

RAS 2645

January 16, 2001

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE COMMISSION

DOCKETED
USNRC

In the Matter of)
)
CAROLINA POWER & LIGHT)
(Shearon Harris Nuclear)
Power Plant))

'01 JAN 22 A9:10
Docket No. 50-400 - LA
ASLBP No. 99-762-02-LA
OFFICE OF SECRETARY
RULEMAKING AND
ADJUDICATIONS STAFF

**ORANGE COUNTY'S REPLY TO NRC STAFF'S AND
CP&L'S OPPOSITIONS TO PETITION FOR REVIEW
AND REQUEST FOR IMMEDIATE SUSPENSION AND STAY OF
THE NRC STAFF'S NO SIGNIFICANT HAZARDS DETERMINATION
AND ISSUANCE OF LICENSE AMENDMENT FOR
HARRIS SPENT FUEL POOL EXPANSION**

Introduction

On December 22, 2000, the Board of Commissioners of Orange County, North Carolina ("BCOC" or "Orange County") petitioned the Nuclear Regulatory Commission ("NRC" or "Commission") for review and immediate stay or suspension of the NRC Staff's No Significant Hazards Determination ("NSH Determination") and issuance of a license amendment for the expansion of spent fuel pool storage capacity at the Shearon Harris nuclear power plant.¹ Both the NRC Staff and the Applicant, Carolina Power & Light Company ("CP&L"), have opposed the petition.² Their responses are completely inadequate to defend the validity of the Staff's No Significant Hazards ("NSH") Determination, or to show that the issuance of the license amendment should not be

1 Orange County's Petition for Review and Request for Immediate Suspension and Stay of the NRC Staff's No Significant Hazards Determination and Issuance of License Amendment for Harris Spent Fuel Pool Expansion ("BCOC Petition").

2 NRC Staff Opposition to Orange County's Petition for Review and Request for Immediate Suspension and Stay of the NRC Staff's No Significant Hazards Determination and Issuance of License Amendment for Harris Spent Fuel Pool Expansion (January 8, 2001) ("Staff Response"); Carolina Power & Light's Response to

Template = Secy - 021

SECY02

suspended. In fact, the Staff does not even attempt to provide a rationalization for its NSH Determination, but remains resoundingly silent in response to Orange County's charge that it unlawfully failed to respond to comments on the NSH Determination, arbitrarily ignored the relevance of the pending environmental adjudication, and clearly erred in its application of the NSH criteria in 10 C.F.R. § 50.92(a).

For its part, CP&L rests largely on the patently erroneous legal theory that the environmental concerns raised by Orange County are not relevant to a NSH review. As discussed below, and in the attached Declaration of 16 January 2001 by Dr. Gordon Thompson in Response to Submissions Dated 8 January 2001 by Carolina Power & Light and the NRC Staff ("Thompson 16 January Declaration"), neither the Staff nor CP&L has demonstrated that the Commission should not take discretionary review and immediately suspend the issuance of the Harris license amendment.

I. ORANGE COUNTY MEETS THE COMMISSION'S STANDARD FOR TAKING DISCRETIONARY REVIEW.

A. The Commission is Not Prohibited From Taking Review of the Staff's No Significant Hazards Determination.

At the outset, both the Staff and CP&L argue that under the regulations, Orange County has no right to seek review by the Commission. NRC Staff Response at 4, CP&L Response at 7. Orange County has not asserted such a right; rather, it requests the Commission to exercise its power of discretionary review and its inherent supervisory authority over this proceeding. The Commission's authority to take discretionary review is established in 10 C.F.R. § 50.58(b)(6), and was exercised in the case cited by the Staff and CP&L, *Pacific Gas & Electric* (Diablo Canyon Nuclear Power Plant, Units 1 & 2),

Orange County's December 22, 2000, Filing (January 8, 2001) ("CP&L Response").

CLI-86-22, 24 NRC 1, 4-5 (1986) (hereinafter “*Diablo Canyon*”), *rev’d and remanded on other grounds, San Luis Obispo Mothers for Peace v. NRC*, 799 F.2d 1268 (9th Cir.

1986). While the Commission must decide to take review on its own motion, it need not disregard the arguments set forth by Orange County.

The NRC Staff and CP&L also argue that it is inappropriate to apply the standard in 10 C.F.R. § 2.786(b)(4) to determine whether discretionary review is warranted, because this proceeding does not involve review of a Presiding Officer’s decision. NRC Staff Response at 3-4, CP&L Response at 8. Section 2.786(b)(4) is the only NRC regulation that provides a standard for discretionary review by the Commission; although technically it applies only to review of decisions by Presiding Officers, there is no other regulation that provides a separate standard for Commission review of Staff actions. Under the circumstances, it is appropriate to consult the guidance provided in § 2.786(b)(4). Neither the Staff nor CP&L has provided any practical reason why application of the criteria set forth in § 2.786(b)(4) would be inappropriate here.

Finally, contrary to CP&L’s argument at page 8 of its response, BCOC’s Petition does not constitute an inappropriate request for “interlocutory review.” As provided by 10 C.F.R. § 50.92(a), a NSH determination is “final.” Pursuant to 42 U.S.C. § 2239(b), such a final decision is “subject to judicial review.” Nonetheless, because the NSH Determination was made by the NRC Staff, apparently without seeking the approval of the Commissioners as the highest level of decisionmaking authority in the agency, the County believes it is appropriate to seek Commission review before bringing the matter to the U.S. Court of Appeals.³

³ The suggestion in CP&L’s Response at page 8 that Orange County is trying to obtain

B. This Case Meets the NRC's Standard for Discretionary Review.

1. By itself, the Staff's complete failure to respond to Orange County demonstrates that review is warranted.

In its Petition, Orange County asserts two fundamental legal errors in the Staff's NSH Determination, which meet the Commission's criteria for taking discretionary review. First, the Staff ignored relevant severe accident-related comments filed by Orange County; second, the Staff disregarded the significance of the Board's decision to admit Orange County's severe-accident-related contention for litigation. In addition, Orange County asserts that the Staff had committed a significant and clear factual error because the proposed license amendment does not satisfy the NRC's criteria for a NSH determination in 10 C.F.R. § 50.92(c)(1)-(3).⁴ BCOC Petition at 8-15.

The NRC Staff makes no response whatsoever to Orange County's assertions that it failed to respond to the County's severe accident-related comments, or take the obvious relevance of the pending environmental adjudication into account. The Staff neither attempts to refute Orange County's arguments regarding its legal obligations, nor does it dispute Orange County on the facts. It simply says nothing. By its silence, the Staff effectively concedes that it failed to follow the fundamental legal requirements for

interlocutory review of some decision in the pending license amendment proceeding is nonsensical. Orange County does not seek review of any action by the Licensing Board.

4 The NRC standard for making a No Significant Hazards determination is found in 10 C.F.R. § 50.92(c)(1)-(3), which provides that the NRC may find that a license amendment poses no significant hazards considerations if it would not:

- (1) Involve a significant increase in the probability or consequences of an accident previously evaluated;
- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or
- (3) Involve a significant reduction in a margin of safety.

rational and accountable decisionmaking.

Moreover, the Staff makes no attempt to address the substantial question of whether it committed a clear error in determining that the Harris license amendment application satisfies the criteria in 10 C.F.R. § 50.92(a). Instead, in the context of opposing the stay motion, the Staff tries two strategies for shifting the ground of the debate: first, by arguing that the issue on review is the merits of BCOC's case in the environmental adjudication; and second, and by attacking the qualifications of Orange County's expert, Dr. Gordon Thompson. Neither of these arguments has any merit.

As its first tactic of distraction, the Staff argues that the relevant issue before the Commission is whether BCOC "is likely to prevail on its assertion that accident sequence postulated by its witness, Dr. Thompson, as EC-6 is not remote and speculative and requires preparation of an EIS." NRC Staff Response at 5. The Staff then embarks on a lengthy defense of its position in the pending license amendment proceeding. *Id.* at 6-11. This argument is pure sophistry. The question before the Commission, which constitutes both the subject of Orange County's Petition for Review and the legal issue on which Orange County must show a likelihood of prevailing on the merits, is this: whether the NRC Staff committed a clear factual error when it decided that the proposed Harris license amendment meets its criteria for a No Significant Hazards Determination in 10 C.F.R. § 50.92(a). The Staff's NSH Determination must be reversed if it is in error. *See San Luis Obispo Mothers for Peace v. NRC*, 799 F.2d 1268, 1271 (9th Cir. 1986). The Commission need not look to the relative merits of the parties' positions in the pending environmental adjudication in order to make such a ruling.⁵

⁵ The Staff's Response and the accompanying Affidavit of Gareth W. Parry in Support

Ironically, the Staff ignores the one aspect of the pending environmental adjudication that is highly relevant to its NSH Determination: the Licensing Board's decision in LBP-00-19 to admit Contention EC-6 for litigation. As the Court of Appeals recognized in *San Luis Obispo Mothers for Peace v. NRC*, the regulations in 10 C.F.R. § 50.92(a) "appropriately require a hearing before the proposed license amendment becomes effective whenever the amendment *creates the possibility* of a new or different kind of accident." 799 F.2d at 1270 (emphasis in original). By admitting Contention EC-6, which postulates a severe spent fuel pool accident scenario not previously considered in any EIS, the Licensing Board presumptively established the "possibility of a new or different kind of accident from any accident previously evaluated." See 10 C.F.R. § 50.92(a)(2). The Staff may not dispense with that established possibility by pre-judging the merits of Orange County's contention.⁶ *Id.*; see also House Conf. Rpt. No. 97-884.

The Staff's second tactic of distraction is to reprise its habitual attack on the qualifications of Orange County's expert, Dr. Gordon Thompson. Staff Response at 10. In this attack, the Staff is joined by CP&L. CP&L Response at 19-20. The attack is not only completely meritless, but it is hypocritical, because it fails to acknowledge that over

of NRC Staff Opposition, Etc., are replete with factual misrepresentations and mischaracterizations of the evidence presented by Orange County in support of Contention EC-6's assertion that the proposed expansion of spent fuel pool capacity at Harris raises the significant and foreseeable possibility of a severe spent fuel pool accident. See Thompson 16 January Declaration, attached.

⁶ In any event, the Staff's characterization regarding the merits of Orange County's position in the pending environmental proceeding is grossly incorrect. The Staff's Response and the accompanying Affidavit of Gareth W. Parry in Support of NRC Staff Opposition, Etc., are replete with factual misrepresentations and mischaracterizations of the evidence presented by Orange County in support of Contention EC-6's assertion that the proposed expansion of spent fuel pool capacity at Harris raises the significant and foreseeable possibility of a severe spent fuel pool accident. See Thompson 16 January Declaration, attached.

the course of this proceeding, the Staff has first mocked -- and then adopted -- key aspects of Dr. Thompson's analyses. Dr. Thompson is highly qualified to testify on issues relating to application of probabilistic risk assessment regarding the Harris design and operation, and his work is more rigorous in significant respects than the analysis submitted by the Staff and CP&L in the pending Subpart K proceeding. *See* Thompson 16 January Declaration, par. 9. Dr. Thompson's qualifications are well established in his 20 November 2000 Declaration, which was attached to Orange County's Petition; and are ably demonstrated by the thorough and scientific report that he submitted in the Subpart K proceeding.⁷ The Staff's and CP&L's attempts to denigrate his qualifications in their Responses are based on mischaracterizations and false statements, and in one particular case, on a total failure to even read Dr. Thompson's analysis. *See* Thompson 16 January Declaration, *passim*.

Perhaps the best evidence of the lack of merit of the Staff's criticisms of Dr. Thompson's qualifications lies in the fact that the Staff has now accepted and utilized key assertions by Dr. Thompson that it formerly denigrated as baseless. *See* Orange County's Detailed Summary at 19-21. In particular, the Staff first scoffed at, and then adopted, Dr. Thompson's views that (a) partial drainage of a spent fuel pool (*i.e.*, adiabatic heatup conditions) is a more severe condition than complete drainage, and is reached earlier; (b) that spent fuel that has been removed from a reactor for over five years is susceptible to zircaloy/fire exothermic reaction, and (c) that the probability of a fire in aged fuel is within the same range as the probability of a severe reactor accident as predicted by

⁷ A copy of that report was also attached to Orange County's Petition.

NUREG-1150.⁸ *Id.* Thus, the Staff's attack on Dr. Thompson is disingenuous.

Moreover, the Staff's own analyses lack the level of scientific rigor, documentation, and rationality required to defend its failure to prepare an EIS for the proposed Harris license amendment; and the affidavit prepared in support of the NRC Staff's Response shows a failure to follow basic principles of scientific discourse. *See* Thompson 16 January Declaration, pars. 9, 23 and 24.

2. CP&L errs in arguing that beyond-design basis accidents and environmental considerations are outside the scope of a No Significant Hazards determination.

CP&L admits that the Staff did not respond to the County's severe-accident-related comments [CP&L Response at 15], but argues that this was not legal error, because the severe accident-related considerations raised by Orange County are irrelevant to the NSH Determination. *Id.* at 9-10. According to CP&L, "beyond-design-basis accidents" such as a severe spent fuel pool accident are not within the scope of permissible considerations under 10 C.F.R. § 50.92. *Id.* Based on this argument, CP&L dismisses as irrelevant the various severe accident-related respects in which its license

⁸ These concessions were made by the NRC Staff in the course of a November 2, 2000, meeting of the Advisory Committee on Reactor Safeguards regarding the Staff's Draft Technical Study of Spent Fuel Accident Risk at Decommissioning Plants (noticed in the Federal Register at 65 Fed. Reg. 8,825 (February 22, 2000)). The County presumes that these concessions are reflected in the final version of the Technical Study, which has been completed and delivered to the Commission, but which has not yet been released to the public.

Orange County submits that the Technical Study has a bearing on the disposition of its Petition, because it addresses issues related both to the merits of the attacks by the Staff and CP&L on Dr. Thompson's qualifications, and also to the issue of irreparable harm. The Draft Technical Study has been commented on extensively, and the parties are well aware of its content and evolution. In the interest of fairness and full disclosure, Orange County requests that the Commission release it immediately and provide a copy to

amendment application fails to satisfy 10 C.F.R. § 50.92. Thus, CP&L dismisses as “irrelevant” the Licensing Board’s recognition of the possibility of a severe spent fuel pool accident in LBP-00-19, the significantly increased consequences of a severe reactor accident, and the decreased margin of safety posed by the risk of a severe spent fuel pool accident.

CP&L provides absolutely no support for this curious assertion of legal irrelevance; nor can any be found in the statute, the regulation, or the legislative history of the *Sholly Amendment*. To the extent that CP&L is asserting that environmental issues are not within the scope of relevant No Significant Hazards considerations, CP&L’s position is directly contradicted by the *Sholly Amendment’s* legislative history. The Conference Report accompanying the *Sholly Amendment* specifically states that the NRC Staff’s task in a No Significant Hazards review is to identify the issues raised by the proposed license amendment and “determine whether they involve significant health, safety or environmental considerations.” House Conf. Rpt. No. 97-884 (September 28, 1982). Thus, it is quite clear that neither Congress nor the NRC intended that the *Sholly Amendment* or 10 C.F.R. § 50.92 would trump NEPA’s statutory requirement for consideration of significant environmental impacts *prior* to the issuance of a license.

To the extent that CP&L is arguing that beyond-design-basis accidents need not be considered in an NRC licensing review, that reasoning is flatly inconsistent with prior Commission and court precedents. *See, e.g., Limerick Ecology Action v. NRC*, 869 F.2d 723, 736 (3rd Cir. 1989); *Vermont Yankee Nuclear Power Co.* (Vermont Yankee Nuclear

Power Station), CLI-90-7, 32 NRC 129, 132 (1990).⁹ CP&L's position is also inconsistent with LBP-00-19, the Licensing Board's decision admitting Contention EC-6. As the Licensing Board implicitly recognized in LBP-00-19, whether or not an accident is considered "beyond-design-basis," it must be addressed in an Environmental Impact Statement ("EIS") if its probability cannot be ruled out as "remote and speculative." *Id.*, slip op. at 13. In fact, the second criterion of the No Significant Hazards standard goes even farther than NEPA, because it rules out pre-hearing issuance of license amendments where there is even the "*possibility*" of an accident that has not been previously considered.

Here, by admitting Contention EC-6, which postulates a severe spent fuel pool accident scenario not previously considered in any EIS, the Licensing Board presumptively established the "possibility of a new or different kind of accident from any accident previously evaluated." *See* 10 C.F.R. § 50.92(a)(2). As the Court of Appeals recognized in *San Luis Obispo Mothers for Peace v. NRC*, the NRC's regulations in 10 C.F.R. § 50.92(a) "appropriately require a hearing before the proposed license amendment becomes effective whenever the amendment *creates the possibility* of a new or different kind of accident." 799 F.2d at 1270 (emphasis in original). The Staff may not dispense with that established possibility by pre-judging the merits of Orange County's contention. *Id.*; *see also* House Conf. Rpt. No. 97-884. Only if and when the

⁹ CP&L cites *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), LBP-87-17, 25 NRC 838, 846 (1987), for the proposition that the Commission's Policy Statement on Severe Reactor Accidents "explicitly removes plant-specific reviews of control or mitigation of severe accidents from the review of operating-license applications." CP&L Response at 10, note 31. However, CP&L neglects to acknowledge that this aspect of the Severe Accident Policy Statement was explicitly overruled in *Limerick Ecology Action v. NRC*, 869 F.2d 719, 736-41 (3rd Cir. 1989).

issue is resolved by the Licensing Board in CP&L's favor can the NRC issue the license amendment.

3. CP&L's factual defense of NSH Determination is without merit.

As discussed above, the NRC Staff has made no attempt to defend the merits of its NSH Determination. CP&L does make such an attempt, but its arguments are to no avail. As discussed above, CP&L's arguments are largely based on the erroneous premise that environmental and severe accident-related considerations are beyond the scope of a No Significant Hazards determination. To the extent that CP&L actually engages Orange County's factual assertions, its response is based on factual errors and mischaracterizations, as discussed below.

a. Significant increase in the probability or consequences of an accident previously evaluated

CP&L argues that the proposed license amendment "does not result in a significant increase in the probability or consequences of an accident previously evaluated." CP&L Response at 13. CP&L disputes Orange County's assertion that by doubling the number of fuel handling activities, CP&L will double the likelihood of a fuel handling accident. *Id.* CP&L argues that this "simple extrapolation" is inappropriate because fuel movements are not random events. *Id.* According to CP&L, Orange County's assertion reflects a "complete lack of knowledge of probabilistic methodology." *Id.* As discussed in the Thompson 16 January Declaration, however, it is CP&L's argument which reflects a lack of knowledge of probabilistic methodology. If one makes the reasonable assumption that the probability of a spent fuel handling accident, per fuel handling operation, is relatively small, then the probability of a fuel handling accident will be

closely related to the increase in the number of fuel handling operations. *Id.*, par. 6.

CP&L also argues that the County's predicate for consequences is "wrong," because the capacity of the Harris spent fuel pools will not exceed the "previously licensed" level of 7,640 fuel assemblies until "about 2016." CP&L Response at 14. CP&L reads new language into 10 C.F.R. § 50.92. The standard in 10 C.F.R. § 50.92(a)(1) is whether the proposed license amendment would involve a "significant increase in the consequences of an accident previously evaluated." CP&L would like to change the standard to be whether the proposed license amendment would involve a significant *and immediate* increase in the consequences of an accident previously evaluated. However, the language is not there. The proposed license amendment would permit the storage of up to 8,384 spent fuel assemblies in pools C and D.¹⁰ *See* License Amendment Application, Enclosure 1 at 3 (December 23, 1998). This is roughly double the amount of spent fuel that is currently licensed to be stored in pools A and B [*id.*,] and approximately ten percent more fuel than was originally licensed and assumed in the original EIS for the licensing of the Harris facility.¹¹ By any measure, the increase in the

¹⁰ CP&L repeatedly provides misleading information regarding the spent fuel pool capacity that would be allowed by the proposed license amendment. In two separate discussions regarding the company's plans for spent fuel storage expansion, CP&L states that the total licensed capacity of pools A, B, and C, would be 7,359 fuel assemblies. *See* Response at page 3 note 4 and page 14 note 47. In making this assertion, CP&L conveniently neglects to mention pool D, which is also covered by the license amendment application, and which would hold an additional 1,025 assemblies. While CP&L does not intend to fill pool D until a later "campaign," after it has obtained NRC permission to exceed the 1.0 million BTU/hour limit on the head load in pools C and D, no further licensing action will be needed to store 1,025 spent fuel assemblies in pool D. That permission has been granted in this license amendment proceeding. *See* BCOC Petition at 4 note 3, *citing* License Amendment Application, Enclose 1 at 3 (December 23, 1998).

¹¹ *See* NUREG-0972, Final Environmental Statement Related to the Operation of Shearon Harris Nuclear Power Plant Units 1 and 2, Docket Nos. STN 50-400 and STN

inventory of spent fuel at Harris is significant in comparison with what exists now or what was previously assumed to exist, and therefore the increased consequences of a radioactive release from that inventory would be significant.¹²

b. Possibility of a new or different kind of accident

CP&L asserts that “[t]he postulated scenario is independent of placing spent fuel pools C and D in service.” *Id.* This assertion misses the point that a severe spent fuel pool accident has *never* been considered previously in an EIS for Harris, for any other plant, or generically.¹³

CP&L also asserts that the probability of Orange County’s postulated accident scenario “is actually diminished by the commissioning of the SFPPCS for spent fuel pools C and D.” CP&L Response at 14-15. As discussed in Dr. Thompson’s 16 January Declaration, however, the presence of a second SFPPCS would be irrelevant in most scenarios leading to ongoing loss of pool cooling and makeup. *Id.*, par. 12. Moreover, this issue is a subject of significant dispute between the parties. *Id.* It would be

50-401, Carolina Power and Light Company (October 1983).

12 In this regard, it is important to note that 1983 EIS did not “evaluate” severe spent fuel pool accidents or their consequences at all, and instead examined only the consequences of core melt release accidents. *Id.*, § 5.9.4.5. As discussed in Dr. Thompson’s report of November 20, 2000, 70 million curies of cesium-137 could be released to the atmosphere from the Harris pools if all fuel aged up to nine years were to undergo exothermic reaction. *Id.* at 46-47. This is 30 times the number of curies that would be released in the most severe reactor accident identified in the Individual Plant Evaluation (“IPE”), a risk assessment that was prepared for Harris by CP&L. See Thompson, *Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant* at 9 (February 1999). (This report was attached as an exhibit to Orange County’s Request for Admission of Late-Filed Environmental Contentions (January 31, 2000).

13 CP&L also asserts that the postulated consequences of the scenario are dominated by the spent fuel stored in spent fuel pools A and B. CP&L Response at 14. As discussed, *supra*, at note 10, this assertion is based on misleading representations of the amount of

inappropriate to pre-judge the merits of this dispute in the context of the No Significant Hazards proceeding. See *San Luis Obispo Mothers for Peace v. NRC*, 799 F.2d at 1270.

c. Significant reduction in the margin of safety

CP&L argues that to the extent this issue is related to the beyond-design basis accident postulated by Orange County, it is irrelevant to the NSH Determination. CP&L Response at 15. As discussed above, this argument is incorrect. Clearly, the creation of a new and significant environmental hazard would reduce the margin of safety in the operation of the Harris plant.

C. This Case Raises Special Circumstances That Warrant Review.

Citing *Diablo Canyon*, the Staff and CP&L contend that there are no “special circumstances” that would warrant Commission review and the issuance of a stay in this case. NRC Staff Response at 3, CP&L Response at 3, citing 24 NRC at 4. To the contrary, the circumstances of this proceeding are very unusual, because of the NRC Staff’s complete failure to even attempt to defend the NSH Determination that it made in the name of the Commission. Thus, the Staff has, unilaterally and without justification, short-circuited the ongoing environmental adjudication, by issuing the requested license amendment before the hearing is completed.

The record shows that Staff has strayed far outside the bounds of agency accountability, due process and good faith by issuing the NSH Determination without responding to or even acknowledging Orange County’s comments on relevant severe accident risks; without taking into consideration the obvious relevance of the pending litigation of Orange County’s contention regarding the previously unanalyzed hazards of

spent fuel to be stored at Harris under the proposed license amendment.

severe accidents in the Harris spent fuel pools; and without addressing the potential prejudicial effect of its decision on the outcome of a pending NEPA adjudicatory proceeding whose central issue is whether an EIS must be prepared *before* the requested license amendment is issued.

The NRC Staff has committed these egregious legal violations in the name of the Commission. This gives the appearance that the Commission, which sits as the highest appellate body over the ongoing adjudication, and which has supervisory authority over the entire agency, has no regard for its own adjudicatory process. These indeed are special circumstances that warrant review by the Commissioners.

II. ORANGE COUNTY SATISFIES THE COMMISSION'S REQUIREMENTS FOR ISSUING A STAY.

Both the Staff and CP&L contend that Orange County has failed to demonstrate that a stay of the Staff's action is appropriate in this case. They are in error.

First, neither party has controverted Orange County's strong showing that it is likely to prevail on the merits. As discussed above in Section I.B.1, the Staff erroneously claims that the evaluation of this factor calls for an examination of the strength of Orange County's case before the Licensing Board. This is a red herring. The question before the Commission is whether the County is likely to prevail in challenging the lawfulness of the Staff's NSH Determination. Orange County has made a strong showing that the Staff has violated the Atomic Energy Act, the Administrative Procedure Act, and NEPA.

Second, neither the Staff nor CP&L has controverted Orange County's showing that its citizens and other members of the public will be irreparably injured by the increased risk of a severe spent fuel pool accident, and by the irretrievable commitment of resources before the completion of an EIS for the Harris plant.

The NRC Staff argues that the risk alleged by Orange County is “remote and speculative,” and therefore does not warrant issuance of a stay. NRC Response at 11. To the contrary, as Dr. Thompson has demonstrated in his report, the probability of a severe spent fuel pool accident at the Harris nuclear power plant is within the range of foreseeable events. Moreover, the Subpart K submissions prepared by the NRC Staff and CP&L in support of their view that the probability of such an accident is vanishingly low is based on incomplete and poorly documented technical analyses. See Thompson 16 January Declaration, pars. 9, 11. Moreover, as the U.S. Court of Appeals has recognized, even where the likelihood of an accident is small, a stay may be warranted where “the potential severity is enormous” and “the injuries which could result are indisputably irreparable”.¹⁴ *State of Ohio ex rel. Celebrezze v. NRC*, 812 F.2d 288, 291 (6th Cir. 1987).

CP&L argues that because activation of pools C and D would not significantly alter the probability of a pool fire at Harris, Orange County cannot claim that the purported harm would arise from the commissioning of those pools. CP&L Response at 21. This argument ignores the fact that the consequences of a spent fuel pool accident would be raised significantly by increasing the inventory of spent fuel in the pools. Moreover, CP&L is misleading in stating that, because of the heat rate limitation of 1.0 MBTU/hour on the spent fuel to be stored in pools C and D initially, it would take over 100 days for spent fuel pools C and D to dry out if there is a loss of all spent fuel cooling

¹⁴ The Staff’s argument that, in evaluating the potential for irreparable harm, the Commission may not consider the potential consequences of a severe spent fuel pool accident, is absurd. See Staff Response at 12. While accident consequences are not within the scope of Contention EC-6 as admitted by the Licensing Board, this fact has no legal bearing on either the Staff’s No Significant Hazards Determination or the scope of the Commission’s inquiry on this review.

and makeup.¹⁵ In fact, CP&L has agreed that the timing of the pool fire scenario identified by Orange County would be governed by the time to dryout of pools A and B, and CP&L has assumed that a period of 4 days would be available to prevent dryout of pools A and B by providing cooling or makeup.¹⁶ See Thompson 16 January Declaration, pars. 8, 13.

CP&L also argues that it will be months before it begins to place spent fuel in pool C. CP&L Response at 22. However, it is also possible that it will take several months for the Licensing Board to issue its decision as to whether Orange County is entitled to a hearing on Contention EC-6; and it may also take months for such a hearing to be concluded. In the meantime, there is no requirement for CP&L to give any notice to Orange County of its schedule for placing spent fuel in the pools. Under the circumstances, it is appropriate to stay the implementation of the license amendment immediately.

CP&L also concedes that it is going ahead with modifications to the cooling systems for pools C and D. Affidavit of R. Steven Edwards and Robert K. Kunita, par. 11 (January 5, 2001). These modifications could not be completed without the

¹⁵ The 100-day period for dryout of pools C and D depends on the unsupported assumption that the gates between pools A/B and C/D will be closed and perfectly sealed. In fact, if these gates were absent or leaking, pools C and D could dry out in a period much shorter than 100 days. See Thompson 16 January Declaration, par. 13.

¹⁶ In accepting that the timing of the scenario would be governed by the time to dryout of pools A and B, CP&L and the Staff have accepted that a severe accident at one part of the Harris plant, namely a fire in pools A and B, would preclude actions needed to provide cooling or makeup to pools C and D. Neither CP&L nor the Staff has explained why they believe that actions to provide cooling or makeup would be precluded in this case, but would not be precluded in the case of a degraded-core accident with containment failure or bypass.

authorization of the license amendment. *Id.*, par. 7. While these modifications do not involve any change in the radioactive inventory of the plant, they do involve the irretrievable commitment of resources to the expansion of the spent fuel cooling system, before alternatives have been considered. If an EIS ultimately is required for the Harris license amendment, these expenditures may well be considered to constitute sunk costs. In addition, if CP&L is permitted to incur transportation costs involved in bringing spent fuel from other reactors to store in high density racks in pools C and D, these expenditures may also be treated as sunk costs. *See, e.g., Public Service Company of New Hampshire* (Seabrook Station, Units 1 & 2), ALAB-422, 5 NRC 503, 532 (1977). Accordingly, to permit these modifications to go forward would violate the cardinal principle of NEPA that prejudice to environmental decisionmaking must be avoided by preparing an EIS *before* taking a proposed major federal action significantly affecting the human environment. *Robertson v. Methow Valley Citizen Council*, 490 U.S. 332, 349 (1989).

Finally, even assuming for purposes of argument that the Commission finds the potential for irreparable to Orange County is not great, the Commission should take into account the County's high likelihood of prevailing on the merits, which must be considered "inversely proportional" to irreparable harm. *Ohio ex rel. Celebrezze v. NRC*, 812 F.2d at 290.

Third, the Staff admits that it will not suffer irreparable injury if the amendment is suspended. In addition, the injury asserted by CP&L is purely economic, and is therefore not cognizable. *Ohio ex rel. Celebrezze v. NRC*, 812 F.2d at 291.

Fourth and finally, neither the Staff nor CP&L has shown that the public interest

would be served by denying a stay. CP&L claims that issuing a stay would frustrate Congress' and the Commission's intent to expedite spent fuel storage expansion cases, in order to encourage utilities to expand on-site storage. CP&L Response at 24. In passing Section 189a of the Atomic Energy Act, however, Congress also strongly expressed an intention to permit public participation in NRC decisions that require the public to accept the risk of grave injury that is associated with the operation of nuclear facilities. In addition, in passing NEPA, Congress expressed its clear intent to permit public participation in environmental decisionmaking. *Robertson*, 490 U.S. at 349. Here, Orange County has sought to use the NRC's adjudicatory process in order to participate in the decisionmaking process that would permit the Harris nuclear power plant to become the largest spent fuel storage facility east of the Mississippi River. Before CP&L's proposal is approved, Orange County reasonably seeks the preparation of an EIS to evaluate the potential for a severe accident that could have catastrophic consequences for its citizens, and to examine alternatives that would avoid that potential. Orange County is now in the process of advocating for an EIS in the adjudicatory process. At a result of the NSH Determination, the NRC Staff has fatally undermined the adjudicatory process by issuing the requested license amendment before the hearing is concluded. Had the Staff conducted its NSH review in a rational and accountable manner, Orange County is confident that it would not have reached this result. Protection of the public interest in the integrity of the NRC hearing process, as well as the integrity of the NRC's No Significant Hazards review process, warrants issuance of a stay.

Moreover, Congress' purpose of encouraging on-site storage of spent fuel is not served by refusing to stay the Staff's action. CP&L's spent fuel pool expansion proposal

is not designed to promote on-site storage of spent fuel generated at the Harris plant, but to allow Harris to take fuel from other CP&L facilities around the region, and to store it in the cheapest way possible. Orange County legitimately seeks environmental review of the wisdom of this plan and the availability of less dangerous alternatives. If the license amendment is allowed to stand, any actions that are completed by CP&L – such as completion of the cooling system, transportation of spent fuel from other plants to Harris, installation of high-density racks in pools C and D, and packing of the racks with additional spent fuel – may well be seen as irretrievable commitments of resources, thus prejudicing any NEPA review that Orange County may be able to obtain. Accordingly, the public interest would best be served by issuing a stay.

IV. CONCLUSION

For the reasons stated above, the Commission should take review of the Staff's NSH Determination and immediately suspend the effectiveness of the license amendment issued by the Staff.

Respectfully submitted,



Diane Curran
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.
1726 M Street N.W., Suite 600
Washington, D.C. 20036
202/328-3500
e-mail: Dcurran@harmoncurran.com

January 16, 2001

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

_____)	
In the Matter of)	
)	
CAROLINA POWER & LIGHT)	Docket No. 50-400 - LA
(Shearon Harris Nuclear)	ASLBP No. 99-762-02-LA
Power Plant))	
_____)	

**DECLARATION OF 16 JANUARY 2001 BY DR. GORDON THOMPSON
IN RESPONSE TO SUBMISSIONS DATED 8 JANUARY 2001
BY CAROLINA POWER & LIGHT AND THE NRC STAFF**

I, Gordon Thompson, declare as follows:

Introduction

(1) I am the executive director of the Institute for Resource and Security Studies, a nonprofit, tax-exempt corporation based in Massachusetts. Our office is located at 27 Ellsworth Avenue, Cambridge, MA 02139. Information about my experience and capabilities is available in a declaration that I prepared on 22 December 2000. My 22 December 2000 declaration supported Orange County's petition for review and request for stay in regard to the NRC Staff's 'no significant hazards' determination and issuance of a license amendment for expansion of spent fuel storage capacity at the Harris plant.

(2) In response to Orange County's petition, Carolina Power & Light (hereafter, CP&L) and the NRC Staff (hereafter, Staff) presented submissions to the Commission on 8 January 2001. Both submissions made reference to my 22 December 2000 declaration, and to other documents that I have authored in connection with the Harris license amendment proceedings. In their submissions, both CP&L and the Staff misrepresented my analysis and conclusions. Accordingly, I have prepared the present declaration, which corrects the misrepresentations.

Submission by CP&L

(3) On 8 January 2001, CP&L submitted a response to Orange County's petition for review and request for stay.¹ In this submission, CP&L misrepresented my analysis and conclusions at the following locations in the submission: (a) page 6; (b) footnote 14; (c) page 13; (d) page 15; (e) page 17; (f) page 19; (g) page 20; (h) footnote 68; and (i) pages 21-22. These misrepresentations are corrected in the following paragraphs.

(4) On page 6 of its submission, CP&L stated that Orange County, during oral argument on 7 December 2000, complained "that its expert could not understand the analyses proffered by the other parties and that more time was required for more investigation." I was present throughout the oral argument and can vouch that Orange County's attorney never complained that the County's expert (myself) could not understand the analyses proffered by CP&L and the Staff. Instead, Orange County stated in oral argument that the analyses proffered by CP&L and the Staff were incomplete and lacked the technical content that would be required to support their conclusions. For example, the analysis proffered by CP&L provided not a single estimate of the radiation dose that a person on the Harris site would experience pursuant to a degraded-core reactor accident with containment failure or bypass, although the magnitude of this dose was central to the issues under discussion.

(5) In footnote 14 of its submission, CP&L asserted that I "calculated that the temperature of the steam exiting a spent fuel element in the Harris spent fuel pool would be one and a half times the temperature of the surface of the sun." The same assertion was made at greater length in a CP&L submission of 20 November 2000.² During oral argument on 7 December 2000, Orange County pointed out, quoting from the relevant text that I had written, that CP&L's assertion was false. Nevertheless, CP&L repeated this false assertion in its submission of 8 January 2001. Two attachments to this declaration demonstrate the falsity of CP&L's assertion. Attachment 1 is from CP&L's submission of 20 November 2000.³ Attachment 2 is the relevant page of text that I had written.⁴

¹ Carolina Power & Light Company's Response to Orange County's December 22, 2000, Filing, January 8, 2001.

² Summary of Facts, Data, and Arguments on which Applicant Proposes to Rely at the Subpart K Oral Argument Regarding Contention EC-6, Carolina Power & Light Company, 20 November 2000, page 27.

³ Ibid.

⁴ Gordon Thompson, Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant, February 1999, page D-4. This report was included as an

(6) On page 13 of its submission, CP&L disputed Orange County's statement that the proposed amendment of the Harris license would double the probability of a fuel handling accident. I made a similar statement in paragraph 40 of my declaration of 12 February 1999 in connection with the Harris license amendment proceedings. CP&L argued that Orange County's statement "demonstrates a complete lack of knowledge of probabilistic methodology." In support of this argument, CP&L stated that "fuel handling is not a random event." Orange County has never stated that fuel handling is a random event. Clearly, the process of fuel handling consists of a set of planned events. During this process, the potential exists for an error or failure that could lead to an accident, such as a fuel assembly drop. Orange County's statement was based on the principle that the probability of such an accident, integrated over some number of fuel handling operations, is roughly proportional to the number of operations. CP&L disputed this principle, stating that "a simple extrapolation will not yield an accurate probability of error with a higher number of performances." In the footnote that supported this statement (footnote 43), CP&L stated: "the probability of "heads" when flipping a coin is 0.5, whether it is flipped once or an infinite number of times." That statement, while true for an unbiased coin, has no logical connection with the sentence to which footnote 43 was attached. By using the coin analogy, CP&L apparently sought to imply that the probability of a fuel handling accident, per fuel handling operation, is the same for each operation, and that the operations are independent. That is a simplistic picture, but will serve for illustration.⁵ Under these conditions, the cumulative probability of a specified number of accidents over some number of operations is provided by the binomial distribution. Assuming that the probability of an accident during each operation is small, the binomial distribution shows that the cumulative probability of one accident is approximately proportional to the number of operations.⁶ Thus, CP&L, not Orange County, lacks knowledge of probabilistic methodology.

exhibit in Orange County's submission of 20 November 2000, titled Detailed Summary of Facts, Data and Arguments and Sworn Submission on which Orange County Intends to Rely at Oral Argument to Demonstrate the Existence of a Genuine and Substantial Dispute of Fact with the Licensee Regarding the Proposed Expansion of Spent Fuel Storage Capacity at the Harris Nuclear Power Plant.

⁵ In practice, there is a potential for dependent errors or failures during fuel handling operations. Also, the probability of error or failure is not necessarily the same for each operation.

⁶ If the probability of an outcome in one trial is A , the binomial distribution shows that the cumulative probability of one such outcome in N trials is $N \times A \times (1-A)^{N-1}$. If A is small, this expression can be approximated by the expression $N \times A$.

(7) On page 15 of its submission, CP&L stated that, for the pool fire scenario postulated by Orange County, the consequences "are dominated by the spent fuel stored in spent fuel pools A and B." CP&L further stated that the probability of the scenario would be diminished by the activation of pools C and D. CP&L's submission implied that these propositions are beyond dispute. In fact, both statements are contradicted by the findings of my analysis. Paragraph 7 of my declaration of 22 December 2000 stated that activation of pools C and D at Harris would increase the consequences of a pool fire by a factor of up to 2.5; that statement is supported by deterministic calculations. In the same paragraph I stated that activation of pools C and D would not significantly alter the probability of a pool fire at Harris; that statement is supported by analysis that I have performed, drawing upon information provided by CP&L.

(8) On page 17 of its submission, CP&L stated that the pool fire scenario postulated by Orange County would require an absence of spent fuel pool cooling and makeup over a period of weeks. In fact, as stated in paragraph 17 of my declaration of 22 December 2000, the parties to the Harris license amendment proceedings now agree that the timing of this scenario would be governed by the time to dryout of pools A and B. CP&L assumes that a period of 4 days would be available to restore cooling and makeup to pools A and B.⁷ In accepting that the timing of the scenario would be governed by the time to dryout of pools A and B, CP&L and the Staff have accepted that a severe accident at one part of the Harris plant, namely a fire in pools A and B, would preclude actions needed to provide cooling or makeup to pools C and D. Neither CP&L nor the Staff have explained why they believe that actions to provide cooling or makeup would be precluded in this case but would not be precluded in the case of a degraded-core accident with containment failure or bypass.

(9) On page 19 of its submission, CP&L stated that Orange County's "analysis in addressing the Licensing Board's questions was non-existent." In fact, I provided on behalf of Orange County a detailed analysis that was, in significant respects, more rigorous than the analyses submitted by CP&L and the Staff.⁸ I articulated a set of requirements for a comprehensive analysis of the accident scenario under discussion. Neither CP&L nor the Staff articulated such requirements. I discussed the need for a functioning command structure if onsite actions are to be taken in the aftermath of a degraded-core accident at the Harris reactor.

⁷ See paragraph 10 of the 8 January 2001 affidavit by Gareth W Parry of the NRC Staff.

⁸ Gordon Thompson, The Potential for a Large, Atmospheric Release of Radioactive Material from Spent Fuel Pools at the Harris Nuclear Power Plant: The Case of a Pool Release Initiated by a Severe Reactor Accident, 20 November 2000.

Neither CP&L nor the Staff provided a comparable analysis of this subject. I provided deterministic analysis of the probability of a pool fire, given a loss of water, while CP&L and the Staff made arbitrary assumptions about this probability. I accounted for relevant phenomena, including the fragmentation and powdering of high-burnup fuel, that were ignored by CP&L and the Staff. My analysis did not purport to be exhaustive, but was thoroughly documented so that the extent of its completeness could be readily ascertained. By contrast, CP&L and the Staff provided poorly documented analyses that purported to be exhaustive but were not.

(10) On page 20 of its submission, CP&L stated that "Dr Thompson is no expert in the technical disciplines relevant to the issues raised here by BCOC [Orange County]". In fact, I have testified during deposition that I am careful to address only those technical issues that I am qualified to address. I take this posture in recognition of the number of technical disciplines that are required to perform rigorous analysis of nuclear safety issues. Thus, I am qualified to address the issues that have been raised by Orange County. CP&L also stated on page 20 of its submission that in performing my analysis I "made assumptions and performed scoping calculations, which produced nonsensical results." In fact, important parts of my analysis drew directly from CP&L and Staff studies. Other parts consisted of deterministic calculations that have not been disputed by CP&L or the Staff. These parts were supplemented by scoping calculations at points in the analysis where appropriate findings from deterministic calculations or probabilistic models were not available. My analysis was thoroughly documented.⁹

(11) In footnote 68 of its submission, CP&L incorrectly characterized my scoping estimate for the onsite deposition of radioactive material pursuant to a degraded-core reactor accident featuring temperature-induced steam generator tube rupture (TI-SGTR). CP&L stated that I assumed that "all radioactive material released" during the accident would be "uniformly deposited in a 200 meter radius around the release point." In fact, I assumed that a fraction of the radioactive material that would be released to the atmosphere would be deposited uniformly within an area bounded by a circle of 200 meter radius; the remainder of the released material would be carried offsite in an atmospheric plume. I used a scoping calculation for onsite deposition because at present there is no analytic model that can credibly address all of the relevant phenomena, which include: fragmentation and powdering in high-burnup fuel; time dependence of the characteristics of steam released during a TI-SGTR event;

⁹ Ibid.

building wake effects; aerosol agglomeration; plume rainout; varying wind direction and atmospheric stability; and resuspension of deposited material.¹⁰ Neither CP&L nor the Staff addressed this set of phenomena in their analyses.

(12) On pages 21-22 of its submission, CP&L stated that Orange County "was not able to refute in the Subpart K proceeding the analysis that the probability of its postulated scenario was actually less with the License Amendment's implementation and the placing into service a second SFPCCS [spent fuel pool cooling and cleanup system]." In fact, as stated in paragraph 7, above, my analysis showed that activation of pools C and D would not significantly alter the probability of a pool fire at Harris. Specifically, the presence of a second SFPCCS would be irrelevant in most scenarios leading to ongoing loss of pool cooling and makeup. Differences between my findings on this question and the findings of CP&L could not be explored without an evidentiary hearing.

(13) On page 22 of its submission, CP&L stated that Orange County conceded that a heat rate limit of 1.0 MBTU/hr in pools C and D would mean that a period exceeding 100 days would be required for evaporative dryout of pools C and D if cooling and makeup to the Harris pools were unavailable. This calculation would be correct for a situation in which the gates separating pools C and D from pools A and B are in place and are perfectly sealed. However, absence of those gates or leakage past the gate seals would cause water to flow from pools C and D to pools A and B, where this water would be evaporated.¹¹ As a result, pools C and D could dry out in a period much shorter than 100 days. More importantly, the parties to the Harris license amendment proceedings now agree, as explained in paragraph 8 above, that the timing of the pool fire scenario postulated by Orange County would be governed by the time to dryout of pools A and B. Thus, a comparatively long dryout period for pools C and D does not imply that a fire in these pools is a comparatively unlikely event.

Submission by NRC Staff

(14) On 8 January 2001, the Staff submitted a response to Orange County's petition for review and stay.¹² Included in the Staff's submission was a supporting affidavit by Gareth W Parry, a member of the Staff. The Parry

¹⁰ Ibid (especially Appendix D).

¹¹ Neither the position of the gates nor the status of the gate seals is governed by the Technical Specifications for the Harris plant.

¹² NRC Staff Opposition to Orange County's Petition for Review and Request for Immediate Suspension and Stay of the NRC Staff's No Significant Hazards Determination and Issuance of License Amendment for Harris Spent Fuel Pool Expansion, 8 January 2001.

affidavit misrepresented my analysis and conclusions at the following locations in the affidavit: (a) paragraph 3; (b) paragraph 4; (c) footnote 10; (d) paragraph 5; (e) paragraph 6; and (f) paragraph 9.

(15) In paragraph 3 of his affidavit, Dr Parry stated that "the Staff does not consider Dr Thompson to be expert in Probabilistic Risk Assessment...." That statement should be considered in light of the fact that the Staff would be embarrassed if Orange County's position were to prevail in the Harris license amendment proceedings. Dr Parry further stated that "Dr Thompson has admitted that [he] has little or no experience in the other disciplines relating to the analysis of the issues raised by EC-6 [Orange County's admitted environmental contention]". That statement is false. As discussed in paragraph 10, above, I have testified during deposition that I am careful to address only those technical issues that I am qualified to address.

(16) In paragraph 4 of his affidavit, Dr Parry claimed that CP&L had performed detailed onsite radiation dose calculations to support its oral argument on 7 December 2000. Dr Parry also stated: "CP&L did not submit the actual calculations as part of its filing, but this level of detail was not necessary for the purposes of the Subpart K proceeding." Indeed, not only did CP&L fail to submit its dose calculations, but also failed to provide a single estimate of radiation dose. Dr Parry's statement implies that a Subpart K filing is exempt from one of the fundamental requirements of scientific discourse, namely that a discussion of a numerical calculation must be accompanied by the numbers involved in the calculation. I see no valid argument for such an exemption. Instead, I believe that analysis of nuclear risk issues must discriminate between quantitative discussion and qualitative discussion, and must provide the numbers that accompany any quantitative discussion. I ask that my own analysis be judged according to this standard.

(17) In paragraph 4 of his affidavit, Dr Parry stated that Orange County had addressed the onsite deposition of radioactive material using "an extremely simplistic and unrealistic assumption that radioactivity would be deposited evenly across the site." Dr Parry stated in the same paragraph that the Staff's analysis of onsite deposition "carefully took into account conditions within the plant to address habitability concerns inside the plant, and considered the impact of meteorological dispersion on site accessibility." In fact, the Staff used a straight-line Gaussian plume model, embodied in the ARCON code, to assess onsite deposition. The Staff's assessment did not account for the set of phenomena described in paragraph 11, above, whose complexity led me to employ a scoping estimate. The Staff's assessment was simplistic and

nonconservative. Onsite deposition deserves a much more thorough analysis than it has received to date. I look forward to the time when such an analysis is available, so that a scoping estimate is no longer necessary.

(18) In footnote 10 of his affidavit, Dr Parry discussed a statement in paragraph 4 of my declaration of 22 December 2000, regarding the offsite consequences of a large, atmospheric release of radioactive material from the Harris pools. I had stated that the area of the affected environment could exceed the area of North Carolina. Dr Parry characterized this statement as a "misleading exaggeration", and provided arguments to support his characterization. Those arguments misrepresent my analysis and conclusions in two important respects, as explained in the following two paragraphs. First, Dr Parry apparently did not read my supporting analysis but made a guess as to what it might contain, thereby violating a fundamental requirement of scientific review. Second, Dr Parry drew upon information from NUREG-1437, although that information is irrelevant to my statement.

(19) When Dr Parry reviewed my statement that the area of the affected environment could exceed the area of North Carolina, he apparently made no effort to understand the basis for the statement. In footnote 10 of his affidavit Dr Parry proffered the guess, which has no foundation, that my statement was "based on a hypothetical and unrealistic assumption that the fission products are uniformly distributed in all directions." In fact, my statement was based on calculations by Dr Jan Beyea using a straight-line Gaussian plume model, which is an appropriate model for determining the area of land contaminated by offsite deposition.¹³ My use of Dr Beyea's calculations, and the original calculations themselves, are thoroughly described in documents that have been submitted by Orange County as part of the Harris license amendment proceedings. These documents have been readily available to Dr Parry. I am forced to the conclusion that Dr Parry was so focussed on disparaging my analysis that he failed to actually read it, thereby violating one of the fundamental requirements of scientific review.

(20) Dr Beyea's calculations, described in the preceding paragraph, provide the area of land that would be contaminated with cesium-137 pursuant to a postulated atmospheric release of this radionuclide. In these calculations the threshold of contamination is a groundshine dose of 10 rem to an inhabitant over

¹³ Gordon Thompson, Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant, February 1999, Appendix E.

a period of 30 years.¹⁴ That threshold was used in the NRC's Reactor Safety Study of 1975 as an exposure level above which populations were assumed to be relocated from rural areas. In footnote 10 of his affidavit, Dr Parry did not address land contamination. Instead, he cited NUREG-1437 as a source of information about fatal cancer risk.¹⁵ That information is irrelevant for two reasons. First, the information cited by Dr Parry did not address land contamination and the relocation of populations. Second, the cited information pertained to the offsite consequences of reactor accidents rather than spent fuel pool fires. A pool fire at Harris would release to the atmosphere an amount of long-lived radioactive material that would exceed, by a factor of at least 10, the release from an accident at the Harris reactor. The area of contaminated land would therefore be much larger for a pool fire than for a reactor accident.

(21) In paragraph 5 of his affidavit, Dr Parry stated that the Staff "concur with Dr Thompson" that activation of pools C and D would not significantly alter the probability of a pool fire at Harris.¹⁶ Yet, Dr Parry went on to say that activation of pools C and D would, because it would provide additional opportunities for water makeup, mean that "the probability of a pool fire is actually decreased". These two statements by Dr Parry are logically inconsistent.

(22) In paragraph 6 of his affidavit, Dr Parry disputed a statement in paragraph 9 of my 22 December 2000 declaration, wherein I said that available estimates indicate that the probability of a fire in pools C and D at Harris is comparable to the probability of a degraded-core accident at the Harris reactor with containment failure or bypass. Dr Parry stated: "Dr Thompson fails to point out that the only analysis that reaches this conclusion is his own analysis." Yet, in paragraph 8 of his affidavit, Dr Parry stated that the probability of a pool fire is "less than 3E-6/y for all events analyzed" and further stated that "the frequency of severe reactor accidents involving containment failure is on the order of 2E-5/y". The numbers 3E-6 and 2E-5 differ by a factor of seven.¹⁷ When one considers the uncertainty and variability that characterize probability estimates of this kind, and the issues that remain in dispute between Orange County and CP&L and the Staff in the Harris license amendment proceedings, a factor of

¹⁴ Dr Beyea's calculations accounted for cesium weathering and assumed a shielding factor of 0.25.

¹⁵ Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG-1437, May 1996. Dr Parry cited parts of Section 5, "Environmental Impacts of Postulated Accidents".

¹⁶ See paragraphs 7 and 12 of this declaration.

¹⁷ Terrorism and sabotage are not accounted for in the Staff's estimate that the probability of a pool fire is less than 3E-6/y.

seven is comparatively small. Thus, my own analysis is not the sole basis for saying that the probability of a fire in pools C and D at Harris is comparable to the probability of a degraded-core accident at the Harris reactor with containment failure or bypass.

(23) In paragraph 9 of his affidavit, Dr Parry addressed the statement, in paragraph 16 of my declaration of 22 December 2000, that the parties now agree that a loss of water from pools C and D at Harris would inevitably cause a pool fire. Dr Parry sought to add caveats to this agreement. However, he neglected to mention that I provided deterministic analysis to support Orange County's position, while CP&L and the Staff provided nothing more than assumptions. Also, Dr Parry neglected to mention that the Staff, in submissions opposing the admission of Orange County's environmental contentions into the Harris license amendment proceedings, repeatedly scoffed at the County's claim that a loss of water from pools C and D could cause a pool fire. The Staff can no longer sustain that position, but has yet to develop an analytic approach that adequately accounts for the relevant phenomena.

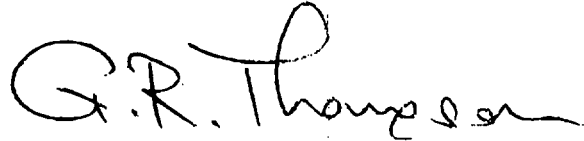
Conclusions

(24) Instead of addressing Orange County's admitted environmental contention on its merits, CP&L and the Staff have repeatedly misrepresented the analysis and conclusions that I have prepared for the County. In its submission of 8 January 2001, CP&L repeated a false description of my analysis despite the County's submission of evidence, during oral argument on 7 December 2000, that CP&L's description was false. In proffering their misrepresentations, both CP&L and the Staff have made illogical statements. Moreover, the Staff's principal expert, Dr Parry, has violated two basic principles of scientific discourse. First, he has argued that the findings of a numerical calculation can be adequately discussed without the submission of a single number. Second, he has offered an opinion about a component of my analysis without reading that analysis.

Thompson declaration in response to CP&L and NRC Staff submissions
16 January 2001
Page 11

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed on 16 January 2001:

A handwritten signature in cursive script that reads "G.R. Thompson". The signature is written in black ink and is positioned above a horizontal line.

Gordon Thompson

November 20, 2000

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

Before the Atomic Safety and Licensing Board

In the Matter of)	
)	
CAROLINA POWER & LIGHT)	Docket No. 50-400-LA
COMPANY)	
(Shearon Harris Nuclear Power Plant))	ASLBP No. 99-762-02-LA

**SUMMARY OF FACTS, DATA, AND ARGUMENTS
ON WHICH APPLICANT PROPOSES TO RELY
AT THE SUBPART K ORAL ARGUMENT
REGARDING CONTENTION EC-6**

Of Counsel:
Steven Carr
Legal Department
CAROLINA POWER & LIGHT
COMPANY
411 Fayetteville Street Mall
Post Office Box 1551 – CPB 13A2
Raleigh, North Carolina 27602-1551
(919) 546-4161

John H. O'Neill, Jr.
Douglas J. Rosinski
SHAW PITTMAN
2300 N Street, N.W.
Washington, D.C. 20037-1128
(202) 663-8000
Counsel For CAROLINA POWER
& LIGHT COMPANY

qualified to make - - to perform a *scoping calculation* of that nature.³⁶

However, Dr. Thompson's one attempt at performing useful "scoping calculations" strongly supports our position regarding his lack of competence. The single example of such a calculation in this proceeding is contained in his February 1999 report to BCOC, in which Dr. Thompson presents a "scoping analysis" to provide "insight" into the heat transfer pathways in the Harris spent fuel pools.³⁷ After considering decay heat output, upper bound of temperature rise, heat transfer by conduction, convective cooling by steam, and cooling by thermal radiation, Dr. Thompson calculated that when one-tenth of a spent fuel assembly is submerged, this "yields a T of 9.800 degrees C." where T is "the temperature of steam leaving the top of the fuel assembly."³⁸ This absurd result is remarkable because it is a steam temperature over one and a half times the temperature of *the surface of the sun*.³⁹

³⁶ Id. at 66-67, 71-72 (emphasis added). Merely being "familiar with the science involved" leads to uniformed "analyses" such as comparing the frequency of a boiling water reactor in-containment spent fuel pool boiling event with the core damage frequency from the Harris IPE, simply because the probabilities are "at a similar level." Id. at 178-79. Even though he admitted that this comparison "doesn't prove anything," Dr. Thompson still based his conclusion "that pool accidents could be a major contributor to risk at Harris" upon it. Id. at 179.

³⁷ G. Thompson, "Risks and Alternative Options Associated With Spent Fuel Storage at the Shearon Harris Nuclear Power Plant," Appendix D, D-3 (February 1999); Orange County's Request for Admission of Late-Filed Environmental Contentions, Exhibit 3 (January 31, 2000).

³⁸ Id. at D-4.

³⁹ The temperature of the sun is approximately 6,000 degrees C. See Solar and Heliospheric Observatory, Frequently Asked Questions, <http://sohowww.nascom.nasa.gov/explore/faq/sun.htm#surface>.

INSTITUTE FOR RESOURCE AND SECURITY STUDIES
27 Ellsworth Avenue, Cambridge, Massachusetts 02139, USA
Phone: (617) 491-5177 Fax: (617) 491-6904
Electronic mail: irss@igc.apc.org

EXHIBIT 3

**RISKS AND ALTERNATIVE OPTIONS
ASSOCIATED WITH
SPENT FUEL STORAGE
AT THE
SHEARON HARRIS NUCLEAR POWER PLANT**

A report

prepared for

**Orange County
North Carolina**

by

Gordon Thompson

February 1999

upper bound to the temperature rise that could be experienced by a fuel assembly, absent the initiation of an exothermic reaction of the cladding.

Heat transfer by conduction

Next, consider conduction along the fuel rods. A Harris PWR assembly has 264 rods, each containing 1.74 kg of HM. Each rod is 12 ft long, with an outer diameter of 0.374 inches, a cladding thickness of 0.0225 inches, and a pellet diameter of 0.3225 inches.⁴ Assume that decay heat is generated uniformly along the length of the rod, conduction along the rod is the only heat transfer mechanism, and the two ends of the rod have the same temperature, Y (degrees C). Then, the temperature at the middle of the rod will be Y+2,000Q degrees C.⁵ This result could be viewed as counter-intuitive, because the decay heat in each rod is only 0.48Q Watts per meter of rod.

Convective cooling by steam

Now consider convective cooling of a fuel assembly by upward motion of steam that is generated from residual water at the lower end of the assembly. Neglect other heat transfer mechanisms, assume that decay heat is generated uniformly along the length of the fuel rods, and assume that the temperature of the residual water is 100 degrees C. Define S as the submerged fraction of the assembly and T (degrees C) as the temperature of steam leaving the top of the fuel assembly. Neglect the thermal inertia of the pellets and cladding. Then, the amount of steam generated is proportional to S, while the decay heat captured by this steam is proportional to (1-S). It follows that:⁶

$$T = 100 + (2,260/2.1) \times [(1-S)/S]$$

Note that Q does not enter this equation. If one-tenth of a fuel assembly is submerged (S = 0.1), this equation yields a T of 9,800 degrees C. A temperature of this magnitude would not be generated in practice, because of thermal inertia and the operation of other heat transfer mechanisms.⁷ However, the calculation establishes an important point. Convective cooling of fuel assemblies by steam from residual water will be ineffective when the submerged fraction of the assemblies is small.

⁴ Harris FSAR, Section 1.3, Amendment No. 30.

⁵ Assuming that the cladding's thermal conductivity is 17.3 W/mK, the pellets' conductivity is 1.99 W/mK, and pellets are in perfect contact with each other and the cladding.

⁶ Assuming that the latent heat of evaporation of water is 2,260 kJ/kg and the specific heat of steam is 2.1 kJ/kgK.

⁷ The singularity of the T equation at S=0 reflects the lack of consideration of other heat transfer mechanisms.