

STATE OF SOUTH CAROLINA

(Caption of Case)

In the Matter of

Application of Duke Energy Carolinas, LLC for
Approval of Decision to Incur Nuclear Generation
Pre-Construction Costs

BEFORE THE
PUBLIC SERVICE COMMISSION
OF SOUTH CAROLINA

COVER SHEET

DOCKET

NUMBER: 2007 - 440 - E

Posted: led

Dept: S.A.

Date: 3/20/08

(Please type or print)

Submitted by: Robert Guild

Time: 4:30

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DOCKETING INFORMATION (Check all that apply)

☐ Emergency Relief demanded in petition

☐ Request for item to be placed on Commission's Agenda expeditiously

☐ Other:

INDUSTRY (Check one)	NATURE OF ACTION (Check all that apply)			
<input checked="" type="checkbox"/> Electric	<input type="checkbox"/> Affidavit	<input type="checkbox"/> Letter	<input type="checkbox"/> Request	
<input type="checkbox"/> Electric/Gas	<input type="checkbox"/> Agreement	<input type="checkbox"/> Memorandum	<input type="checkbox"/> Request for Certificatio	
<input type="checkbox"/> Electric/Telecommunications	<input type="checkbox"/> Answer	<input type="checkbox"/> Motion	<input type="checkbox"/> Request for Investigator	
<input type="checkbox"/> Electric/Water	<input type="checkbox"/> Appellate Review	<input type="checkbox"/> Objection	<input type="checkbox"/> Resale Agreement	
<input type="checkbox"/> Electric/Water/Telecom.	<input type="checkbox"/> Application	<input type="checkbox"/> Petition	<input type="checkbox"/> Resale Amendment	
<input type="checkbox"/> Electric/Water/Sewer	<input type="checkbox"/> Brief	<input type="checkbox"/> Petition for Reconsideration	<input type="checkbox"/> Reservation Letter	
<input type="checkbox"/> Gas	<input type="checkbox"/> Certificate	<input type="checkbox"/> Petition for Rulemaking	<input type="checkbox"/> Response	
<input type="checkbox"/> Railroad	<input type="checkbox"/> Comments	<input type="checkbox"/> Petition for Rule to Show Cause	<input type="checkbox"/> Response to Discovery	
<input type="checkbox"/> Sewer	<input type="checkbox"/> Complaint	<input type="checkbox"/> Petition to Intervene	<input type="checkbox"/> Return to Petition	
<input type="checkbox"/> Telecommunications	<input type="checkbox"/> Consent Order	<input type="checkbox"/> Petition to Intervene Out of Time	<input type="checkbox"/> Stipulation	
<input type="checkbox"/> Transportation	<input type="checkbox"/> Discovery	<input checked="" type="checkbox"/> Prefiled Testimony	<input type="checkbox"/> Subpoena	
<input type="checkbox"/> Water	<input checked="" type="checkbox"/> Exhibit	<input type="checkbox"/> Promotion	<input type="checkbox"/> Tariff	
<input type="checkbox"/> Water/Sewer	<input type="checkbox"/> Expedited Consideration	<input type="checkbox"/> Proposed Order	<input type="checkbox"/> Other:	
<input type="checkbox"/> Administrative Matter	<input type="checkbox"/> Interconnection Agreement	<input type="checkbox"/> Protest		
<input type="checkbox"/> Other:	<input type="checkbox"/> Interconnection Amendment	<input type="checkbox"/> Publisher's Affidavit		
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ROBERT GUILD

Attorney at Law

314 Pall Mall • Columbia, South Carolina 29201 • 803-252-1419

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SC PUBLIC SERVICE
COMMISSION

March 20, 2008

Mr. Charles Terreni
Chief Clerk
Public Service Commission of South Carolina
Synergy business Park, Saluda Building
101 Executive Center Drive
Columbia, SC 29210

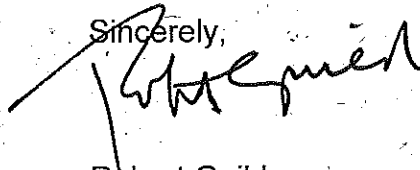
Re: Application of Duke Energy Carolinas, LLC for Approval of Decision to Incur
Nuclear Generation Pre-Construction Costs
Docket No. 2007-440-E

Dear Mr. Terreni:

Enclosed please find for filing and consideration 25 copies of the Direct
Testimony and Exhibit of Peter A. Bradford for Friends of the Earth, together with
Certificate of Service reflecting service upon all parties of record.

With kind regards I am

Sincerely,



Robert Guild

Encls

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BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2007-440-E

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COMMISSION

In the Matter of)
Application of Duke Energy Carolinas, LLC for)
Approval of Decision to Incur)
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DIRECT TESTIMONY OF PETER A. BRADFORD
FOR FRIENDS OF THE EARTH

1 **Q. PLEASE STATE YOUR NAME, ADDRESS AND CURRENT POSITION.**

2 A. My name is Peter A. Bradford. My business address is PO Box 497, Peru,
3 Vermont, 05152. I am an adjunct professor at Vermont Law School and
4 President of Bradford Brook Associates.

5 **Q. PLEASE STATE YOUR EXPERIENCE IN THE FIELD OF UTILITY**
6 **REGULATION.**

7 A. I have chaired the public utility regulatory commissions in Maine (1974-5
8 and 1982-87) and New York (1987-95). I was also a commissioner on the
9 U.S. Nuclear Regulatory Commission (1977-82). Since 1995, I have taught
10 several courses related to energy policy, utility regulation and nuclear power
11 at Yale and at Vermont Law School as well as in seminar programs at the
12 Institute of Public Utilities and elsewhere. I have also worked with the
13 Regulatory Assistance Project and have testified before numerous state
14 utility regulatory commissions.

15 I have consulted in several countries – including China, India, Russia and
16 Indonesia – on issues pertaining to utility regulation and to nuclear power.
17 I was a member of the National Association of Utility Regulatory
18 Commissioners (NARUC) from 1971 until 1995 and served as its president
19 in 1987. I served on the Electric, Gas and Communications Committees as
20 well as on the Subcommittees on Nuclear Waste and Nuclear Economics. I
21 was also the liaison between the Nuclear Regulatory Commission and
22 NARUC and have testified before the U.S. Congress at least 50 times on
23 issues relating to nuclear power.

1 My complete resume is attached as Exhibit A.

2 **Q. PLEASE DISCUSS YOUR EXPERIENCE IN REGULATING NUCLEAR**
3 **POWER AT THE STATE LEVEL.**

4 A. As a regulator in New York and Maine, I chaired commissions deciding
5 cases involving rate implications and prudence concerning the Seabrook I
6 plant in Maine as well as the Shoreham and Nine Mile Point II plants in New
7 York. I chaired the New York and Maine commissions when those states
8 disengaged from the Shoreham and Seabrook plants in ways that resulted
9 in adequate power supplies, improved economic development and electric
10 rate impacts lower than would otherwise have occurred. We also decided
11 several proceedings allocating the costs of cancelled plants. I also
12 reviewed proposals to spread the cost of cleaning up the Three Mile Island
13 accident across all nuclear power plants.

14 More recently, I participated in the 2005 National Research Council of the
15 National Academy of Sciences panel evaluating the alternatives to
16 continued operation of the Indian Point nuclear units in New York. I was also
17 a member of the 2007 Keystone Center Nuclear Power Joint Fact Finding
18 project, which identified points of agreement among a broad range of
19 constituencies, including nuclear power plant owners and builders, on
20 issues relating to nuclear power costs and the role of nuclear power in
21 combating climate change.

22 In other countries, I have participated in evaluating new nuclear units as an
23 option in Ukraine for the European Bank for Reconstruction and

1 Development, in evaluating new nuclear power and decommissioning costs
2 in Armenia and in evaluating the regulatory structure that would oversee the
3 operating of the Mochovce nuclear plant in Slovakia. I have also given talks
4 on the U.S. nuclear experience in China.

5 **Q. PLEASE STATE THE MAIN POINTS THAT YOU WILL MAKE IN**
6 **YOUR TESTIMONY.**

7 A. My testimony begins by noting that the extraordinary benefit being conferred
8 on Duke Energy Carolinas in being able to obtain both an early
9 determination of prudence and preoperational rate increases in connection
10 with the William States Lee III Station. I then explain why Duke cannot
11 establish the prudence of its decision to incur preconstruction costs of \$230
12 million between now and the end of 2009 without providing reliable evidence
13 of the likely cost of the unit and the impact of that cost on the rates to be
14 paid by South Carolina electric customers. I then discuss the ways in which
15 seeking to assess prudence on a segmented basis as contemplated by this
16 proceeding works to the advantage of Duke's investors and to the
17 disadvantage of its customers. I point out that the statute requiring this
18 approach results in a shifting of risk away from Duke's investors that should
19 result in a lower cost of capital for rate setting purposes.

20 In explaining the impossibility of assessing the prudence of the decision to
21 incur preconstruction costs, I point out that cost estimates for new nuclear
22 units have been rising at an astonishing rate and have reached some
23 \$6,000 per kW and above, more than doubling the estimates of five years

1 ago. I also describe my own experience in dealing with the ratemaking
2 consequences of some of the problem plants of the 1970s and 1980s. In
3 discussing this history, I explain also why the changes to the NRC licensing
4 process are not likely to produce large savings and why they may in some
5 respects be counterproductive.

6 Finally, I discuss the possible impact of nuclear power in the context of
7 climate change. I show that – while nuclear power at a reasonable price
8 and under reasonable conditions could be helpful - nuclear power under the
9 conditions presented in this proceeding is unlikely to make a positive
10 impact.

11 **Q. WHY DOES SOUTH CAROLINA'S STATUTORY FRAMEWORK**
12 **CONFER AN "EXTRAORDINARY BENEFIT" ON DUKE?**

13 A. Because it allows the decision to construct the proposed nuclear unit to be
14 deemed prudent based on a review conducted long before events point to
15 anything that has actually gone wrong. On the basis of this necessarily
16 incomplete review, Duke will be well on the road to being able to recover a
17 very substantial portion of its costs before the plant ever operates. No other
18 type of large industrial facility enjoys this capability. A paper mill or an oil
19 refinery must produce products at a competitive price to recover their costs.
20 Indeed, even a nuclear power plant built in restructured markets (where cost
21 recovery depends on participation in a power market) cannot recover costs
22 until it produces kilowatt hours at a competitive price.

1 **Q. WHY DOES THE SEGMENTED NATURE OF THE SOUTH CAROLINA**
2 **PRUDENCE REVIEW PROCESS WORK TO THE ADVANTAGE OF**
3 **DUKE INVESTORS AT THE EXPENSE OF ITS CUSTOMERS?**

4 A. Because no regulatory commission will have the information or the
5 resources to establish the prudence of the thousands of decisions and
6 calculations that the Company must make in deciding to construct a nuclear
7 plant. Only after some subset of those decisions has produced meaningful
8 cost consequences can regulators know where to focus their very limited
9 resources to assess prudence.

10 Throughout twentieth century utility regulation, a prudence review was
11 almost always triggered by the occurrence of one or more events with
12 substantial adverse impacts on rates. The review then focused in great
13 detail on the decisions and actions giving rise to the adverse impacts in
14 order to determine their prudence. Consultants with the necessary specific
15 expertise were employed, and focused proceedings lasting as long as
16 necessary were conducted. Such a review cannot take place in this
17 proceeding because regulators can have no idea which subset of the vast
18 relevant materials requires close attention.

19 Imprudent actions without substantial adverse impacts have in the past not
20 been investigated by regulators. To implement South Carolina's new law,
21 however, the Commission is going to have to detach prudence inquiries
22 from financial consequences and to review the prudence of decisions that
23 have had no adverse consequences.

1 A prudence review without a cost overrun is to a real prudence review as a
2 doctor's physical exam is to an autopsy. Just as a person may pass a
3 physical one month and die the next, so a transaction may pass a review
4 based on the level of information provided in this proceeding only to be
5 revealed as imprudent by later rate impacts indicative of significant
6 infirmities. Nuclear construction history is replete with imprudent decisions
7 and actions that could not have been detected by regulators until they
8 produced real consequences. The decision by Maine utilities to increase
9 their share in the Seabrook units in the late 1970s was one such decision
10 with which I had first hand experience. The process by which a design error
11 led to the waste of hundreds of millions of dollars at the Diablo Canyon
12 Station in California was another. The failures in the quality assurance
13 program at the Zimmer plant in Ohio that eventually led to the cancellation
14 of a plant that had been considered (wrongly as it turned out) to be 99%
15 complete was another case in which the source of the waste could not have
16 been discovered by a state PUC for several years after it had occurred.
17 A prudence review uninformed by the occurrence of substantial rate impacts
18 is an impossible task. Thousands of decisions would have to be reviewed
19 and predictions of consequences would have to be made. Consider that
20 Enron or Global Crossing or Bear Stearns were believed to be sound
21 investments a few months before their collapse proved to the contrary, or
22 imagine that the Pennsylvania PUC had been asked to assess prudence at
23 Three Mile Island Unit 2 in early March, 1979, just before the accident. No

1 before-the-fact reviews would have discovered the many acts of imprudence
2 that caused the accident a few weeks later. Yet once the South Carolina
3 Commission determines prudence in this proceeding it may be foreclosed
4 from revisiting that determination even if later events reveal that it was
5 questionable.

6 By increasing the likelihood that customers will be required to bear the costs
7 of undiscovered imprudence, the South Carolina statute shifts risk from
8 investors to customers. The scale of this shift is not small. In the energy
9 sector alone, a 1985 survey [The Prudent Investment Test in the 1980s] by
10 the National Regulatory Research Institute chronicled more than 50 state
11 decisions that made "significant" use of the prudence standard through
12 1983. Of course, many significant prudence decisions were made after
13 1983. Prudence reviews between 1984 and 1988 are estimated in one
14 study to have saved customers \$11.6 billion (Richard Pierce, *Should the*
15 *Judiciary Attempt to Police the Political Institutions?*, 77 *Georgetown Law*
16 *Journal* 2031, August, 1989). To the extent that the South Carolina
17 Commission makes the requested prudence determination in this
18 proceeding, it will expose customers to some risk of bearing imprudent
19 costs, a risk that they did not bear under the former statutory framework.

20 **Q. AREN'T YOU URGING A PRUDENCE REVIEW BASED ON HINDSIGHT,**
21 **RATHER THAN ONE BASED ON THE INFORMATION AVAILABLE AT**
22 **THE TIME THAT THE DECISION IN QUESTION IS BEING MADE?**

1 A. Not at all. Hindsight in the form of damaging rate impacts should be used to
2 identify the decisions and practices that need to be reviewed, not to assess
3 their prudence. Once these decisions and practices have been identified,
4 they should indeed be reviewed in light of whether the company undertook
5 them with the level of care appropriate to decisions of that magnitude in light
6 of the information reasonably available at the time.

7 **Q. BUT SURELY A PROJECT AS EXPENSIVE AND COMPLEX AS A**
8 **NUCLEAR UNIT COULD NOT BE FINANCED WITHOUT ASSURANCE**
9 **THAT IT WILL RECOVER ITS COST?**

10 A. Size and complexity are not what makes a project unfinanceable. The
11 Trans-Alaska Pipeline, costing some \$7 billion in the dollars of the 1970s
12 and involving unprecedented construction challenges, was built without
13 conscripting capital from its customers before it went into operation.
14 Financing of large and complex projects is a regular occurrence. What
15 makes nuclear projects so hard to finance conventionally is not expense
16 and complexity but risk – risk of cost overruns, risk that the owners will not
17 be able to meet schedules, risk that the plant will operate poorly, risk that
18 demand forecasts will be overstated, risk that other technologies will be
19 available at lower costs. Of course, all of these things happened in this
20 industry in the last three decades, so they are not abstract concerns.

21 **Q. WHY DO YOU SAY THAT DUKE CANNOT DEMONSTRATE THE**
22 **PRUDENCE OF ITS DECISION WITHOUT PROVIDING RELIABLE**
23 **EVIDENCE OF THE COST OF THE UNIT?**

1 A. One of the statutory requirements for a prudence determination is that the
2 power be needed. But need is a function of cost. Every state has a very
3 large need for power costing one cent per kilowatt hour and little or no need
4 for power costing twenty-five cents per kWh. The commission needs to
5 know the price per kWh to know where on this scale the William States Lee
6 Station's output will fall and what its impact on South Carolina rates will be.
7 Recent cost figures for new nuclear plants provided in Florida show the
8 potential for nuclear construction to raise rates by 50 percent or more in that
9 state. To find that such projects are needed, any commission needs to be
10 able to say that cheaper or otherwise preferable resources are unlikely to be
11 available.

12 **Q. WHAT IS THE RELATIONSHIP BETWEEN THE POINTS THAT YOU**
13 **HAVE MADE AND DUKE'S RETURN ON EQUITY?**

14 A. Shifting risk from investors to customers does not produce real savings. It
15 lowers the cost of capital used in building the plant by increasing customer
16 exposure to costly events that might otherwise have been borne by
17 investors. If any of these events occur, the customers will pay for them, and
18 this risk offsets any savings from the reduced cost of capital.

19 The Commission should at least lower Duke's return on equity in order
20 prevent the injustice of having customers pay investors as if they were
21 bearing the risks that have in fact been shifted to the customers.

22 **Q. WHAT ARE THE RECENT TRENDS IN COST ESTIMATES FOR NEW**
23 **NUCLEAR UNITS, AND HOW DO THEY AFFECT THIS PROCEEDING?**

1 A. Nuclear cost estimates have been increasing at a breathtaking pace. As
2 recently as five years ago, vendors and studies were estimating costs
3 between \$1500 and \$2000 per kW. Last June the impartial Keystone
4 Center fact finding found costs in the \$3600-\$4000 range. Four months
5 later, Moody's estimated \$5,000-6,000.

6 In recent weeks, Florida Power and Light and Progress Energy have
7 provided estimates in regulatory proceedings that are higher even than that
8 of Moody's. The Progress Energy estimate of \$17 billion for two 1100MW
9 plants like the ones proposed by Duke represents a tripling of its estimate of
10 just two years ago, according to the St. Petersburg Times of March 11,
11 2008.

12 The nuclear industry has been particularly surprised by developments in
13 Finland, where the first of the advanced reactor designs to be built in the
14 West has been under construction since May, 2005. The plant has fallen
15 two years behind schedule and is at least \$1 billion over budget. Because
16 the French company Areva, which is building the plant, has agreed to a
17 fixed price contract, Finnish customers may be protected from the cost
18 overruns, although Areva has recently said that it may sue to avoid having
19 to absorb the full cost overrun.

20 Given runaway cost trends attested to by utilities in nearby states, the
21 absence of any Duke cost estimate at all in this proceeding is a source for
22 regulatory concern.

1 **Q. DO THESE COST TRENDS CAUSE CONCERN WITH REGARD TO**
2 **DUKE'S REQUEST FOR A FINDING OF PRUDENCE WITH RESPECT TO**
3 **A DECISION TO INCUR OBLIGATIONS FOR "LONG LEAD**
4 **PROCUREMENT ITEMS"?**

5 A. Absolutely. The Commission is being asked to commit the customers to
6 paying very large sums for items as to which great uncertainty exists as to
7 price, schedule and procurement, none of which are addressed in Duke's
8 testimony. Indeed, as to these items, Duke has furnished no cost estimates
9 at all. Neither has it explained the contracting approach that it will use.

10 As to some of these items there may well be only one supplier in the world,
11 so the price of securing a "place in line" will not be constrained by
12 competitive forces, and will certainly run to eight figures, perhaps even nine.
13 Duke has made no showing that the contracts that it proposes to sign will
14 contain price ceilings or penalty provisions, elementary precautions to
15 protect against exploitation of monopoly power or delay or price increases
16 for other reasons

17 On this record, Duke is asking the Commission to put the full risk of such
18 occurrences on the customers, an allocation of risk the Company would
19 never accept on behalf of its shareholders. Such an arrangement cannot be
20 prudent.

21 **Q. Is Duke's proposal prudent in light of industry best practice?**

22 A. No, it isn't. Industry best practice is still evolving in light of the absence of
23 recent experience. However, Exelon, which is proposing a nuclear plant in

1 the restructured market in Texas, where it cannot assure cost recovery by
2 persuading regulators to put all the risks on the customers, seems to be
3 taking quite a different approach. Here is a description of their approach to
4 prudent contracting as described by Chief Operating Officer Christopher
5 Crane in the March 6, 2008 of Nucleonics Week:

6 Engineers and construction contractors for new nuclear
7 plant builds must be prepared to share risks by guaranteeing
8 timely, on-budget performance in their contracts,
9 Christopher Crane, chief operating officer of Exelon
10 Generation, said in a February 27 interview.
11 When the current US power reactor fleet was built, "the
12 risk was always on the owner," but all companies involved
13 in "engineering, procurement, construction or any subset of
14 one of those items" must be "responsible to execute to
15 expectations" if new nuclear projects are to succeed, Crane
16 said. In the 1970s and 1980s, some utilities faced bankruptcy
17 and ratepayers were forced to bear the costs of "mismanagement,
18 project overruns, productivity issues and just bad
19 design," but "there was not a contractor that I ever remember
20 that did anything other than profit wildly. So the model
21 has got to change," he said.

22
23 In practice, parties to new nuclear contracts must "figure
24 out in advance what [costs] in the contract would be fixed
25 and what would be variable," and "bounds" must be set on
26 the "allowable percentage of error or rework," Crane said.
27 Construction contractors must be "accountable" for meeting
28 a certain level of productivity and delivering "quality of
29 work within a reasonable band of acceptance." Hedging and
30 other long-term procurement strategies must account for
31 inflation in future prices for copper, steel, concrete and
32 other key commodities. Such an approach has never before
33 been used for a power reactor construction project in the
34 US, Crane said.

35
36 Vendors are now "working diligently at finalizing their
37 designs so they can finalize their commodity count and constructability
38 evaluations," and until that process is complete,
39 "there's no way to put the strategies in place to come up
40 with the correct [engineering, procurement and construction]
41 model," he said.

42
43 Much that Mr. Crane says is important and sensible. For purposes of this
44 proceeding the last sentence is especially important. There is at present no
45 way to come up with the correct model for the contracts whose conceptual

1 prudence the Commission is being asked to approve. Without establishing
2 that contracts containing the costs to reasonable levels can be negotiated,
3 Duke cannot sustain its burden of proving that a decision to enter into such
4 contracts is prudent.

5
6 **Q. PLEASE DISCUSS YOUR OWN EXPERIENCE WITH SETTING RATES**
7 **TO COVER THE COST OF NUCLEAR CONSTRUCTION IN THE 1970S**
8 **AND 1980s.**

9 A. My first experience with regulating rate impacts of nuclear power came
10 when the Maine Yankee nuclear power plant came on line in 1972. Like the
11 operating Duke plants, Maine Yankee was a relatively inexpensive unit, and
12 the impacts were not large. The same was true for Maine's investments in
13 other early New England units.
14 However, early good experiences turned out not to guarantee that later
15 ones would go as well. The Seabrook station in New Hampshire ran far
16 over budget and behind schedule. Ultimately, the second unit was
17 cancelled after hundreds of millions of dollars had been spent on it. In the
18 mid-1980s, the Maine commission – unconvinced by the estimates of costs
19 to complete the remaining plant – required Maine utilities to seek offers for
20 their share of that plant. The offers were far below the estimates of the cost
21 to complete the unit. Ultimately the Maine utilities negotiated the sale of
22 their Seabrook shares to a southern New England company which went
23 bankrupt as a result of the expenditures required by its new obligation. The

1 replacement power and efficiency of the alternatives procured by the Maine
2 utilities were cheaper than the completion costs and – because much of the
3 power was fueled by Maine resources – also did more for the state
4 economy.

5 The Shoreham situation was more difficult because the unit was closer to
6 completion by the time I became chair of the New York Commission and
7 because there were no potential buyers. Ultimately, the plant was
8 abandoned without being run commercially. Astonishingly, there is little
9 doubt that the customers have been better off as a result of the decision not
10 to run the plant. The plant would – if operating – be a plus today, but there
11 is little chance that the benefits over the rest of its life would ever offset the
12 present value of its negative impact on New York electric rates in its first
13 fifteen years.

14 The other nuclear plant built in New York during that era was the second
15 unit at Nile Mile Point. The owners of that plant entered into a settlement
16 capping the amount that they would be permitted to recover from customers
17 at about \$4 billion. Ultimately, the plant cost several hundred million more
18 than that, and those costs were absorbed by the owners and their
19 shareholders. The cap protected the customers, just as Areva's turnkey
20 contract protects the customers in Finland. There is no indication that Duke
21 proposes any similar protection for the customers of South Carolina.

22 **Q. BUT THE EXPERIENCES YOU'VE DESCRIBED ARE IN OTHER PARTS**
23 **OF THE COUNTRY, WHERE NUCLEAR POWER HAS BEEN MORE**

1 **CONTROVERSIAL AND SOME NUCLEAR UTILITIES HAVE BEEN**
2 **PENALIZED FOR IMPRUDENCE ON A LARGE SCALE. WHY DOES**
3 **THIS HISTORY HAVE ANY RELEVANCE TO DUKE OR TO SOUTH**
4 **CAROLINA?**

5 A. It's true that Duke and South Carolina avoided some of the problems that
6 plagued nuclear power and state regulators in the 1970s and 1980s.
7 However, those problems were not confined to parts of the U.S. where
8 nuclear power was relatively controversial. Georgia, Mississippi, Louisiana
9 and Texas all experienced cost overruns in the billions of dollars. Even
10 Duke cancelled a number of plants at a cost of several hundred million
11 dollars to its customers in North and South Carolina.
12 Furthermore, both New York and New England had successful experiences
13 with nuclear construction. But those successful experiences turned out to
14 be no guarantee against later projects that would cause repeat double digit
15 rate increases, power supply uncertainty and adverse economic
16 development effects.
17 It's important also to keep in mind that even the best nuclear operators are
18 at the mercy of events beyond their control. Duke had this experience with
19 its Oconee units in 1979, when the NRC shut down all Babcock and Wilcox
20 nuclear power plants for a period following the accident at Three Mile Island.

21 **Q. IS MR. JAMIL'S TESTIMONY THAT THE PROJECTED ANNUAL**
22 **CAPACITY FACTOR OF THE LEE STATION REALISTIC?**

1 A. It's extremely optimistic. Nuclear plants in the U.S. today don't have lifetime
2 capacity factors of 90% even with the commendable improvements of the
3 last decade. Indeed, most new units in other countries tend to have
4 significantly lower capacity factors in their first few years of operation, when
5 they are being broken in. Prudence requires assuming something similar
6 with respect to any new design. If the capacity factor of the first few years is
7 significantly below 90%, it will be hard to attain a 90% lifetime average
8 because downtime for refueling and maintenance remains unavoidable
9 even for the best units.

10 **Q. DOESN'T THE REVISED NRC LICENSING PROCESS PROVIDE**
11 **ASSURANCE THAT THE EXPERIENCES THAT YOU HAVE DISCUSSED**
12 **WON'T BE REPEATED?**

13 A. No. The NRC licensing process was not a significant cause of the delays
14 and cost overruns of the previous generation of nuclear plants. Although
15 the hearings were sometimes contentious and protracted, they took place
16 while the plants were being built and were invariably ended with the
17 issuance of the requested license. The U.S. issued 230 construction
18 permits in 20 years between 1958 and 1978, more than the next five
19 countries combined. Half of the plants were cancelled.
20 The real causes of the cost overruns were in the pace at which nuclear
21 power grew in the U.S., a pace so rapid that the lessons of operating
22 experience surprises had repeatedly to be applied to plants that were
23 already partially built, an expensive and wasteful process.

1 Whether this problem will be repeated in future plants remains to be seen.
2 However, it cannot be fixed by "streamlining" the licensing process. Indeed,
3 if the changes to the licensing process have the effect of diminishing its
4 thoroughness or increasing public mistrust of the Nuclear Regulatory
5 Commission, some the changes may even be counterproductive.

6 **Q. ISN'T NUCLEAR POWER SO ESSENTIAL TO COMBATTING CLIMATE**
7 **THAT THE COMMISSION SHOULD GRANT DUKE'S REQUESTS EVEN**
8 **WITHOUT KNOWING THEIR COST ESTIMATES?**

9 A. No. The Keystone Fact Finding Report that I alluded to earlier concluded
10 that nuclear can contribute only modestly to reducing climate change even if
11 the world builds three times its existing nuclear capacity over the next 50
12 years, an immense achievement that would require increases in the rate of
13 construction far beyond anything that now seems likely. If nuclear power
14 can be built cost effectively, this contribution would make the climate
15 change task easier. However, if nuclear is not cost effective, it will take
16 revenue and attention from other measures that can prevent far more green
17 house gas reductions far more quickly.

18 **Q. WHAT ARE THE IMPLICATIONS OF THE UNCERTAINTY THAT YUCCA**
19 **MOUNTAIN WILL BE AVAILABLE FOR THE PRUDENCE OF**
20 **PROCEEDING WITH THIS PLANT?**

21 A. Unless the law is changed to expand Yucca Mountain, that proposed
22 repository will not be able to store all of the waste from the existing plants,
23 to say nothing of new ones. Furthermore, the Department of Energy does

1 not have the same obligation to take the waste from new plants, such as the
2 unit proposed by Duke in this proceeding, that it has under the contracts
3 with the existing plants. Therefore, the waste from this plant is not assured
4 of a place in any repository. Indeed, there is no assurance that it can be
5 moved off site at all.

6 The only prudent assumption is that the waste from this plant may have to
7 be stored on site for a long time. Dry cask storage makes this technically
8 feasible, but Duke and its customers may be responsible for the costs of
9 that indefinite storage because, unlike the existing spent fuel, it is not
10 covered by a contract that subjects the U.S. government to an obligation to
11 take it.

12 **Q. IN THE EVENT THAT YUCCA MOUNTAIN IS NOT LICENSED, WON'T**
13 **REPROCESSING PROVIDE AN ALTERNATIVE WAY – INDEED, A**
14 **PREFERABLE WAY - TO DEAL WITH SPENT NUCLEAR FUEL?**

15 A. Reprocessing will add substantially to the cost of nuclear power – at least
16 1.5 cents per kWh according to the 2003 MIT report - and it will do almost
17 nothing to solve the waste problem. In some ways it makes it worse. This
18 is because the primary driver of repository size is the heat load, and
19 reprocessing doesn't diminish the heat load. Reprocessing removes only
20 the plutonium and the uranium from the waste. These are not significant
21 heat contributors. All of the rest of the spent fuel remains to be disposed of.
22 In addition, reprocessing creates significant new volumes of radioactive
23 waste.

1 The British are close to giving up on reprocessing because of its high costs.

2 The French have thus far kept some of the costs of reprocessing in the
3 government budget rather than in electric rates, but they are making only
4 limited use of the recycled plutonium and – as European markets become
5 more transparent and competitive - the future even of the French program is
6 not certain.

7 The only U.S. spent fuel reprocessing plant that ever operated closed in
8 1972, saddling the state of New York and the federal government with a
9 multibillion dollar clean up task that is not yet complete. Two other plants –
10 including one at Barnwell in South Carolina - that were completed never
11 operated due to President Ford's 1976 decision that reprocessing should
12 not go forward in the U.S. President Carter expanded that decision.
13 President Reagan reversed it, but no private sector firm was interested, a
14 condition that persists today.

15 **Q. WHAT LESSONS FROM THIS EXPERIENCE MIGHT SOUTH CAROLINA**
16 **REGULATORS CONSIDER WITH REGARD TO NEW NUCLEAR**
17 **CONSTRUCTION TODAY?**

18 A. I'd suggest several lessons applicable to this proceeding:

- 19 • First, the Commission should not find any decisions prudent until it is
20 presented with a credible cost estimate and an estimate of rate impacts as
21 well as a clear comparison among the alternatives.
- 22 • Second, the Commission should confine the scope of its prudence
23 determination as narrowly as possible under the statute. In particular, the

1 Commission should not accept the proposition that payments to secure
2 the long lead time items are “preconstruction” costs. Such payments are
3 very much part of the construction process. Their prudence requires
4 detailed separate review of evidence not presented in this proceeding in
5 the event that they give rise to excessive costs.

6 • The Commission should require that Duke use a competitive power
7 procurement process to screen possible power supply resources. Such
8 competitive power procurement was the source of the resources that
9 successfully replaced the Seabrook power in Maine. Indeed, when utilities
10 in Maine sought a determination of the prudence of a major transmission
11 project to buy power from Hydro-Quebec, the Maine Commission required
12 that they test the purchase decision against the results of competitive
13 solicitation for equivalent power. The solicitation produced ample power
14 at lower prices, and the transmission line was never built.

15 • In the present environment of rapidly escalating costs, it is particularly
16 urgent to protect customers from open-ended commitments with
17 potentially ruinous economic impacts. To this end, the Commission
18 should limit the total cost of the project that it would consider to be a
19 prudent commitment at this time. Costs above that ceiling would not be
20 recoverable from the customers. Such a ceiling might be revisited once or
21 twice as the project moves forward, but the Commission should be clear
22 that it is not subject to infinite upward revision.

- Because of the strong likelihood that energy efficiency is available at lower cost than the proposed nuclear station, the Commission should require a showing that programs are in place to capture all cost-effective energy efficiency before it accepts as prudent any decision to build a nuclear unit.
- The Commission should indicate in any decision on prudence under the new South Carolina statute that it recognizes the reduced risk that will flow from the decision and intends to adjust the allowed return on equity accordingly.

Q. DO YOU HAVE AN OPINION, BASED ON YOUR QUALIFICATIONS AND EXPERIENCE, AS TO WHETHER DUKE ENERGY'S DECISION TO INCUR NUCLEAR GENERATION PRECONSTRUCTION COSTS SHOULD BE APPROVED BY THIS COMMISSION AS "PRUDENT CONSIDERING THE INFORMATION KNOWN TO THE UTILITY AT THE TIME AND CONSIDERING THE OTHER ALTERNATIVES AVAILABLE TO THE UTILITY FOR SUPPLYING ITS GENERATION NEEDS"?

A. Duke has not set forth basic elements necessary to a finding that incurring preconstruction costs would be prudent. I urge the Commission not to expose South Carolina customers to the very large rate impacts implicit in such a finding.

EXHIBIT A

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PROFESSIONAL EXPERIENCE:

March 1996- present Energy *and Regulatory Advisor*;

Peter Bradford advises and teaches on utility regulation, restructuring, nuclear power and energy policy in the U.S. and abroad. He has been a visiting lecturer in energy policy and environmental protection at Yale University and has taught courses entitled "Nuclear Power and Public Policy" and "The Law of Electric Utility Restructuring" at the Vermont Law School, where he is an adjunct professor. He has recently served on a Keystone Center fact finding collaboration on nuclear power and a National Academy of Sciences panel evaluating the alternatives to continued operation of the Indian Point Nuclear Power Plants in New York. He is also affiliated with the Regulatory Assistance Project, which provides assistance to state and federal energy regulatory commissions regarding economic regulatory policy and environmental protection. He is vice-chair of the Board of the Union of Concerned Scientists.

He has advised on restructuring issues and has testified on aspects of electricity and telecommunications restructuring in many U.S. states. As to nuclear power, he advised the Internal Revenue Service in a successful proceeding related to taxation of Maine Yankee fuel expenditures, testified on behalf of Wiscasset, Maine in a 2004-05 property tax proceeding on the value of spent fuel storage and advised the Vermont Legislature on issues pertaining to the taxation of Maine Yankee. He testified before the U.S. Congress on the renewal of the Price-Anderson Act.

International - Taught and/or advised abroad on energy (including nuclear power) and water issues and electric restructuring in China, Armenia, Russia, India, Indonesia, Mongolia, Canada, St. Lucia, Kosovo, South Africa, Georgia, Trinidad and Tobago. Member, Policy Advisory Committee of the Packard Foundation's China Sustainable Energy Project. Served as one of two U.S. representatives on international panel advising European Bank for Reconstruction & Development on least cost alternatives in Ukraine to continued operation of the Chernobyl Nuclear Station (1996-97) and on an international expert panel assessing the safety of the Mochovce Nuclear Power Station in Slovakia (1998);

February 1995 - March 1996 Fellow, **Regulatory Assistance Project**

Project funded by the U.S. Dept. of Energy, the Environmental Protection Agency and foundations to provide assistance to state and federal regulatory commissions on energy and environmental matters.

June 1987- January 1995 **Chairman, New York State Public Service Commission, Albany, New York**

CEO of state agency charged with overseeing \$29 billion annual revenues of New York utilities. Responsible for developing and implementing consumer and environmental protection policies, transitions from monopoly to competition in energy and telecommunications industries. 700 employees, \$65 million budget.

July 1982- June 1987 Chairman, **Maine Public Utilities Commission, Augusta, Maine**

CEO of state agency charged with overseeing \$2 billion annual revenues of Maine utilities. Responsible for developing and implementing consumer and environmental protection policies, including competitive bidding for independent power production and energy conservation services as well as adjusting to the break-up of AT&T. 60 employees, \$4 million budget.

March 1982-June 1982 **State of Maine Public Advocate**

First full-time Maine public advocate; intervened on consumers' behalf in telephone and electric cases; oversaw staff of 6; prepared briefs; cross-examined witnesses.

Aug. 1977-March 1982 **Commissioner, United States Nuclear Regulatory Commission, Washington, D.C.**

One of five commissioners of the federal agency whose responsibilities include safety of nuclear power plants and other nuclear facilities; preparing licensing criteria for a nuclear waste repository; licensing exports of nuclear fuel and reactors pursuant to Nuclear Nonproliferation Act; assisted in major upgrades of regulatory and enforcement processes in wake of Three Mile Island accident. 3000 employees, \$250 million budget.

Dec. 1971-Aug. 1977 **Commissioner, Maine Public Utilities Commission, Chairman (9/74-7/75).**

Sept. 1968- Dec. 1971 **Federal-State Coordinator, State of Maine**

Responsible for many oil, power, environmental and housing matters. Assisted in preparation of landmark Maine laws relating to oil pollution and industrial site selection. Staff Director, Governor's Task Force on Energy, Heavy Industry and the Coast of Maine.

Aug. 1964-June 1965 **Athens College, Greece, Teaching Fellowship**

PROFESSIONAL AFFILIATIONS:

1999-present - Member, Policy Advisory Committee, China Sustainable Energy Project (funded by the David and Lucille Packard Foundation and the Energy Foundation).

1998-2002 - Member, Advisory Council, New England Independent System Operator

Nov. 1986-Nov. 1987 President, National Association of Regulatory Utility Commissioners

1977-1995 NARUC positions, **Member**, Executive Committee; Member, Electricity Committee (1977-1989); Member, Gas Committee (1989-1993); Member, Communications Committee (1975-1977); Board of Directors, National Regulatory Research Institute (1985-1987).

1975-1977, 1982-1986. Advisory Council, Electric Power Research Institute

1987-1995, Member of New York State Energy Planning Board

1987-1995, Member, Board of Directors, New York State Energy Research and Development Administration

1987-1995, Member, New York State Environmental Board;

1987-1995, Chair, New York State Energy Facilities Siting Board

1992-1994, State co-chair, New York State Task Force on Telecommunications Policy

Vice-chair, Board of Directors, Union of Concerned Scientists

Board of Directors, Nuclear Control Institute

EDUCATION:

1964 B.A. History, Yale University, New Haven, CT

1968 L.L.B., Yale University School of Law, New Haven, CT

AWARDS:

Honorary Degree, Unity College, 1981.

Environmental Award, Natural Resources Council of Maine, 1979.

PERSONAL:

Married (Susan Symmers Bradford)

Three children (Arthur, Laura, Emily)

PUBLICATIONS of Peter A. Bradford

Books

Fragile Structures: A Story of Oil Refineries, National Security and the Coast of Maine, 1975, Harpers Magazine Press.

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BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2007-440-E

In the Matter of

Application of Duke Energy Carolinas, LLC
for Approval of Decision to Incur Nuclear
Generation Pre-Construction Costs

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Certificate of Service

I hereby certify that on this date I served the above Direct Testimony and Exhibit of Peter A. Bradford by placing copies of same in the United States Mail, first-class postage prepaid, addressed to:

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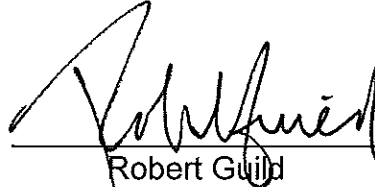
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March 20, 2008