laboratory. In: Schmitz-Feuerhake I, Schmidt M (eds.), *Radiation Exposures by Nuclear Facilities: Evidence of the Impact on Health*, Berlin: Gesellschaft für Strahlenschutz, 1998.

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Pearce NE, Matos E, Koivusalo M, Wing S. Industrialization and Health. In: Pearce NE, Matos E, Vainio H, Boffetta P, Kogevinas M (eds), *Occupational Cancer in Developing Countries*, Lyon: International Agency for Research on Cancer, 1994.

Wing S. Basics of radiation epidemiology. In: Burdman GM, Kaplan L (eds.), *Radiation Health Effects*, Seattle: Hanford Health Information Network, 1994.

Wing S. A review of recent findings on radiation and mortality at Oak Ridge National Laboratory. In Lengfelder E, Wendhausen H (eds.), *Neue Bewertung des Strahlenrisikos*, Proceedings of the International Society of Radiological Protection, pp 217-228, Munich: Medizin Verlag, 1993.

Kotelchuck M, Dodds J, Wing S and Kotch J. Societal trends that affect nutrition status and services for the maternal and child health populations. In Sharhaugh, C (ed) *Call to Action: Better Nutrition for Mothers, Children and Families*. Washington, DC: National Center for Education in Maternal and Child Health, 1991.

Wing S. Trends in society and public health: Looking towards the twenty-first century. In Kaufman M. (ed.) *Moving Towards the 21st Century: Empowering Nutritionists for Leadership in Public Health*. Proceedings of the Continuing Education Conference for the Association of State and Territorial Public Health Nutrition Directors and Association of Faculties of Graduate Programs in Public Health Nutrition, pp. 23-34, Chapel Hill, NC: Department of Nutrition, School of Public Health, University of North Carolina, 1989.

Tennis P, Wing S and Tyroler HA. Geographic variation among state economic areas in levels and declines of ischemic heart disease mortality in women of the U.S. Southeast, 1968-1978. In Eaker E.E. et al. (eds.) *Coronary Heart Disease in Women*, NY: Haymarket Doyma, 1987.

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*Avery R, Wing S, Marshall S, Schiffman S. Perceived odor from industrial hog operations and suppression of mucosal immune function in nearby residents. *Archives of Environmental Health*, 59:101-108, 2004.

Richardson D, Wing S, Steenland K, McKelvey W. Time-related aspects of the healthy worker survivor effect. *Annals of Epidemiology*, 14:633-639, 2004.

Richardson DB, Wing S, Lorey F, Hertz-Piccioto I. Adult hemoglobin levels at birth and risk of sudden infant death syndrome. *Archives of Pediatric and Adolescent Medicine*, 158:366-371, 2004.

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Wing S, Richardson D, Wolf S, Mihlan G. Plutonium-related work and cause-specific mortality at the United States Department of Energy Hanford Site. *American Journal of Industrial Medicine*, 24:153-164, 2004.

Wing S. Objectivity and ethics in environmental health science. *Environmental Health Perspectives*, 111:1809-1818, 2003.

*Morland K, Wing S, Diez Roux A. The contextual effect of the local food environment on residents' diets: the Atherosclerosis Risk in Communities Study. *American Journal of Public Health*, 92:1761-1767, 2002.

*Wilson S, Howell F, Wing S, Sobsey M. Environmental injustice and the Mississippi hog industry. *Environmental Health Perspectives*, 110 (Supplement 2):195-201, 2002.

Wing, S. Social responsibility and research ethics in community driven studies of industrialized hog production. *Environmental Health Perspectives*, 110:437-444, 2002.

Wing S, Freedman S, Band L. The potential impact of flooding on confined animal feeding operations in eastern North Carolina. *Environmental Health Perspectives*, 110:387-391, 2002.

*Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *American Journal of Preventive Medicine*, 22:23-29, 2002.

Richardson D, Wing S, Hoffmann W. Cancer risk from low level ionizing radiation: the role of age at exposure. *Occupational Medicine State of the Art Reviews*, 16:191-218, 2001.

Wing S. The influence of age at exposure to radiation on cancer risk in humans (extended abstract). *Radiation Research*, 154:732-733, 2000.

Cole D, Todd L, Wing S. Concentrated swine feeding operations and public health: A review of occupational and community health effects. *Environmental Health Perspectives*, 108:685-699, 2000.

Wing S, Richardson D, Wolf S, Mihlan G, Crawford-Brown D, Wood J. A case-control study of multiple myeloma at four nuclear facilities. *Annals of Epidemiology*, 10:144-153, 2000.

*St. George DM, Wing SB, Lewis DL. Geographic and temporal patterns of toxic industrial chemicals released in North Carolina, 1988-1994. *North Carolina Medical Journal*, 61:396-400, 2000.

Richardson D, Wing S, Watson J, Wolf S. Evaluation of annual external radiation doses at or near minimum detection levels of dosimeters at the Hanford nuclear facility. *Journal of Exposure Analysis and Environmental Epidemiology*, 10:27-35, 2000.

Wing S, Cole D, Grant G. Environmental injustice in North Carolina's hog industry. *Environmental Health Perspectives*, 108:225-231, 2000.

Wing S, Wolf S. Intensive livestock operations, health, and quality of life among eastern North Carolina residents. *Environmental Health Perspectives*, 108:233-238, 2000.

Santana VS, Loomis D, Wing S. Bahia-Carolina program in environmental and occupational health: A North-South partnership for workplace and environmental justice. *International Journal of Occupational and Environmental Health*, 5:218-222, 1999.

*Richardson DB, Wing S. Greater sensitivity to radiation exposures at older ages among workers at Oak Ridge National Laboratory: Follow-up through 1990. *International Journal of Epidemiology*, 28:428-436, 1999.

*Richardson D, Wing S. Radiation and mortality among workers at Oak Ridge National Laboratory: Positive associations for doses received at older ages. *Environmental Health Perspectives*, 107:649-656, 1999.

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*Richardson D, Wing S. Methods for investigating age differences in the effects of prolonged exposures. *American Journal of Industrial Medicine*, 33:123-130, 1998.

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Frome EL, Cragle DL, Watkins JP, Wing S, Shy CM, Tankersley WG, West CM. A mortality study of employees of the nuclear industry in Oak Ridge, Tennessee. *Radiation Research*, 148:64-80, 1997.

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*Armstrong D, Wing S, Tyroler HA. Race differences in estimates of sudden coronary heart disease mortality, 1980-88: The impact of ill-defined death. *Journal of Clinical Epidemiology*, 49:1247-51, 1996.

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*Armstrong DL, Wing SB, Tyroler HA. United States mortality from ill-defined causes, 1968-1988: Potential effects on heart disease mortality trends. *International Journal of Epidemiology*, 24:522-527, 1995.

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Tyroler HA, Wing S, Knowles M. Increasing inequality in CHD mortality in relation to educational achievement profile of places of residence, US. 1962-87. *Annals of Epidemiology* 3:S51-S54, 1993.

Wing S, Barnett E, Casper M, Tyroler HA. Geographic and socioeconomic variation in the onset of decline of coronary heart disease mortality in white women. *American Journal of Public Health* 82:204-209, 1992.

*Carter L, Walton S, Knowles M, Wing S, Tyroler HA. Social inequality of stroke mortality among US Black populations, 1968-1987. *Ethnicity and Disease* 2:343-350, 1992.

*Casper M, Wing S, Strogatz D, Davis CE, Tyroler HA. Antihypertensive pharmacotherapy and U.S. declines in stroke mortality, 1962 to 1980. *American Journal of Public Health* 82:1600-1606, 1992.

Wing S, Shy C, Wood J, Wolf S, Cragle D and Frome E. Mortality among workers at Oak Ridge National Laboratory: Evidence of radiation effects in follow-up through 1984. *Journal of the American Medical Association* 265:1397-1402, 1991.

Manton K, Stallard E and Wing S. Analyses of Black and White differentials in the age trajectory of mortality in two closed cohort studies. *Statistics in Medicine* 10:1043-1059, 1991.

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Sorel JE, Heiss G, Tyroler HA, Davis WB, Wing SB, Ragland DR. Black-White differences in blood pressure among participants in NHANESII: The contribution of blood lead. *Epidemiology* 2:348-52, 1991.

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James SA, Strogatz DS, Wing SB and Ramsey DL. Socioeconomic status, John Henryism, and hypertension in blacks and whites. *American Journal of Epidemiology*, 126:664-73, 1987.

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Tyroler HA, Knowles M, Wing S, Logue EE, Davis CE, Heiss G, Heyden S and Hames CG. Ischemic heart disease risk factors and twenty-year mortality in middle-age Evans County black males. *American Heart Journal* 108:738-746 (supplement), 1984.

Wing S. The role of medicine in the decline of hypertension-related mortality. *International Journal of Health Services* 14:649-666, 1984.

Wing S and Manton KG. The contribution of hypertension to mortality in the US: 1968, 1977. *American Journal of Public Health* 73:140-144, 1983.

Wing S, Aubert R, Hansen J, Hames CG, Slome C and Tyroler HA. Isolated systolic hypertension in Evans Co. I. Prevalence and screening considerations. *Journal of Chronic Diseases* 35:735-742, 1982.

Wing S and Manton KG. A multiple cause of death analysis of hypertension-related mortality in North Carolina, 1968-1977. *American Journal of Public Health* 71:823-830, 1981.

Manton KG, Poss SS and Wing S. The black/white mortality crossover: Investigation from the perspective of the components of aging. *The Gerontologist*, 19:291-300, 1979.

Other unrefereed works, including presentations and book reviews

Invited scientific lectures, seminars and testimony

Health disparities. American Medical Association – Medical Student Section Region 4 Annual Meeting, Duke University Medical Center, March 5, 2005.

Genes, justice, and racial inequalities in health. 5th Annual Minority Health Leadership Summit, School of Public Health, University of Pittsburgh, January 13, 2005.

Quantitative methods in the epidemiology of environmental injustice: Examples from eastern North Carolina. Math Departmental Seminar, East Carolina University, December 1, 2004.

Improving environmental health science through partnerships in communities affected by environmental injustice. The Science of Environmental Justice Working Conference, US Environmental Protection Agency, Boston University, May 25, 2004.

North Carolina swine production, health and environmental justice (with Gary R. Grant). The Science of Environmental Justice Working Conference, US Environmental Protection Agency, Boston University, May 26, 2004.

Environmental injustice in eastern North Carolina: Corporate hogs and guerrilla epidemiology. Department of Epidemiology and Biostatistics seminar, College of Public Health, University of South Florida, December 3, 2003.

Inequality and inequity: the broader causes of health disparities. Panel presentation, Mending the Health Care Divide: Eliminating Disparities in Access for Minority and Low Income Communities. University of North Carolina School of Law, UNC Center for Civil Rights and UNC School of Public Health, Chapel Hill, NC, November 1, 2003.

The "chilling effect" on environmental health research: Industry tactics and institutional disincentives. Conflicted Science: Corporate Influence on Scientific Research and Science-Based Policy, conference sponsored by the Center for Science in the Public Interest's Integrity in Science Project. July 11, 2003 Washington, DC.

Science, objectivity and ethics in environmental health. Dialogues for Improving Research Ethics in Environmental and Public Health (Conference), Brown University, Providence, RI, May 31, 2003.

Methodology and ethics in epidemiology of environmental justice: Industrial hogs and guerrilla epidemiology. Departmental Seminar, Department of Epidemiology, School of Public Health, State University of New York, Albany, NC, April 11, 2003.

Health disparities, research ethics and environmental epidemiology. Epidemiology Branch, National Institute of Environmental Health Sciences, May 13, 2002.

Health impacts, Risks and Response: Nuclear Terrorism in the Triangle, A Public Forum to Address Emergency Planning and Risk Minimization, sponsored by Orange and Chatham County Boards of Commissioners, William Friday Center, Chapel Hill, NC, May 2, 2002.

Bioterrorism preparedness and health disparities, The New War Economy, a teach-in sponsored by the UNC-CH Progressive Faculty Network, Chapel Hill, NC, April 19, 2002.

The role of epidemiology in evaluating releases from nuclear facilities: Insights from the work of Alice Stewart. The Alice Stewart Lecture, 16th Low Level Radiation and Health Conference, Dublin Institute of Technology, Ireland, June 21, 2002.

Health effects of low level radiation, Physicians for Social Responsibility, Los Angeles, March 11, 2002.

Community based environmental health research, Morehouse College and Southeast Community Research Center, Atlanta, GA, November 10, 2001.

Pork production, public health and environmental justice. Department of Environmental Health, University of Cincinnati, Departmental Seminar, May 23, 2001.

Subcommittee on Energy and Environment of the Committee on Science, United States House of Representatives, "Reexamining the Scientific Basis for the Linear No-Threshold Model of Low-dose Radiation," July 18, 2000. Published testimony: Serial No. 106-98, pages 101-115 and 123-138. Government Printing Office, Washington, DC: 2001.

Human Health, Sustainable Hog Farming Summit, New Bern, NC, January 11, 2001.

Integrating research, teaching and practice in environmental justice. Departmental Seminar, Department of Sociology and Anthropology, NC State University, December 1, 2000.

Community public health needs and industrial animal production research. American Public Health Association Annual Meeting, Boston, MA, November 14, 2000.

Social inequalities in occupational and environmental health. Brazilian Congress of Epidemiology Annual Meeting, Salvador, Bahia, Brazil, September 1, 2000.

The influence of age at exposure to radiation on cancer risk in humans. American Statistical Association Conference on Radiation and Health, Park City, UT, June 27, 2000.

National Academy of Sciences, Committee on the Biological Effects of Ionizing Radiation (BEIR VII). "The Relevance of Occupational Epidemiology to Radiation Protection Standards," Washington DC, June 13, 2000.

Radiation and Rocky Flats: Risks to workers and the public, Rocky Mountain Peace and Justice Center, Boulder, CO, June 24, 2000.

Public health and intensive hog production in North Carolina. Research Triangle Institute, June 9, 2000.

Low level radiation and health. Brookhaven National Laboratory, June 5, 2000.

Research to action: Getting our work used! Community-Based Research for Environmental Justice: Workshops from the Field 2000 Training and Conference, Rutgers University, Newark, NJ, May 21, 2000.

Health effects of nuclear weapons production, Our Nuclear Future, Conference held prior to the United Nations Disarmament Conference, United Nations Plaza Hotel, New York, NY, April 24, 2000.

US Environmental Protection Agency National Environmental Justice Advisory Committee, Enforcement Subcommittee, "Confined animal feeding operations," Atlanta, GA, May 25, 2000.

The challenge of environmental justice: Science, public health and advocacy, Minority Health Conference, School of Public Health, Chapel Hill, NC, February 18, 2000.

Environmental health effects of intensive livestock operations. Division of Occupational and Environmental Medicine departmental seminar, School of Medicine, Duke University, February 8, 2000.

United States Department of Agriculture Air Quality Task Force. "Health and intensive livestock operations," Research Triangle Park, NC, November 1, 1999.

Environmental injustice in North Carolina's hog industry. Regional Research Institute Colloquium, West Virginia University, Morgantown, WV, October 8, 1999.

Community based research and environmental justice, African American Environmental Justice Action Network Conference, Arlington, VA, September 18, 1999.

Agriculture Committee, House of Representatives, North Carolina General Assembly, "Environmental Injustice in North Carolina's Hog Industry," Raleigh, NC, April 27, 1999.

Intensive livestock operations, health, and quality of life among eastern North Carolina residents. Conference on Public Health Impacts of Intensive Livestock Operations, NC Department of Health and Human Services, Raleigh, NC, July 15, 1999.

Radiation and health, Hanford Downwinders Conference, Pendleton, WA, April, 1999.

Cancer and Three Mile Island, Three Mile Island Alert, Harrisburg, PA, March 26-27, 1999.

Environmental injustice in the North Carolina hog industry. Society of Toxicology Annual Meeting, New Orleans, LA, March 17, 1999.

Radiation and health, Livermore City Council, Lawrence Livermore National Laboratory, October 22-24, 1998.

Radiation and mortality among US Department of Energy workers: Relevance to radiation protection standards. NY Academy of Medicine, New York, September 26, 1998.

Health effects of Department of Energy Facilities. Physicians for Social Responsibility Annual Meeting, Arlington, VA, May 1, 1998.

Committee on Veterans Affairs, United States Senate, 105th Congress Second Session, "Ionizing Radiation, Veterans Health Care, and Related Issues," Washington, DC, April 21, 1998; published testimony: Serial HRG. 105-983, pages 14-16 and 111-113, U.S. Government Printing Office, Washington, DC.

Environmental justice in North Carolina, East Carolina University Brody School of Medicine, Greenville, NC, April 17, 1998.

Radiation epidemiology, Hanford Health Effects Subcommittee (CDC-ATSDR), Seattle, WA, 1997.

How communities affect epidemiology: A re-analysis of cancer incidence near Three Mile Island. Community Partnership Research Conference, Clark University, September 21, 1996.

How pure is the quantitative basis of epidemiology? An examination of four numerical concepts. London School of Hygiene and Tropical Medicine, July 1996.

Whose epidemiology, whose health? Department of Public Health, University of Liverpool, July 1996.

Department of Health and Human Services Advisory Committee on Energy-Related Epidemiologic Research, "Data collection and record access in epidemiological studies of workers at DOE facilities," Santa Fe, NM, April 18, 1996.

Occupational inequalities in mortality. Division of Occupational and Environmental Medicine, School of Medicine, Duke University, February 2, 1996.

Environmental epidemiology, Conference on Cancer and the Environment: Women's Action for Prevention, Shaw University, Raleigh, NC July 7, 1995.

An epidemiological triangle: Questions, answers and methods. Joint meeting of the Brazilian, Ibero-American and Latin American Congresses of Epidemiology, Salvador, Bahia, Brazil, April 24-28, 1995.

Radiation risks and mammography, Health and Today's Environment: A Symposium on Action for Cancer Prevention and Natural Health, Albuquerque, NM, October, 1994

Low-level radiation panel, Radiation Health Effects and Hanford: A Conference for Concerned Citizens and Health Care Providers, Spokane, WA, September, 1994

Health risks from ionizing radiation, Massachusetts Low-Level Radioactive Waste Management Board, Worcester, MA, November 3, 1993

Concepts in modern epidemiology: Population, risk, dose response and confounding. Workshop on Critical Theory in Epidemiology, Department of Preventive Medicine, Federal University of Bahia, Salvador, Brazil, June 14-18, 1993.

Recording of external radiation exposures at Oak Ridge National Laboratory: Implications for epidemiological studies. Workshop on the Epidemiologic Use of Nondetectable Values in Radiation Exposure Measurements. National Institute of Occupational Safety and Health, Cincinnati, OH, September 9 and 10, 1993.

Towards a post-Columbian science of disease causation. Indigenous Peoples Forum/Medical and Scientific Methods for Diagnosing Human and Environmental Effects from Nuclear Testing, Las Vegas, Nevada, October 2-4, 1992.

Subcommittee on Compensation, Pension and Insurance of the Committee on Veteran's Affairs, House of Representatives, 102nd Congress Second Session, "H.R. 3236 and H.R. 4458, Bills Affecting Veterans Exposed to Ionizing Radiation in Military Service," May 27, 1992. Published testimony: Serial No 102-42, pages 10-16 and 51-52, US Government Printing Office, Washington: 1992.

Recent findings on low-dose radiation and mortality at the Oak Ridge National Laboratory, U.S.A. Institute for Radiation Hygiene, Munich, Germany, March 5, 1992.

Recent findings on low-dose radiation and mortality at the Oak Ridge National Laboratory, U.S.A. German Cancer Institute, Heidelberg, Germany, March 4, 1992.

Recent findings on low-dose radiation and mortality at the Oak Ridge National Laboratory, U.S.A. Institute for Radiation Biology, University of Munster, Munster, Germany, March 3, 1992

Study of worker exposure at Oak Ridge National Laboratory. Low Level Radioactive Waste Forum Quarterly Meeting, New Orleans, LA, April 19, 1991.

Health effects of low level radiation, Chatham County, NC Low-Level Radioactive Waste Site Designation Review Committee, April, 1991

Health effects of low level radiation, Richmond County, NC Low-Level Radioactive Waste Site Designation Review Committee, April, 1991

Factors associated with the onset and magnitude of the decline of cardiovascular disease mortality in the United States. First International Searle Symposium on Prevention and Epidemiology, Ulm, Germany, July 5, 1990.

An epidemiological study of low dose occupational exposure to ionizing radiation. First International Searle Symposium on Prevention and Epidemiology, Ulm, Germany, July 5, 1990.

Social inequalities and health: The contradictory role of health professionals. 17th Annual Regional Conference on Maternal and Child Health, Family Planning, and Services for Children with Special Health Needs, Raleigh, N.C., May 2, 1990.

Letters, commentaries and book reviews in peer-reviewed journals

Richardson D, Wing S. Are A-bomb survivor studies an appropriate basis for nuclear worker compensation? *Environmental Health Perspectives*, 111:A748, 2003.

Richardson D, Wing S. Studies of radiation-cancer associations among workers at Oak Ridge National Laboratory. *Technology*, 9:141-143, 2003.

Wing S, Richardson D. Use of A-bomb survivor studies as a basis for nuclear worker compensation. *Environmental Health Perspectives*, 110:A739, 2002.

Wing, S. (Review) Challenging Inequalities in Health: From Ethics to Action. *New England Journal of Medicine*, 345:1857-1858, 2001.

Wing S, Richardson D. Collision of evidence and assumptions: TMI Deja View. *Environmental Health Perspectives*, 109: 496, 2001.

Wing S, Richardson D, Armstrong D. Reply to comments on "A Reevaluation of Cancer Incidence Near the Three Mile Island." *Environmental Health Perspectives*, 105:266-268, 1997.

Wing S, Richardson D, Armstrong D. Response: Science, public health and objectivity: Research into the accident at Three Mile Island. *Environmental Health Perspectives*, 105:567-570, 1997.

Wing S, Richardson D, Armstrong D. Low-level radiation harmed humans near Three Mile Island: Response. *Environmental Health Perspectives*, 105:787, 1997.

Casper M, Wing S, Strogatz D, Davis CE, Tyroler HA. Stroke mortality trends and antihypertensive drug use (letter in reply to Smith and Pinckney). *American Journal of Public Health* 83:1643, 1993.

Wing S, Shy CM, Wood JL, Cragle D. Radiation dosage estimation and health risk (letter in reply to Maienschein and Peele). *Journal of the American Medical Association* 267:929-930, 1992.

Wing S, Shy CM, Wood JL, Wolf S, Cragle D, Frome EL. Mortality of workers at the Oak Ridge National Laboratory, (letter in reply to letter by Gilbert and editorial by Prichard). *Health Physics* 62:261-264, 1992.

Wing S, Shy C. Public health effects of occupational and environmental radiation exposure (letter in reply to letters by Brown; Greenspan; and Marshall and Baker; and editorial by Hendee). *Journal of the American Medical Association* 266:653-4, 1991.

Monographs and other unpublished works

Grant G, Wing S. The North Carolina Hog Roundtable. *Race, Poverty & the Environment*, Winter, 2004.

Wing, S. Community-driven epidemiology and environmental justice: A course at The University of North Carolina. The Networker: Newsletter of the Science and Environmental Health Network 5(5), October, 2000, www.sehn.org.

Richardson D, Wing S, Stewart A. Epidemiologic Studies of the Effects of Exposure to Ionizing Radiation. Ministry of Finance and Energy, Schleswig-Holstein, Germany, 1997.

Wing S, Richardson D. Material Living Conditions and Health in the United States, Canada and Western Europe. Research in Public Health Technical Papers, Series 19, Pan American Health Organization, Washington, DC, 2000.

Wing S, Richardson D. Occupational Health Studies at Los Alamos National Laboratory. In, New Mexico's Right to Know: The Impacts of LANL Operations on Public Health and the Environment, Concerned Citizens for Nuclear Safety, 2002, <http://www.nuclearactive.org>.

Wing S. Evaluation of the US Agency for Toxic Substances and Disease Registry's Public Health Assessment of Laurence Livermore National Laboratory. Prepared for Tri-Valley CAREs, Western States Legal Foundation and the San Francisco Bay Area Physicians for Social Responsibility under their "Health Consultation on the Impact of Two Major Tritium Accidents at Livermore Lab: An Independent Scientific Analysis," 2002.

TEACHING ACTIVITIES

UNC Courses

2002-04 Lead instructor, Masters of Science in Public Health Seminar (EPID 105) (5 – 12 students per semester)

A workshop for addressing special topics related to MSPH program including, but not limited to, research topic development, career planning and public health ethics.

2000- Lead instructor, Community-Driven Epidemiology and Environmental Justice (EPID 278) (7 – 12 students per semester)

Principles for conducting research within communities unduly burdened by environmental health threats are presented. Topics include research ethics, community presentations, study design and implementation, and student research projects.

EPID 278 was selected as an innovative course by The Consortium for Environmental Education in Medicine in 2000, and was nominated by the Theta chapter of Delta Omega for the Delta Omega Award for Innovative Public Health Curriculum in 2001.

1997-99 Co-instructor, Occupational Epidemiology (EPID 276)

The course provides a background in the epidemiology of work-related illness and injury and the application of epidemiologic concepts and methods in protecting workers' health and safety.

1996- Lead instructor, Doctoral Seminar in History and Philosophy of Epidemiology (EPID 390) (18 – 28 students per semester)

This seminar exposes epidemiology doctoral students to issues and debates in the philosophy of science, the objects of knowledge in epidemiology, and the place of epidemiology in public health.

1994-97 Co-instructor, Advanced Methods in Epidemiology (EPID 268)

An in-depth treatment of key methodological topics in epidemiology, including concepts of cause, confounding, control selection, data quality, sampling variability, and effect modification.

1992-95 Instructor, Philosophy of Epidemiology (EPID 217)

A forum for evaluating the place of epidemiology in science, public health and society, focusing on the nature of objectivity and the social construction of epidemiological knowledge.

1987-91 Instructor, co-instructor, Principles of Epidemiology (EPID 160)

An introductory course that considers the meaning, scope, and applications of epidemiology to public health practice and the uses of vital statistics data in the scientific appraisal of community health.

1985-87 Co-instructor, Cardiovascular Disease Epidemiology (EPID 256)

Review of the main causes of cardiovascular disease morbidity and mortality, and their population determinants. Topics include epidemiologic methods, risk factors, strategies for prevention, and a student research project.

Other Courses

1997 Co-instructor, Occupational and Environmental Epidemiology, Institute of Collective Health, Federal University of Bahia, Brazil. An introduction to epidemiology in occupational and environmental health.

1993 Lead instructor, Problems in Epidemiology: Methodology and Philosophy. Department of Preventive Medicine, Federal University of Bahia, Brazil.

An advanced seminar in philosophy of epidemiology conducted with faculty and students from UFBA.

1990 Co-instructor, Principles of Epidemiology, 4-week introductory graduate-level course.

University of Ulm, Germany. An introductory course that considers the meaning, scope, and applications of epidemiology to public health practice and the uses of vital statistics data in the scientific appraisal of community health.

CONTRACTS & GRANTS

Active (annual award amount)

- 2003 Agricultural Dust and Childhood Asthma Symptoms (Principal Investigator, doctoral research of Maria Mirabelli), National Heart Lung and Blood Institute R01 HL073113, 04/01/03 – 03/31/05. \$107,379
- 2002 Improving Environmental Health Research Through Dialogue (Carolyn Crump, Principal Investigator). National Institute of Environmental Health Sciences, 9/30/02 - 8/31/07. \$200,000
- 2002 Susceptibility in Occupational Radiation Risks (co-Principal Investigator). National Institute for Occupational Safety and Health, 9/30/02-9/29/05. \$171,656
- 2002 Time-Factors in Exposure Effects Among Uranium Workers. (co-Principal Investigator). National Institute for Occupational Safety and Health, 5/01/02 - 4/30/05.
- 2002 Community-Driven Research on Environmental Justice and Landfills in North Carolina (Principal Investigator). Jesse Ball duPont Fund, 01/01/02 – 12/31/05. \$65,878.
- 2001 Community Health Effects of Industrial Hog Operations. (Principal Investigator). National Institute of Environmental Health Sciences, 09/01/01 - 08/30/06. \$360,594
- 2000 Work and Health Disparities among Rural Women: Epidemiology Support (Principal Investigator). Duke University -- National Institute of Environmental Health Sciences, 09/30/00 - 09/29/05. \$13,545
- 2000 Short Courses for Environmental Health Research Ethics: North Carolina Component (Principal Investigator). Syracuse University -- National Institute of Allergy and Infectious Disease, 09/30/00 - 08/31/06. \$30,719
- 2000 Community Health and Environmental Reawakening (Principal Investigator). National Institute of Environmental Health Sciences, 09/01/00 - 08/30/08. \$234,725

Completed

- 2000 Minority Graduate Research Assistant Supplement to Community Health and Environmental Reawakening (Principal Investigator). National Institute of Environmental Health Sciences, 09/01/00 - 08/30/01.
- 1999 Environmental and Public Health Impacts of Intensive Livestock Operations in the Wake of Flooding from Hurricane Floyd (Principal Investigator). Center for a Livable Future, Johns Hopkins School of Public Health, 01/01/00 - 12/30/00.

- 1998 Rural Health Study (Principal Investigator). North Carolina Department of Health and Human Services, 7/1/98 – 6/30/99.
- 1998 Older Women, Dietary Intake and Dependence on the Local Food Environment (Principal Investigator, doctoral research of Kimberly Morland, 07/01/98 – 06/30/99).
- 1997 Enabling Community-Based Environmental Research and Education (Principal Investigator). Chancellors Office, University of North Carolina at Chapel Hill, 12/01/97 - 6/30/98.
- 1997 Environmental Justice and Community-Based Prevention/Intervention Research Conference Grant, supplement to Southeast Halifax Environmental Reawakening (Principal Investigator). National Institute of Environmental Health Sciences, 09/01/97 - 08/31/99.
- 1996 Bahia-US Environmental Epidemiology Training and Research (co-Principal Investigator). Fogarty International Center, National Institutes of Health, 9/30/96 - 09/29/01.
- 1996 Ionizing Radiation and Mortality Among Hanford Workers (Principal Investigator). National Institute for Occupational Safety and Health, 09/30/96 - 09/29/01.
- 1996 Southeast Halifax Environmental Reawakening (Principal Investigator). National Institute of Environmental Health Sciences, 09/01/96 - 08/30/00.
- 1996 Critical Review of the United States Department of Energy Efforts to Investigate the Human Health Effects of Plutonium (Principal Investigator). Berger-Montague, 07/18/96 – 07/17/97.
- 1995 Time Related Factors in Radiation-Cancer Dose Response (Principal Investigator, Doctoral research of David Richardson). National Institute for Occupational Safety and Health, 07/01/95 - 06/30/97.
- 1994 Epidemiological Studies of the Accident at Three Mile Island (Principal Investigator). Center for Environmental Studies, John Snow Institute, 03/01/94 - 12/31/95.
- 1993 Study of Multiple Myeloma Among Workers Exposed to Ionizing Radiation and Other Physical and Chemical Agents (Principal Investigator). National Institute for Occupational Safety and Health, 10/01/93 - 02/29/96.
- 1992 Geographical Differentials in Stroke Mortality Levels and Trends in the U.S. (Principal Investigator). Centers for Disease Control, 08/28/92 - 03/30/93.

- 1992 The Potential Impact of Ill-Defined Mortality on the Decline of Ischemic Heart Disease in the U.S. (Principal Investigator, Doctoral research of Donna Armstrong). American Heart Association, North Carolina Affiliate, 07/01/92 - 06/30/93.
- 1990 Minority Graduate Research Assistant Supplement to Community Structure and Cardiovascular Mortality Trends (Principal Investigator). National Heart, Lung and Blood Institute, 07/01/90 through 05/31/92.
- 1989 Community Structure and Cardiovascular Mortality Trends (Principal Investigator). National Heart, Lung and Blood Institute, 06/01/89 - 05/31/93.
- 1987 Health and Mortality of Department of Energy Workers (co-Principal Investigator). U.S. Department of Energy, 10/01/87 - 03/31/94.

SERVICE

Department

Masters Examination Committee, Ad Hoc Core Course Review Committee, Masters Program Committee, Departmental Seminar Committee, Ad-hoc Task Group on Integration of the Core Methods Courses, Faculty Task Group on Course Evaluations, Curriculum Committee, Doctoral Qualifying Examination, Graduate Studies Committee, Awards Committee, MSPH Program Advisor

School

Greenburg Alumni Endowment Awards Committee, 2005
Housekeeper Health Study Co-investigator, 1997-1999
Committee on Learning Environments and Research Networking for the 21st Century, 1995-1996
Institutional Review Board, 1994-1997
School of Public Health Awards Committee

University

Center for Health Promotion and Disease Prevention Population and Policy Working Group, 1998
University Faculty Council, 1993-1996

State

State of North Carolina Wake County Office of Administrative Hearings. Jerry Franks, Petitioner, vs. North Carolina Department of Environment & Natural Resources and Wake County Board of Commissioners, Respondents.
North Carolina Central University, Advisory Board, Environmental Risk and Impact in Communities of Color and Economically Disadvantaged Communities, 2001-2002.
North Carolina Environmental Justice Network, founding member and member, annual NC Environmental Justice Summit Planning Committee, 1998 - present.
Center for Community Action, Lumberton, NC. Reviewer, health effects of tire pyrolysis facility, 1996.

- Clean Water Fund of NC, Asheville, NC. Review of cancer studies in Paw Creek conducted by the NC Department of Health and Human Services, 1996.
- Land Loss Fund, Tillery, NC, consultation on land loss and public health, National Black Land Loss Summit planning committee member, 1996.
- UNC Alumni Heart Study (Duke University), research design consultation, 1985-88.

National

- United States District Court for the Middle District of Pennsylvania. TMI Litigation Cases Consolidated II, Civil Action No. 1:CV-88-1452.
- United States District Court for the Eastern District of Tennessee Northern Division at Knoxville. Euchee Marina & Campground, et al., Plaintiffs vs. Martin Marietta Energy Systems, Incorporated, et al., Civil Action No. 3-91-0510.
- United States District Court for the Southern District of California. Glen and Doreth James, Plaintiffs, vs. Southern California Edison Company, et al., Case No. 94-1085 NJ (RBB).
- District Court of Harris County, TX, 125th Judicial District. Terry Joe Groom, Plaintiff, vs. Schlumberger Technology Corporation et al., Case No. 94-42682.
- United States District Court for the District of Colorado. Merilyn Cook, et al., Plaintiffs, vs. Rockwell International Corporation and The Dow Chemical Company, Civil Action No. 90-K-181.
- Carolyn Mull, Personal Representative of the Estate of Roy Mull, Employee/Plaintiff vs. Duke Energy Corporation, Employer/Defendant, North Carolina Industrial Commission File No. 717904.
- Agency for Toxic Substances and Disease Registry, peer reviewer, 2002.
- Concerned Citizens for Nuclear Safety, Santa Fe, NM, 2000-2002.
- California Environmental Protection Agency, member and Co-Chair, Santa Susanna Field Laboratory Advisory Panel, 2000-2002.
- East Hampton Town Hodgkin's Cancer Task Force, East Hampton, NY. June 4-5, 2000.
- US General Accounting Office, Denver, CO. Epidemiological evidence relevant to radiation protection, 2000.
- West Virginia University, Morganton, WV. Social Environment and Rural Community Health Project, October 7-8, 1999.
- National Academy of Sciences, Washington, DC. Reviewer, Review of the Hanford Thyroid Disease Study Draft Final Report, 1999.
- Rural Coalition, Washington, DC. Presentation and consultation on community based environmental health research, National Advisory Board, April 6, 1998.
- Pan American Health Organization, Washington, DC. Review of literature on social inequalities in health (with David Richardson), 1998.
- Ministry of Health and Environment, Schleswig-Holstein, Kiel, Germany. Review of literature on radiation health effects (with David Richardson and Alice Stewart), 1997-1998.
- Clark University, Worcester, MA. Member of planning committee, Community Research Partnership Conference, 1996.
- Yakama Indian Nation Environmental Restoration and Waste Management Program, Toppenish, WA. Consultation on radiation epidemiology, 1995.

Centers for Disease Control, Atlanta, GA. Reviewer of educational materials on health effects from the Hanford Plutonium production facility, 1995.
American Public Health Association, Washington, DC. Member, Task Force on Social Welfare Policy, 1992-1993; co-author of Social Welfare Policy Statement.
Three Mile Island Public Health Fund Scientific Advisory Board, Philadelphia, PA. Consultation on radiation epidemiology, October, 1992.
Ministry of Health and Environment, Schleswig-Holstein, Kiel, Germany. Consultation with the Minister of Health regarding radiation protection policy. March, 1992.
Northwest National Life Insurance Company State Health Rankings, Delphi Panel Member, 1992.

JOURNAL REVIEW

American Journal of Epidemiology
American Journal of Industrial Medicine
American Journal of Public Health
CA - A Cancer Journal for Clinicians
Environmental Health Perspectives
Environmental Research
Epidemiology
Journal of Epidemiology and Community Health
Journal of Gerontology
Medicine and Global Survival
Occupational and Environmental Medicine
Radiation Research
Social Science and Medicine
New England Journal of Medicine

GRANT REVIEW

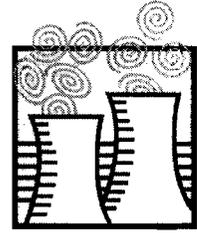
NIEHS special emphasis panel, Environmental Health Sciences Center Grants, June, 2002.

NIEHS special emphasis panel, Community Based Prevention and Intervention Research, March 2000.

NIEHS special emphasis panel, Environmental Justice: Partnerships for Communication, February 1999.

NIEHS special emphasis panel, Community Based Prevention and Intervention Research, July 1996.

Grant referee, Alberta Cancer Board, 1992



Population Living Near the Harris Nuclear Plant, North Carolina

This information sheet was developed by researchers at the University of North Carolina-Chapel Hill, Department of Epidemiology, in response to concerns of community members and government officials about the potential for an attack or accident at Carolina Power and Light's Harris Plant in central North Carolina. Harris is a nuclear power plant and a storage site for spent nuclear fuel generated at several reactors in the Carolinas.

Data from the US Census 2000 Summary File 1 (100% data) were used to prepare this report. The resident population living within 10, 20 and 50 miles of the plant was estimated from the number of people in Census blocks within 10, 20, and 50 miles of the plant. Numbers of children, women of childbearing age, senior citizens and nursing home residents are given because these persons may have special difficulties in the event of an evacuation and may be more susceptible to radiation emissions and other hazards that could occur in connection with evacuation and re-location. Other susceptible populations, such as homebound persons and number of children attending schools within the 10, 20, and 50 mile radius are not available from the Census, and are not included in this report.

Table 1 provides the estimated population living in Census blocks within 10, 20, and 50 miles of the Harris Nuclear Plant. Over two million people – about 25% of the State's population – live within 50 miles of the plant. Approximately 59 thousand people live in the ten-mile area, including over five thousand young children and about four thousand persons aged 65 and over. Census blocks in the 20-mile area include approximately 456 thousand people of whom about 2,300 are nursing home residents.

Table 2 gives the estimated total population living within 10, 20, and 50 miles of the Harris Nuclear Plant separately for each county in the 50-mile area.

TABLE 1. Population of Residents Living in Census Blocks within 10, 20, and 50 miles of the Harris Nuclear Plant, North Carolina

	Within 10 miles	Within 20 miles	Within 50 miles	State Total
Total Population	59,083	455,920	2,049,830	8,049,313
Under 5 years old	5,358	31,158	145,550	539,509
Under 20 years old	17,885	127,185	574,823	2,193,360
Females 15-44 years	14,555	117,800	486,037	1,782,766
Ages 65 years and older	3,974	35,529	200,520	969,048
Ages 85 years and older	427	3,956	21,191	105,461
Live in Nursing Home	159	2,285	10,982	50,892
Live in Correctional Facility	0	2,410	11,992	46,614

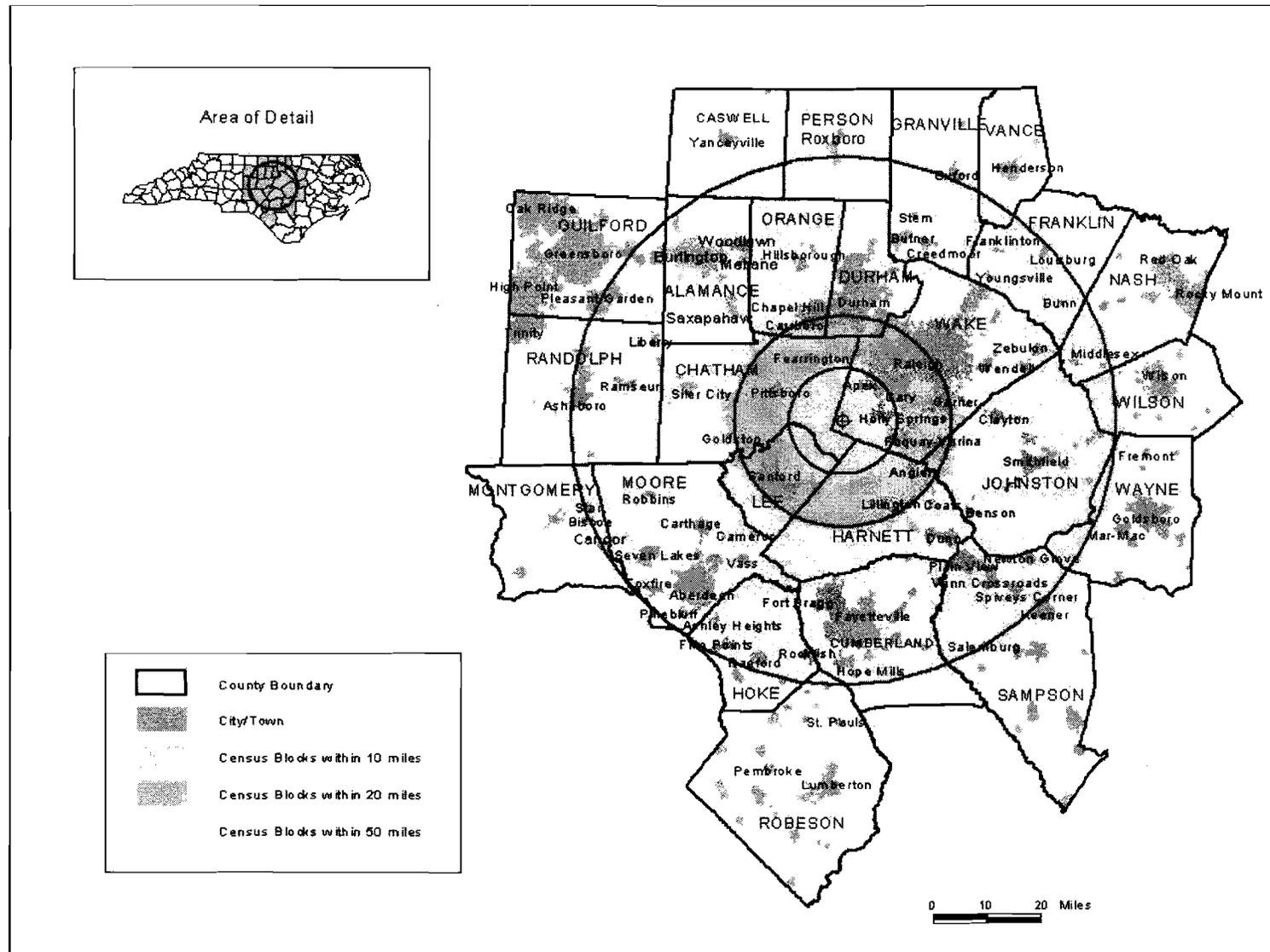
Source: US Census Bureau, Census 2000 Summary File1

TABLE 2. Population of Residents living in Census blocks within 10, 20, and 50 miles of Harris Nuclear Plant; by County

County	Population within radius	Less than 5 years	Less than 20 years	Females ages 15-44 years	Age 65 years and older	Age 85 years and older	Total County Population
Alamance							130,800
50 miles	130,286	8,374	35,008	28,530	18,418	2,138	
Caswell							23,501
50 miles	3,146	182	854	656	359	30	
Chatham							49,329
10 miles	4,185	266	1,022	879	451	42	
20 miles	26,888	1,632	6,150	5,414	4,397	554	
50 miles	49,329	3,095	12,077	9,940	7,530	860	
Cumberland							302,963
50 miles	297,061	24,483	93,143	70,514	22,863	1,835	
Durham							223,314
20 miles	29,457	2,113	6,093	8,747	1,934	253	
50 miles	223,314	15,492	58,773	57,331	21,574	2,777	
Franklin							47,260
50 miles	37,118	2,716	10,451	8,234	3,858	467	
Granville							48,498
50 miles	30,344	1,900	7,716	5,999	2,649	207	
Guilford							421,048
50 miles	25,616	1,470	6,491	5,066	3,247	266	
Harnett							91,025
10 miles	3,391	265	971	793	287	26	
20 miles	33,654	2,319	9,617	7,715	3,491	403	
50 miles	91,025	6,937	27,232	20,843	9,447	966	
Hoke							33,646
50 miles	27,949	2,546	8,946	6,548	2,190	182	
Johnston							121,965
20 miles	4,576	451	1,412	1,101	264	17	
50 miles	121,965	9,573	34,468	27,357	11,973	1,151	
Lee							49,040
10 miles	2,494	159	669	547	247	17	
20 miles	40,711	2,881	11,483	8,426	5,531	565	
50 miles	49,040	3,399	13,953	10,209	6,345	616	
Montgomery							26,822
50 miles	6,421	518	1,949	1,315	894	126	
Moore							74,769
50 miles	74,755	4,200	18,076	13,528	16,269	1,685	
Nash							87,420
50 miles	9,351	705	2,696	2,032	998	63	
Orange							118,227
20 miles	32,926	1,115	10,466	13,124	1,686	220	
50 miles	118,227	5,854	31,952	33,976	9,931	1,174	
Person							35,623
50 miles	12,941	832	3,470	2,865	1,422	115	
Randolph							130,454
50 miles	78,424	5,570	21,559	16,324	10,360	1,199	
Robeson							123,339
50 miles	1,204	103	413	283	115	6	
Sampson							60,161
50 miles	22,873	1,701	6,613	4,846	2,491	241	
Vance							42,954
50 miles	2,106	115	711	525	167	13	
Wake							627,846
10 miles	49,013	4,668	15,223	12,336	2,989	342	
20 miles	287,708	20,647	81,964	73,273	18,226	1,944	
50 miles	627,846	45,142	175,572	157,104	46,372	4,973	
Wayne							113,329
50 miles	5,744	413	1,654	1,261	622	57	
Wilson							73,814
50 miles	3,745	230	1,046	751	426	44	

Source: US Census Bureau, Census 2000 SF1

Map 1. Counties and Places 10, 20 and 50 miles of Harris Nuclear Plant, North Carolina



ORANGE COUNTY BOARD OF COMMISSIONERS

A Resolution

**Calling for Coordinated Emergency Management and Evacuation
Planning Within the 50-Mile Radius Ingestion Pathway for Potential
Discharge of Airborne Nuclear Waste Material from the Shearon
Harris Nuclear Power Plant**

WHEREAS, the Orange County Board of Commissioners has a long and well-established practice of advocating for any and all activities that would promote the public health, safety and welfare, particularly in regard to feasible threats to that health, safety and welfare; and

WHEREAS, the Orange County Board of Commissioners has a long and well-established record of concern and activism related to the potential magnitude and catastrophic consequences of an airborne release of nuclear waste materials from the Shearon Harris nuclear power plant; and

WHEREAS, information developed within the least eight years has demonstrated the vulnerability of spent nuclear fuel to combustion with ensuing airborne release and dispersion of extremely harmful and dangerous nuclear waste material as a consequence of accident or sabotage/ terrorism; and

WHEREAS, there exists an area of a ten-mile radius around the Shearon Harris nuclear power plant for which there are in place emergency management and evacuation plans of debatable efficacy in case of a catastrophic accident and airborne release of nuclear waste material from the plant; and

WHEREAS, an airborne release of nuclear material may stem from an uncontrollable event of several days or greater duration that would affect at least all of the fifty-mile radius ingestion pathway area; and

WHEREAS, the fifty-mile radius ingestion pathway around the Shearon Harris plant contains approximately two million persons, the state capital, Fort Bragg, the Research Triangle, four major universities and a number of smaller universities, hundreds of public and private schools, thousands of businesses, dozens of local government jurisdictions; millions of pets, and a rich natural environment; and

WHEREAS, there is no coordinated emergency management and evacuation planning for the portion of the ingestion pathway beyond the area defined by the ten-mile radius around Shearon Harris; and

WHEREAS, fairly recent ice and snow storm events of a far less catastrophic level of severity have proven capable of reducing Research Triangle area traffic to a state of extended gridlock; and

WHEREAS, orderly or effective evacuation of the fifty-mile radius ingestion pathway under current emergency management and evacuation planning and coordination conditions would be fraught with difficulties, if not impossible; and

WHEREAS, protection of public health, safety and welfare in regard to the atmospheric release of nuclear waste material is a responsibility that must be shared by Progress Energy/CP&L; local law enforcement and emergency management/ response agencies and others; the NC Utilities Commission; the N.C. Department of Crime Control & Public Safety and others; and the US Department of Homeland Security, Environmental Protection Agency and others; as well as the public;

NOW, THEREFORE, do we, the Orange County Board of Commissioners, hereby resolve to request and recommend that Progress Energy/CP&L; the NC Utilities Commission, Department of Crime Control & Public Safety and others; and the US Department of Homeland Security, Environmental Protection Agency work with the appropriate local, state and federal government transportation planning, law enforcement and emergency management/response agencies and personnel to develop and coordinate emergency management, response and evacuation plans for the entire fifty-mile radius surrounding its Shearon Harris nuclear power plant.

This is the 3rd day of October, 2006



Barry Jacobs, Chair
Orange County Board of Commissioners

CNN.COM

Apex mayor: Fire fizzling; evacuees can't go home yet

POSTED: 8:03 p.m. EDT, October 6, 2006

Story Highlights

- Mayor says residents can't go home until at least Saturday
- Firefighters still trying to put out three fires beneath collapsed building
- Parent company of plant will reimburse displaced residents for expenses
- It could take up to 12 hours to put out the fires

APEX, North Carolina (CNN) -- Firefighters will not be able to put out the blaze at a hazardous waste plant until Saturday at the earliest, the mayor said, adding that his earlier assertion that evacuees may be able to return home Friday evening was optimistic.

Three fires were still burning beneath the collapsed building at the plant, Apex Mayor Keith Weatherly said. Environmental Protection Agency officials won't give the all-clear until the fires are extinguished, he said.

The Michigan-based company that owns the plant is reimbursing displaced residents for their expenses, a spokesman said.

Earlier, firefighters in the Raleigh suburban town of 32,000 had hoped to have the blazes out by late Friday afternoon, but that plan proved overly ambitious.

"The strategy that they employed to put out the fires has been unsuccessful," Weatherly said Friday evening. It could take up to 12 hours to put out the fires burning under the rubble.

The Environmental Quality Industrial Services building collapsed Friday as fiery explosions overnight left a gas plume hovering over the town.

The cloud forced residents to flee their homes, but Dianna Kees, spokeswoman for the state Department of Environment and Natural Resources, said preliminary tests by air and water specialists are "not finding anything alarming."

Residents had feared the blaze and ensuing explosions would send noxious fumes over the city, but a fortunate rainfall Friday morning helped wash the air of impurities, officials said.

At a noon news conference, Weatherly said experts were determining the extent of "potential hazard" from chemicals at the plant. (Watch concerns about local pets with nausea, bleeding -- 1:25)

Bruce Radford, Apex Town Manager, had declared a state of emergency and said the business district, town hall and all schools in Apex were to be closed Friday.

No major injuries were reported. Thirteen police officers who were treated at hospitals were released and expected to be back on duty immediately, Weatherly said.

At least 106 residents of a nearby nursing home were hospitalized, according to hospital officials. Others were admitted after complaining of severe respiratory distress.

Thousands evacuated

Half of Apex's residents were told to evacuate after the blasts began late Thursday night. Apex is about 14 miles west of Raleigh.

About 3,850 people left to stay with friends or family. The town set up shelters at elementary schools and shut down sections of major thoroughfares.

All area hotels were booked, Radford said. It was unclear how many residents remained in their homes, said Jane Wilson, public affairs manager for Wake County, where Apex is located. .

Scores of people were hospitalized. Practically the entire eastern part of Apex was evacuated by early Friday, Radford said.

Officials had not yet determined what caused the fire.

Early reports suggested flames from the plant caused nearby petroleum tanks belonging to another company to explode. But officials told the the Raleigh-based News & Observer that may not be the case.

Fireballs seen shooting up

John Echols, 28, who lives near the plant, told the News & Observer that blasts were "like the world's largest bowl of Rice Krispies -- pop, pop, pop! But it was real loud."

At first, fireballs "would shoot up from time to time -- it was nasty," he said.

At one point, flames reached 150 feet. Officials let the fire burn itself out to avoid toxic runoff and the threat to firefighters.

Officials told the News & Observer they still had not determined what chemicals were at the site because the company holds permits to handle numerous toxic substances, including cadmium, chromium, mercury and hazardous organic materials.

The company that owns the plant was fined by the state as recently as March 31, when state officials found six safety violations, according to the North Carolina Department of Environmental and Natural Resources Web site.

The company was required to pay a \$32,000 fine for failing to "minimize the possibility of a sudden or nonsudden release of hazardous waste constituents to air, soil or surface water which could threaten human health or the environment."

The company also was cited for storing a container of hazardous waste beside an incompatible one and for not clearly marking containers to identify their contents.

It also was cited for failing to immediately carry out the procedures outlined in the contingency plan "whenever there is a release of hazardous waste or constituents which threatens or could threaten human health or the environment."

Weatherly said the most recent inspection of the plant was "done on September 28 and 29 with no violation."

Robert Doyle, a spokesman at EQ's headquarters outside Detroit, told The Associated Press about 25 employees work at the Apex plant, all of whom had left the building by 7 p.m. The blasts reportedly started around 10 p.m.

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North Carolina Chemical Fire: What Went Wrong

When a building full of hazardous waste went up in flames, a noxious cloud forced the evacuation of nearly 17,000 — and raised concerns about such facilities nationwide.

By Arianne Cohen

Diagram by Blanddesigns

Published in the January 2007 issue.



The fire that tore through a hazardous waste facility in Apex, N.C., was so dangerous that the fire department just let it burn. (Photograph by Chris Seward/Raleigh News and Observer/WPN)

On the evening of Oct. 5, 2006, Jack Lewis was sprawled on a couch with his bulldog, watching the Tigers beat the Yankees in the playoffs. There's not much else for the police chief of Apex, N.C., to do on a typical Thursday night. "It's usually a quiet, safe town," Lewis says.

Then, at about 10 pm, a series of rapid-fire explosions from a nearby hazardous waste facility rocked the Raleigh suburb, sending Lewis and his colleagues into action. A chemical cloud rose from the site and, fanned by the wind, engulfed the neighborhood to the west. "The whole valley was covered in fog," says Mark Haraway, the town's fire chief. "It was white, and maybe 30 or 40 ft. high."

The facility, one of 11 operated by the Environmental Quality Co. (EQ), consolidated waste materials into 55-gal. drums and 1-cu.-yard plastic "totes," and stored the containers until they were transferred to disposal and recycling plants. As the flames spread, a site manager reportedly told responders that the building might contain pesticides, herbicides, sulfurs and paints. But, remarkably, no one at EQ could confirm what chemicals were burning. Firefighters soon heard the drums popping open in the heat — more than three dozen explosions in 4 hours.

Quick action by Lewis and local fire officials helped prevent deaths and limit damage. Nonetheless, the blaze highlighted the risks posed by the nation's hundreds of similar sites, and raised concerns about the lack of national standards for dealing with toxic fires.

Lewis asked the Federal Aviation Administration to close local airspace, and ordered the evacuation of about 7000 residents in the cloud's path. At first, firefighters didn't fight the blaze, which could have exposed them to deadly gases and, ironically, spread the contamination farther. Instead, they focused on containment. Three hundred firefighters from four counties responded, many helping to build a dirt berm around the fire, to prevent chemical runoff down the sloping land and the spread of the 10-story flames. "The emergency response was appropriate and efficient," says Robert Hall, the lead investigator for the U.S. Chemical Safety Board (CSB).

By 3 am, shifting winds had helped spread the cloud, and Lewis expanded the evacuation order to 10,000 more residents. A downpour then provided some relief, washing acids from the air. The acids "get into the water supply, but become diluted quickly," says William Grosshandler, fire re-search chief at the National Institute of Standards and Technology.

By midday Friday, the flames had subsided enough to allow Haraway's team to attack the blaze, aided by an industrial fire company. They used an aqueous film-forming foam to prevent chemical runoff and suppress vapors.

The origin of the fire may never be known with certainty. "The building is essentially destroyed, so there's really no evidence," Hall says. However, his team concluded that it probably began in a part of the facility where oxidizers, such as pool chlorination tablets, were kept. The likely cause: improper mixing of chemicals.

In March 2006, the North Carolina Department of Environmental and Natural Resources fined the company \$32,000 — a

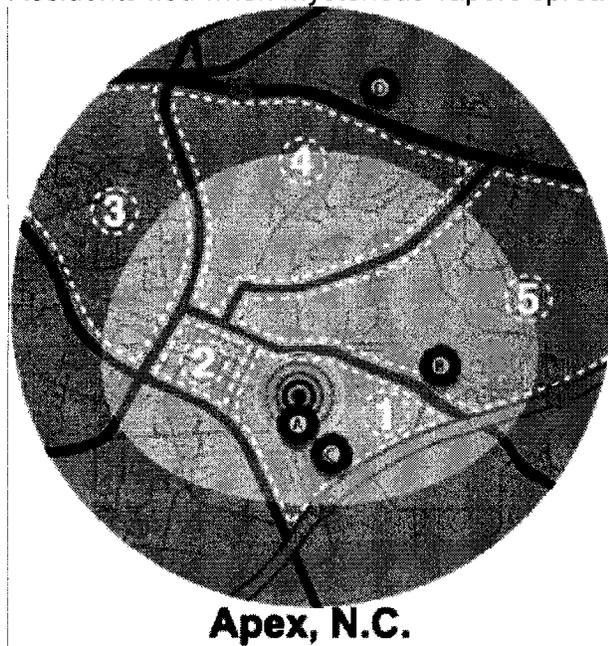
large figure by the state's standards. The violations included storing incompatible chemicals together and failing to enact the proper contingency plan during a hazardous waste release. (EQ also faces an investigation into an explosion that occurred in the summer of 2005 in a Michigan facility — one that may have followed the improper mixing of chemicals.) "We welcome any regulatory agency's input, and plan to work closely with investigating agencies," says EQ spokesman Robert Doyle.

The Apex incident highlights the lack of a national fire code to govern waste transfer sites. "The fire raises a number of questions, including whether better fire detection, protection, firewalls and separation measures could improve the safety of hazardous waste facilities — especially those close to residential neighborhoods," says CSB head Carolyn W. Merritt. And, she continues, local officials need accurate information on what is stored in these facilities.

In Apex, an air and water sampling by federal and state environmental agencies revealed no hazardous levels of contamination. Residents began returning home on Oct. 7. By then, Haraway says, "the building looked like a molten pile of metal."

Chemical Cloud

Residents fled when mysterious vapors spread over a square mile of Apex, N.C.



FIRE

Shortly before 10 pm on Oct. 5, a fire broke out at the Environmental Quality hazardous waste facility on Investment Boulevard. On Oct. 7, firefighters finally extinguished the blaze with film-forming foam.

HEADQUARTERS

Emergency responders initially set up headquarters on Schieffelin Road (A). As they assessed the situation, headquarters was moved twice—to sites (B) and (C)—before officials settled at a safe distance on Highway 64 (D).

EVACUATION

As a chemical cloud spread, 7000 residents were evacuated from zones 1 and 2, and parts of 3, 4 and 5. Shifting winds caused the displacement of another 10,000 residents. A shelter was erected at a local school before being moved to nearby Cary, N.C.

'All Clear' Given for Chemical Fire; Evacuees Permitted to Return

10/7/2006

Residents of Apex forced to evacuate after a chemical fire have been given an "all-clear" to return by local officials. Apex leaders announced a phased-in plan for evacuated residents to return to their homes.

Town officials want residents to return in an orderly manner to avoid delays and ensure safety.

Commander Larry Cseh (pronounced check) and Dr. Robert L Williams of the Federal Center for Disease Control and Prevention (CDC) reviewed the sampling data by the U.S. Environmental Protection Agency (EPA) and Center for Toxicology and Environmental Health (CTEH) group and see no levels exceeding those expected to cause adverse health effects.

Environmental Quality Co. stored a variety of chemicals on the Apex site, including oil- and latex-based paints, household cleaners, detergents and pool chemicals. Concerns about toxic smoke and ash forced the evacuation of surrounding residents. The evacuation area impacted approximately 16,000 residents of Apex. Local officials confirmed that nearly 4,000 people left their homes to seek shelter with friends and family members, in local hotels and at local emergency shelters.

Chemical analyses of the surrounding area Friday detected no toxins at levels sufficient to cause long-term health problems. Air monitoring by the U.S. Environmental Protection agency and private consultants, along with state and local responders found that, except in the immediate vicinity of the facility, concentrations of volatile organic compounds were below any level of concern.

"On-site toxicological testing results do not indicate immediate or long-term risk for Apex residents," said Rick Rowe, Wake County Environmental Services director. "Wake Environmental Services and state agencies will continue to monitor air and water quality conditions in the affected area as an added precaution. I'd like to thank the residents in the evacuation area for their cooperation, patience and understanding during this time of crisis."

Because the chemicals involved in the fire were highly volatile, they quickly dissipated into the atmosphere. There should be no residual chemicals, odors or vapors, officials determined.

Wake County Environmental Services inspection officials are working with N.C. Department of Environmental and Natural Resources (NCDENR) to establish an inspection pattern of commercial kitchens and other regulated facilities, notably childcare facilities, in the evacuation area. Once the evacuation order is lifted, County inspection officials will be working in stages to inspect and clear Apex facilities to re-open for business.

"We want to reassure the public that we don't feel there is a significant health risk of any side effects," said Gibbie Harris, Wake County Community Health director. "However, people in the evacuation area should be alert of symptoms, such as respiratory

Related Information:

[Frequently Asked Questions Concerning Returning to Your Home Following Apex Fire Evacuation](#)

[Apex: Return Home Safely](#)

[Phased Map for Re-entry](#)

[Citizen Re-Entry Plan](#)

or breathing problems and unexplained skin irritations or rashes. We advise anyone experiencing symptoms to seek medical attention."

Although it is not necessary, returning residents who have concerns about chemical residue may take the following precautions:

- Shower and wash clothes thoroughly.
- Change heat/air filters.
- Wash bedclothes.
- Wipe or wash counters with water or mild soap.
- Wash children's toys.
- Wash pet toys and food/water containers, particularly if these items are kept outside. You may also want to bathe your pet.

Packaged food should be free from contamination. Use normal precautions with food left out or unrefrigerated for an extended time. Medicines stored in their original, sealed containers should be fine. Any medications left open or not stored in their original, sealed containers should be discarded.

Wake County and American Red Cross opened two elementary schools as shelters Thursday night where they served an estimated 400 evacuees. These sites were consolidated into a single shelter Friday morning at Green Hope High School, 2500 Carpenter Upchurch Road, Cary, where a total of 142 individuals were served. Other evacuees found other accommodations. Wake Animal Care, Control and Adoption program had also dispatched mobile pet care facilities.

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Apex, County Officials Indicate Fire Under Control

10/7/2006

7 a.m. News Conference Scheduled to Announce Re-entry Plans

Fire and HAZMAT officials at the incident command center in Apex are reporting that the chemical fire at Environmental Quality Company will be extinguished in the initial 12 hours previously estimated.

"We are making good headway on the fire," said Gene Schulze, spokesperson and Apex Town Council member from the incident command center. "Every indication is that the fire will be extinguished early Saturday morning."

Schulze said that the evacuation order remains in place until Apex Town leaders announce re-entry plans after all fires have been confirmed extinguished. Town officials will announce those plans at a news conference at 7 a.m., Saturday, October 7, provided all fires are extinguished.

Schulze praised HAZMAT and fire personnel, saying they had been working around-the-clock to tackle the stubborn fires remaining under the metal structures of the collapsed EQ building that required heavy excavators to remove.

Environmental Quality stored a variety of chemicals on the site, including oil- and latex-based paints, household cleaners, detergents and pool chemicals. Concerns about toxic smoke and ash forced the evacuation of surrounding residents. The evacuation area impacted approximately 16,000 residents of Apex. Local officials confirmed that nearly 4,000 people left their homes to seek shelter with friends and family members, in local hotels and at local emergency shelters.

Wake County Emergency Operations Center reported that EQ offered shelter residents who were evacuated to Green Hope High School accommodations at a local hotel. Only five guests remained at the evacuation shelter as of midnight Friday.

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CHAPEL HILL, N.C. 27515-3793
919-942-0600

May 18, 2007

VIA EMAIL & MAIL

Office of the Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attn.: Rulemaking and Adjudications Staff

Re: Request for a Hearing and Petition for Leave to Intervene
Renewal of Facility Operating License No. NPF-63
Carolina Power & Light Company
Shearon Harris Nuclear Power Plant, Unit 1 (Docket No. 50-400)

Dear Sirs:

Attached please find the and Petition for Leave to Intervene Request for a Hearing in the Renewal of Facility Operating License No. NPF-63 by Carolina Power & Light Company for the Shearon Harris Nuclear Power Plant, Unit 1, by the N.C. Waste Awareness and Reduction Network and the Nuclear Information and Resource Service.

Please contact me at my email address, jrunkle@mindspring.com, upon receipt of this document.

Sincerely,



John D. Runkle

cc. John H. O'Neil, Jr.
Pillsbury Winthrop Shaw Pittman
2300 N Street, NW
Washington D.C. 20037