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**Florida  
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**BEFORE THE  
FLORIDA PUBLIC SERVICE COMMISSION**

**DOCKET No. 970261-EI**

**In Re: Review of Nuclear Outage  
at Florida Power Corporation's  
Crystal River Unit No. 3**

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**REBUTTAL TESTIMONY  
OF**

**JAMES H. SNIEZEK**

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FLORIDA POWER CORPORATION  
DOCKET NO. 970261-EI

REBUTTAL TESTIMONY OF  
JAMES H. SNIEZEK

1 I. EXPERIENCE AND QUALIFICATIONS

2

3 Q. PLEASE STATE YOUR NAME AND YOUR BUSINESS ADDRESS.

4 A. My name is James H. Sniezek. My business address is 14601 Layhill Road,  
5 Silver Spring, MD 20906-1918.

6

7 Q. PLEASE SUMMARIZE YOUR PROFESSIONAL EDUCATION,  
8 QUALIFICATIONS, AND EXPERIENCE.

9 A. My education, qualifications, and experience are summarized on pages 2  
10 through 5 of my Direct Testimony before the Florida Public Service Commission,  
11 Docket No. 970261-EI regarding Review of Nuclear Outage at Florida Power  
12 Corporation's Crystal River Unit No. 3.

13

14 II. PURPOSE

15

16 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

17 A. On April 28, 1997, the *Direct Testimony of William R. Jacobs, Jr., Ph.D.*  
18 was filed in Docket No. 970261-EI before the Florida Public Service Commission.  
19 The purpose of my testimony is to evaluate certain statements made in Dr.  
20 Jacobs' testimony. Specifically, I will evaluate the basis for certain opinions  
21 expressed by Dr. Jacobs in his testimony and the validity of these opinions.

1 **III. SUMMARY OF DR. JACOBS' TESTIMONY**

2  
3 **Q. WHAT IS YOUR EVALUATION OF DR. JACOBS' TESTIMONY?**

4 A. I believe that Dr. Jacobs' testimony is flawed for two fundamental reasons.  
5 First, many of the documents he has relied upon as a basis for his testimony  
6 were prepared to satisfy the standards used by the U.S. Nuclear Regulatory  
7 Commission (NRC) to regulate power plant safety rather than the standards that  
8 are appropriate for determining management reasonableness. Second, the  
9 principal evidence on which he bases his findings and conclusions comes from  
10 retrospective analyses of events that have occurred at Crystal River 3, that were  
11 prepared utilizing hindsight and a knowledge of the outcome.

12  
13 Additionally, the use of such documents as a basis for his opinions is  
14 inconsistent with the standard Dr. Jacobs has stated that he used in performing  
15 his evaluation.

16  
17 **Q. HOW IS THIS INCONSISTENT WITH DR. JACOBS' STANDARD?**

18 A. Dr. Jacobs has stated, at page 5 of his testimony that he "...evaluated the  
19 decisions and action by FPC management, employees and contractors in light of  
20 the facts that were known or reasonably should have been known at the time..."  
21 The principal documents he has relied upon do not provide information about  
22 what FPC managers "knew or should have known," or even seek to determine  
23 this. He relies upon documents that contain information that was learned later,  
24 after retrospective analysis of the results of decisions, rather than known at the  
25 time management decisions were made.

1 Q. WHICH DOCUMENTS THAT DR. JACOBS HAS RELIED UPON DO YOU  
2 BELIEVE TO BE INAPPROPRIATE BECAUSE OF THEIR USE OF HINDSIGHT?

3 A. Dr. Jacobs states that his "Overview of CR-3 Management Problems" is  
4 "primarily based on assessments, root cause analyses and corrective action plans  
5 developed by the Company." At numerous places in his testimony, he cites NRC  
6 reports, the Company's Management Corrective Action Plan II (MCAP II) and the  
7 "Poole Report" of September, 1995 as a basis for his opinions.

8

9 These documents do not provide an appropriate basis for testimony in this  
10 proceeding because they were prepared for the NRC, or using NRC standards,  
11 and present retrospective analyses of known events using knowledge only  
12 obtainable through hindsight.

13

14 Q. WHY IS THE USE OF DOCUMENTS THAT APPLY AN NRC STANDARD FOR  
15 EVALUATING MANAGEMENT A FLAW IN DR. JACOBS' ANALYSIS?

16 A. As I have said in my Direct Testimony, the NRC regulates to a safety  
17 standard, rather than a standard of "reasonableness." The NRC intentionally  
18 utilizes hindsight in its evaluations of events that occur at nuclear power plants,  
19 in order to identify forerunners of potentially more safety-significant events.  
20 Favorable results are required in order to be acceptable under NRC's standards,  
21 which have been set very high.

22

23 Further, the NRC has continually raised its acceptance standards to reflect  
24 knowledge gained from operating events, NRC inspection program findings, and  
25 the results of research conducted by the NRC and industry organizations. This

1 has created a situation where actions taken by licensees that were acceptable  
2 under the standards in effect at the time the actions were taken, can later be  
3 found unacceptable by the NRC, under higher standards in effect at the later  
4 time. The use of rising standards is a good safety concept that has resulted in  
5 a continual and significant improvement in the safety performance of American  
6 nuclear power plants. The criteria and practices used by the NRC, however, are  
7 implicit in the documents that are produced by the NRC and its licensees in the  
8 course of safety regulation. The NRC routinely uses its retrospective reports and  
9 actions, such as notices of violation and civil penalties, as one means of  
10 communicating its acceptance standards to its licensees. For this reason, these  
11 documents do not provide an appropriate basis for evaluating the reasonableness  
12 of utility company management.

13

14 Dr. Jacobs has acknowledged, at page 6 of his testimony, that "The NRC uses  
15 different criteria in performing its evaluations." However, he then relies upon  
16 numerous documents that have been prepared for the NRC or using its criteria.

17

18 **Q. CAN YOU PROVIDE AN EXAMPLE OF THE NRC RAISING ITS STANDARDS**  
19 **IN RESPONSE TO OPERATING EVENTS OR FINDINGS FROM ITS INSPECTION**  
20 **PROGRAMS?**

21 **A. Yes. A good example that is relevant to issues being considered in this**  
22 **Docket can be seen in the evolution of NRC requirements and industry practices**  
23 **regarding the documentation of design bases and licensing bases at nuclear**  
24 **power plants, continuing until today.**

25

1 At the time nuclear power plants are issued an operating license, the principal  
2 document used by the NRC to determine whether the plant design satisfies the  
3 NRC's licensing criteria is the Final Safety Analysis Report (FSAR) submitted by  
4 the utility company with its license application. In the era when CR-3 was  
5 licensed, the NRC did not prescribe the format and content of the utility  
6 company's FSAR nor require that the FSAR be updated to reflect modifications  
7 made to the plant during its operating life.

8

9 In 1980, the NRC adopted 10 CFR 50.71(e), which required that the FSAR for  
10 each plant be updated periodically to include changes that had been made to the  
11 plant. Several types of inspections conducted at nuclear power plants by the  
12 NRC during the 1980's, including Integrated Design Inspections (IDIs), Safety  
13 System Functional Inspections (SSFIs), and Safety System Outage Modification  
14 Inspections (SSOMIs), found deficiencies in the documents and calculations  
15 supporting the design of many plants and many instances where the as-built  
16 plant was not consistent with the design documents, throughout the nuclear  
17 industry.

18

19 In the late 1980s, the NRC began to encourage licensees to "reconstitute" the  
20 design basis for their plants. In 1989, the NRC conducted a survey of design  
21 control practices at six utility companies and one reactor vendor and in 1990  
22 issued a Policy Statement on design basis reconstitution programs. The results  
23 of this survey were published by the NRC in 1991, as NUREG-1397, *An*  
24 *Assessment of Design Control Practices and Design Reconstitution Programs in*  
25 *the Nuclear Power Industry*. The Executive Summary to this report stated:

1 Many utilities have embarked on design-document  
2 reconstitution programs although there has been no clear  
3 consensus regarding what information should be included on  
4 design-bases documents, what is the minimum set of  
5 necessary design documents to support the design bases, or  
6 how missing or deficient design documentation should be  
7 handled.  
8

9 After several reports to the NRC Commissioners by the NRC staff about this  
10 issue, including evaluation of whether a rulemaking was necessary to clarify the  
11 NRC's authority and requirements in this area and consideration of whether the  
12 NRC should issue a Generic Letter on this topic, the NRC issued a Policy  
13 Statement entitled *Availability and Adequacy of Design Bases Information at*  
14 *Nuclear Power Plants*, in August, 1992. With this Policy statement, the NRC  
15 said:

16  
17 The Commission believes, as a result of NRC inspections  
18 and licensees' self-assessments, that all power reactor  
19 licensees should assess the accessibility and adequacy of  
20 their design bases documentation. The results of this self-  
21 assessment should form the basis for a licensee's decision  
22 whether a design reconstitution program is necessary and  
23 the attributes to be included in the program.  
24

25 This brief summary of the evolution in NRC's policies and practices regarding  
26 design bases documentation and compliance demonstrates that, contrary to the  
27 impression created by Dr. Jacob's testimony, these have been issues for the  
28 entire nuclear industry, not just at CR-3.

29

30 This is further evident in events that have occurred since discovery of design  
31 basis compliance issues at the Millstone and Maine Yankee nuclear power  
32 plants, in 1995 and 1996. Since issues arose at these plants, the NRC has

1 undertaken a review of the "lessons learned" from the Millstone issues and a  
2 review of the 10 CFR 50.59 process, which I discuss later in my testimony.

3

4 As reported by the NRC in February 1997, the Millstone Lessons Learned Task  
5 Group identified the following policy issues that require resolution by the NRC:

6

7 • What should be the licensing basis for an operating plant  
8 and in which documents should it be located so it is  
9 accessible to the licensee, the NRC and the public?

10

11 • What information should be in the FSAR?

12

13 • What information, if any, may licensees remove from  
14 their FSARs without a corresponding change to the facility?

15

16 • Has the NRC done enough to ensure the design basis is  
17 sufficiently understood and is being used properly?

18

19 • What should be the scope and threshold of Section  
20 50.59?

21

22 • Should the agency more formally establish its position on  
23 the actions a licensee should take after identifying degraded  
24 or nonconforming conditions?

25

26 The NRC's review of the 10 CFR 50.59 process has identified two areas where  
27 rulemaking is required to clarify the NRC's requirements. The NRC described  
28 these areas, in a report issued in February 1997, as follows:

29

30 During its review of the implementation of 10 CFR 50.59, the  
31 staff identified two areas where it felt that rulemaking could  
32 be effective in resolving some of the issues discussed above.  
33 The two areas are: 1) the scope of 10 CFR 50.59, and 2)  
34 the criteria that define an unreviewed safety question.

35

36 The fundamental nature of the policy issues that require resolution, identified in  
37 the 1997 reports of the Millstone Lessons Learned Task Group and the NRC's



1 review of 10 CFR 50.59 demonstrate the extent to which issues regarding  
2 design basis compliance raised in Dr. Jacob's report are issues for the entire  
3 nuclear industry, not just at CR-3. His report is deficient in failing to evaluate  
4 management performance at CR-3 within this industry context.

5

6 **Q. WHY IS IT INAPPROPRIATE TO RELY ON DOCUMENTS THAT USE**  
7 **HINDSIGHT TO EVALUATE THE REASONABLENESS OF MANAGEMENT**  
8 **PERFORMANCE?**

9 A. The principal reason that this is not appropriate is that such documents  
10 contain knowledge that was not available to Company managers at the time  
11 relevant decisions were made. Root cause analyses and other retrospective  
12 assessments of events that occur at nuclear power plants have as their starting  
13 point a knowledge of events and their occurrence.

14 Dr. Jacobs has stated, at page 4 of his testimony, that contemporaneous  
15 documents are the best source of information for evaluating management  
16 decisionmaking related to a plant outage. However, he is mistaken when he  
17 includes "presentations to the NRC explaining the facts and circumstances  
18 relevant to the outage, assessments and root cause analyses performed to  
19 determine the fundamental causes of the problems, . . ." as examples of  
20 "contemporaneous documents." Such documents are not "contemporaneous"  
21 with the relevant management decisions. The findings and conclusions of such  
22 analyses may not have been known to Company management at the time  
23 relevant decisions were made. Such documents are retrospective analyses  
24 conducted with a knowledge of the outcome and the wisdom of hindsight.

25

1 When events occur at a nuclear power plant, the NRC's regulations, at 10 CFR  
2 50 Appendix B, Criterion XVI, not only require that the causes of the event be  
3 identified but also that corrective actions be taken to prevent recurrence of the  
4 event. The regulation further requires that:

5  
6 . . .the cause of the condition, and the corrective action  
7 taken shall be documented and reported to appropriate levels  
8 of management.  
9

10 To use analyses conducted and reports prepared pursuant to this requirement as  
11 the primary source of evidence of mismanagement is inappropriate, and as Dr.  
12 Jacobs has noted at page 6 of his testimony, contrary to a 1982 decision of the  
13 Florida Supreme Court. Additionally, as described later in my testimony, the  
14 NRC also has expressed concerns about the use of its documents for such  
15 purposes.

16

17 **Q. DO YOU AGREE WITH DR. JACOBS' DEPOSITION TESTIMONY THAT**  
18 **"CONTEMPORANEOUS" INFORMATION INCLUDES DOCUMENTS PRODUCED**  
19 **WITHIN A YEAR OF THE EVENT BEING CONSIDERED?**

20 **A. No. I believe that "contemporaneous" information is information that was**  
21 **known to or available to the decision-maker at the time a decision was made. A**  
22 **document produced with the benefit of hindsight, after the outcome is known,**  
23 **is not "contemporaneous" information, no matter when it is produced.**

24

25 **IV. EVALUATION OF DETAILS OF DR. JACOBS' TESTIMONY**

26

1 Q. DO YOU AGREE WITH THE ASSERTIONS OF FPC MISMANAGEMENT IN  
2 DR. JACOBS' TESTIMONY?

3 A. No. I have found several such assertions in Dr. Jacobs' testimony which  
4 are incorrect and which I believe are not indicative of unreasonable actions by  
5 FPC management.

6

7 Q. PLEASE IDENTIFY SUCH ASSERTIONS AND STATE YOUR RATIONALE  
8 FOR CONCLUDING THAT DR. JACOBS' TESTIMONY IS NOT CORRECT.

9 A. I believe that Dr. Jacobs is incorrect in his testimony about the following  
10 issues:

11

12 1. Makeup Tank Issue

13 On pages 15-21 of his testimony, Dr. Jacobs uses the September 4 and 5,  
14 1994 Makeup Tank (MUT) evolutions by on-shift operators, subsequent FPC  
15 internal investigations, and reports by the NRC as evidence of mismanagement  
16 on the part of FPC. Based upon my review of Dr. Jacobs' testimony, which  
17 appears to be based upon retrospective documents, and my review of  
18 contemporaneous procedures governing the operation of the MUT in the  
19 September 1994 time frame, I have concluded that Dr. Jacobs' arguments  
20 regarding the unreasonableness of FPC management actions are not valid.

21

22 First and foremost, as Dr. Jacobs' own testimony on page 15, line 13-16,  
23 indicates, the tests conducted on the MUT by the on-shift operators were  
24 unauthorized. They were not authorized by FPC management but were rather  
25 initiated by plant operators in direct violation of established FPC procedures.

1 My review of the contemporaneous FPC procedures governing the operation of  
2 the MUT indicates that they provide clear management direction regarding how  
3 the tank is to be operated. Operating Procedure, OP-402, addresses the  
4 operation of the Makeup and Purification System. Section 4.19 provides  
5 specific directions for hydrogen addition and venting the MUT, including  
6 following the limits set by OP-103B (Series 8) curves. It is clear that FPC  
7 provided sufficient and clear management direction to the operators for the  
8 appropriate operation of the MUT, including venting and filling of the tank and  
9 control of hydrogen overpressure. Providing clear direction for such operations  
10 represents reasonable and appropriate action on the part of FPC management.

11

12 On pages 16-19 of his testimony, Dr. Jacobs inappropriately uses the "Poole  
13 Report" and the FPC Management Review Panel (MRP) recommendations as  
14 evidence of FPC mismanagement. To the contrary, the establishment of the  
15 MRP and the Poole Investigation Team, the candid and self-critical reviews and  
16 evaluations conducted by the MRP and the Poole Investigation Team, and the  
17 specific recommendations resulting from the reviews are evidence of appropriate  
18 and reasonable FPC management actions to improve the FPC programs and  
19 processes.

20

21 It is interesting to note that Dr. Jacobs also implies (page 16, lines 4-5 and 14-  
22 18) that the failure of FPC management to become aware of the September 4,  
23 1994 MUT unauthorized evolution until July 13, 1995 connotes a weakness on  
24 the part of FPC management. However, as stated on page 9 of the Poole  
25 Report:

1 The Nuclear Shift Supervisor and the Assistant Nuclear Shift  
2 Supervisor were apparently not candid with the Management  
3 Review Team in September 1994 and with Corporate  
4 Counsel in April 1995. It appears both had ample  
5 opportunity to disclose the September 4, 1994 evolution but  
6 intentionally chose not to do so for their personal self-  
7 interest.  
8

9 Clearly, failure of individuals to disclose relevant information to investigating  
10 authorities should not be interpreted as FPC mismanagement or a breakdown in  
11 the corrective action process.

12

13 On page 17, lines 1-12, of his testimony, Dr. Jacobs only states part of the  
14 conclusion reached by the Poole report. There is an additional sentence in the  
15 report which changes the context of the conclusion partially cited in Dr. Jacobs'  
16 testimony. The following sentence must be added to the "quote" if the correct  
17 implication of the Poole report conclusion is to be obtained:

18

19 Once the conclusion was made that an unauthorized  
20 evolution had occurred, and the Shift Supervisor and  
21 Assistant Shift Supervisor had conceded their responsibility  
22 in the event, more thorough investigation into the root  
23 cause did not appear needed.  
24

25 In my view, this decision on the part of FPC management not to pursue the  
26 issue further appears to be a reasonable management decision.

27

28 The recommendations Dr. Jacobs extracted from the MRP report (page 18, line  
29 4-page 19, line 3) are not surprising recommendations nor are they evidence of  
30 mismanagement on the part of FPC. These types of recommendations are  
31 commonly found today throughout the nuclear industry when a utility does an

1 in-depth self-assessment after a weakness is identified. Rather than being  
2 evidence of mismanagement, they are representative of the kinds of initiatives  
3 that the better performing licensees use to improve both plant performance and  
4 their relationship with the regulator.

5

6 In reviewing the foregoing portions of Dr. Jacobs' testimony it becomes  
7 apparent that he has not utilized contemporaneous information but rather has  
8 relied exclusively and selectively on portions of retrospective NRC and FPC  
9 documents in conducting his analysis of FPC management. I do not believe this  
10 is an appropriate approach in judging the reasonableness of management  
11 actions. Likewise, utilizing licensee self-critical evaluations as evidence of  
12 mismanagement is not appropriate and in certain instances may be  
13 counterproductive to safety. This concern is expressed by the Nuclear  
14 Regulatory Commission in its Policy Statement on *Possible Safety Impacts of*  
15 *Economic Performance Incentives*, which was published in the Federal Register  
16 on July 24, 1991. Of special importance is the Commission's admonition  
17 against actions that may penalize a utility for taking voluntary action after an  
18 incident to improve its plant procedures or operating practices. The  
19 Commission expresses concern that if it is inferred that the utility's original  
20 procedures are deemed inadequate because of the utility's corrective actions  
21 and, therefore, the utility is penalized financially because of the inferred  
22 inadequacies, such action will discourage utilities from making worthwhile  
23 improvements and can be detrimental to the long-term safety of operations.

24

25

1 2. Diesel Generator Loading Issue

2 In his testimony on pages 24-27, Dr. Jacobs discusses the matter of  
3 Unreviewed Safety Questions and its relationship to the loading of the diesel  
4 generators. He makes a specific point of Mr. Sullivan informing Messrs. Boldt  
5 and Beard that as the design manager, Mr. Sullivan could not support startup of  
6 the unit because of the uncertainty associated with diesel generator loading.

7

8 A fair reading of pages 103-134 of Mr. Sullivan's deposition indicates that the  
9 diesel generator loading issue was very complicated and demanded  
10 consideration of many diverse but interrelated issues. It is not surprising that  
11 some uncertainty might exist as to the exact loading of the diesel generators  
12 during the various scenarios that are involved. As the responsible engineering  
13 manager, Mr. Sullivan demonstrated appropriate management action in  
14 informing his supervisor of his uncertainty regarding whether the diesel  
15 generator loading was as expected. Mr. Sullivan's stated approach to managing  
16 the engineering efforts at FPC is set forth in the continuation of his statement  
17 partially quoted, on page 26, lines 6-9 of Dr. Jacobs' testimony. As indicated  
18 on page 129, lines 8-11, of his deposition, Mr. Sullivan went on to state, "Now,  
19 my business is to run the power plant, and I will do that in a safe, reliable,  
20 economic, and environmentally sound manner."

21

22 Based upon his actions in this instance, it is clear that these are not merely  
23 platitudes espoused by Mr. Sullivan, but rather convictions which he has placed  
24 into practice. His actions demonstrated on a contemporaneous basis reasonable  
25 actions by a senior FPC manager. Likewise, for their part, both Messrs. Boldt

1 and Beard demonstrated that they are reasonable and responsible managers by  
2 keeping the plant shut down when they received contemporaneous information  
3 indicating there was uncertainty regarding the performance of a safety system  
4 and the potential existence of an unreviewed safety question (USQ).

5

6 It is important to note that the existence of an USQ does not mean that a safety  
7 problem exists. This premise is clearly stated in the July 5, 1996  
8 correspondence from the NRC's Executive Director for Operations to the NRC  
9 Commissioners (SECY 96-154) whereby he stated:

10

11 It should be recognized that not every unreviewed safety  
12 question is necessarily a significant safety issue. However,  
13 until the question is reviewed and understood, there is  
14 uncertainty in the basis for the Commission's safety decision  
15 in licensing the plant.

16

17 In his testimony on page 24, lines 16-17, Dr. Jacobs states that by early  
18 September the NRC had identified what it considered to be USQs with both  
19 systems (Emergency Feedwater and Emergency Diesel Generator). It is not  
20 apparent what Dr. Jacobs uses as the basis for this statement since the NRC  
21 notice announcing establishment of the restart panel states, "The Crystal River  
22 plant was voluntarily shutdown in early September by FPC, who identified  
23 several potential USQs..."

24

25 3. Emergency Feedwater System Issue

26 On pages 45-49 of his testimony, Dr. Jacobs implies that the failure to identify  
27 net positive suction head (NPSH) and potential cavitation issues in the  
28 10CFR50.59 evaluation for the 1987 modification to the Emergency Feedwater



1 System and the failure to report the potential USQ to the NRC constitute  
2 mismanagement on the part of FPC.

3

4 I reviewed the FPC management direction to the staff to determine whether the  
5 contemporaneous process in effect at Crystal River in 1987 adequately covered  
6 the conduct of safety evaluations pursuant to 10CFR50.59. My review of  
7 Nuclear Operations Department procedure, NOD-11, entitled, *Preparation of*  
8 *Safety, Regulatory, and Environmental Compliance Reviews*, revealed that FPC  
9 management provided appropriate direction to the FPC staff for conduct of  
10 safety evaluations consistent with the requirements of 10CFR50.59 as it was  
11 applied by the nuclear industry and the NRC staff in the 1987 time frame.  
12 However, when measured against today's expectations, the 1987 procedure  
13 would be judged as not providing adequate guidance. I also reviewed the 1993  
14 revision of NOD-11 and the current revision of NOD-11 to determine whether  
15 FPC management was revising its directions to the staff so as to remain  
16 consistent with rising industry practice. I found that the augmented guidance in  
17 the 1993 and current revisions of NOD-11 are consistent with contemporaneous  
18 industry practice. Promulgation of staff direction and guidance consistent with  
19 contemporaneous industry practice reflects appropriate management  
20 performance.

21

22 It is not surprising that certain 10CFR50.59 evaluations conducted by FPC in  
23 the 1987 time frame can now be found lacking when judged retrospectively  
24 against current standards. In 1995, the NRC initiated a review of the  
25 10CFR50.59 process and identified that utilities throughout the industry were

1 experiencing difficulties with the day-to-day use of 10CFR50.59 because the  
2 meanings of the rule language are not clear. Therefore, the NRC staff and the  
3 licensees have different interpretations and different expectations for  
4 implementation of the rule. Correspondence from the NRC Executive Director  
5 for Operations to the Commissioners dated February 12, 1997 (SECY-97-035)  
6 identifies many areas of confusion where additional NRC guidance is needed in  
7 order to establish a consistent industry-wide and NRC application of  
8 10CFR50.59 principles to changes being made in the design and operation of  
9 nuclear power plants. In April of this year, the NRC published for comment  
10 NUREG-1606, *Proposed Regulatory Guidance Related to Implementation of 10*  
11 *CFR 50.59.*

12

13 The impact of the rising NRC standard regarding 50.59 evaluations and design  
14 basis documentation can be specifically applied to the issue of NPSH. Dr.  
15 Jacobs' testimony fails to point out that the issue of adequate NPSH is not  
16 unique to FPC, but rather is an industry-wide issue and an area of evolving  
17 regulatory guidance. The NRC has recently issued both a Generic Letter and  
18 Information Notice concerning the availability of sufficient NPSH.

19

20 On February 20, 1997, the NRC published in the Federal Register a Notice of  
21 Opportunity for Public Comment on a proposed Generic Letter, to be sent to all  
22 plant operators, regarding the NPSH issue. The stated Purpose of the Generic  
23 Letter is as follows:

24

25

26

The U.S. Nuclear Regulatory Commission is issuing this  
generic letter (GL) to request that addressees submit the

1 analysis and pertinent assumptions used to determine the net  
2 positive suction head (NPSH) available for emergency core  
3 cooling (including core spray and decay heat removal) and  
4 containment heat removal pumps. This information will  
5 enable the NRC to determine if the NPSH analyses for reactor  
6 facilities are consistent with their respective current licensing  
7 basis.  
8

9 On May 16, 1997, the NRC issued to all plant operators Information Notice 97-  
10 27, *Effect of Incorrect Strainer Pressure Drop on Available Net Positive Suction*  
11 *Head*. The purpose of this Information Notice was to "...alert addressees that  
12 two licensees of boiling-water reactors (BWR) have recently identified inaccurate  
13 assumptions in licensing-basis calculations for net positive suction head  
14 (NPSH)."

15

16 **Q. DO YOU AGREE WITH DR. JACOBS' ASSERTION THAT "...THE NRC**  
17 **DEVELOPED AN ISSUES CHECKLIST THAT CONTAINED MORE THAN 150**  
18 **INDIVIDUAL ITEMS THAT REQUIRED RESOLUTION BEFORE RESTART."?**

19 **A. No. I have reviewed the November 1, 1996 NRC memorandum, including**  
20 **the Crystal River 3 Issues Checklist, that Dr. Jacobs references in his testimony**  
21 **as the source for his information. This memorandum clearly stated that the**  
22 **issues listed by the NRC "...will be reviewed by panel members prior to the next**  
23 **panel meeting to identify which items need to be closed before restart."**

24 **Therefore, at the time this memorandum was issued, a final decision as to**  
25 **which items needed to be resolved prior to restart had not yet been made.**

26

27 **My review of the NRC's Crystal River 3 Issues Checklist indicated that it was a**  
28 **convenient way for the NRC to group together a variety of issues that the NRC**

1 was tracking. For example, the Crystal River 3 Issues Checklist contained open  
2 action items that applied to multiple plants, unresolved issues, and notices of  
3 violation from various NRC inspections. These types of issues are tracked by  
4 the NRC for every nuclear power plant in the country and are not necessarily  
5 associated with specific restart issues. In fact, some of the issue descriptions  
6 contained in the checklist stated that they were not restart issues. This  
7 checklist also contained items that consisted of FPC reports or inspection results  
8 that had already been submitted to the NRC and were undergoing staff review.

9

10 **Q. DO YOU AGREE WITH DR. JACOBS' ASSERTION THAT "AS OF**  
11 **JANUARY 13, 1997, THE NRC'S CRYSTAL RIVER 3 ISSUES CHECKLIST OF**  
12 **ITEMS TO BE INSPECTED BY THE NRC BEFORE RESTART HAD GROWN TO**  
13 **NEARLY 200 ITEMS."?**

14 **A. No. I have reviewed the NRC January 14, 1997, NRC memorandum**  
15 **which included, as an attachment, the NRC's issues checklist as of January 13,**  
16 **1997. This checklist is divided into two sections: those items that the NRC**  
17 **intended to inspect prior to restart, and those the NRC determined did not need**  
18 **inspection prior to restart. Items were determined by the NRC not to need**  
19 **inspection prior to restart for one of the following reasons: 1) item was**  
20 **duplicated on the restart list; 2) item was a generic issue affecting multiple**  
21 **plants and being addressed by NRR; 3) previous inspection of the item was**  
22 **adequate for restart; and 4) resolution was not needed for safe restart.**

23

24 **The number of items that the NRC chose to inspect prior to restart as of**  
25 **January 13, 1997, is roughly half the size that Dr. Jacobs stated in his**

1 testimony. Only if you combine the list of items the NRC designates as restart  
2 issues with the list of items that the NRC states are not restart issues do you  
3 reach nearly 200 items.

4

5 Q. DO YOU AGREE WITH DR. JACOBS' ASSERTION THAT "...THE SCOPE  
6 OF THE OUTAGE INCREASED SO DRAMATICALLY BECAUSE THE NRC HAD  
7 SERIOUS CONCERNS ABOUT FPC'S ABILITY TO SAFELY MANAGE THE  
8 PLANT."?

9 A. No. I have found no evidence which would lead me to believe that the  
10 increased scope of the outage is due to serious NRC concerns about FPC's  
11 ability to safely manage Crystal River 3 (CR-3). If the NRC had serious concerns  
12 about FPC's ability to safely manage CR-3, these concerns would have been  
13 clearly communicated to the licensee in an Order. Orders are issued by the NRC  
14 to modify, suspend, or revoke licensed activities. In this particular case, if the  
15 NRC had serious safety concerns regarding CR-3 operations, a suspension Order  
16 would have been issued. Guidance on the use of Orders is provided in NUREG-  
17 1600, *General Statement of Policy and Procedures for NRC Enforcement Action*.  
18 NUREG-1600 states that suspension Orders may be used "To remove a threat  
19 to the public health and safety, common defense and security, or the  
20 environment." NUREG-1600 further states:

21

22 Suspensions may apply to all or part of the licensed activity.  
23 Ordinarily, a licensed activity is not suspended (nor is  
24 suspension prolonged) for failure to comply with requirements  
25 where such failure is not willful and adequate corrective  
26 action has been taken.

27

1 Based on my review, the current activities at CR-3 are not the result of serious  
2 safety concerns on the part of NRC. Rather, the increased scope of the outage  
3 from the original eight design issues is a typical consequence of a licensee's  
4 reasonable and appropriate initiative to ensure they identify potential areas for  
5 improvement of plant reliability and safety of operations.

6

7 Regarding NRC's use of Manual Chapter 0350, the NRC staff originally issued  
8 Manual Chapter 0350 in March 1990 in response to a May 1989 audit by the  
9 General Accounting Office (GAO) of NRC's restart actions for Peach Bottom.  
10 The GAO found the NRC's restart approval actions were reasonable, but that  
11 the NRC needed to establish criteria to ensure a consistent process is used to  
12 assess readiness for restart. The primary objective of the guidelines in Manual  
13 Chapter 0350 is to ensure that NRC's restart review efforts are appropriate for  
14 the individual circumstances, are reviewed and approved by the appropriate NRC  
15 management levels, and provide objective measures of restart readiness.

16

17 To ensure that NRC review efforts are consistently developed and implemented,  
18 NRC Manual Chapter 0350 contains generic checklists of items that may be  
19 reviewed by the NRC restart panel. Selected portions of the generic checklists  
20 contained in Manual Chapter 0350 are being used in the NRC's restart action  
21 plan for CR-3. In addition, the NRC has also developed a specific issues  
22 checklist for CR-3. This checklist was based on NRC's review of open action  
23 items for CR-3, and as I have already noted in my testimony, many of these  
24 items were not necessarily associated with specific restart issues and in fact are  
25 generic industry-wide issues.

1 Q. DO YOU AGREE WITH DR. JACOBS THAT THE USE OF MANUAL  
2 CHAPTER 0350 BY THE NRC IS "NOT A ROUTINE MATTER?"

3 A. No, I do not. In the period since the GAO's criticism of the process used  
4 by NRC to allow restart of Peach Bottom, Manual Chapter 0350 has become the  
5 typical process used by the NRC to monitor the restart of nuclear power plants  
6 after a long outage. In fact, the NRC is using the restart criteria in Manual  
7 Chapter 0350 to review the restart of all 12 plants that are currently in long  
8 outages. Thus it is clear that the use of this Manual Chapter is a routine matter.  
9 The NRC's use of Manual Chapter 0350 can also be seen in plant outages that  
10 have been completed since the restart of Peach Bottom. Of the 17 completed  
11 plant outages that lasted nine months or longer and occurred since the restart of  
12 Peach Bottom, the NRC used Manual Chapter 0350 to monitor plant restart 12  
13 times.

14

15 Q. DO YOU AGREE WITH DR. JACOBS' CONTENTION THAT THE  
16 CONDITIONS CONTAINED IN THE NRC'S CONFIRMATORY ACTION LETTER TO  
17 FPC CONSTITUTE A REQUIREMENT TO OBTAIN NRC APPROVAL PRIOR TO  
18 RESTART?

19 A. No, I do not. FPC committed to obtaining NRC concurrence prior to  
20 entering Mode 2 during the subsequent start-up of the plant, but, the NRC did  
21 not issue the Confirmatory Action Letter (CAL) to establish a legal requirement  
22 to obtain NRC approval prior to restart of Crystal River 3. If the NRC had  
23 wanted to legally compel FPC to take the actions specified in the March 4, 1997  
24 CAL prior to restart, including obtaining NRC approval, it would have issued an  
25 Order to FPC rather than a CAL. By asserting on page 35 of his testimony that

1 the March 4, 1997 CAL details "... the requirements for FPC's restart of Crystal  
2 River 3", and by asserting that FPC's commitment to obtain NRC concurrence  
3 prior to entering Mode 2 is the same as an NRC requirement to obtain NRC  
4 approval prior to restart [page 35, lines 3-6], Dr. Jacobs is blurring the  
5 distinction between an Order, which is specifically intended to establish legally  
6 enforceable requirements, and a CAL, which confirms a licensee's commitments  
7 but does not impose any enforceable requirements. The distinction between an  
8 Order and a CAL is important, particularly with regard to the imposition of a  
9 requirement for NRC approval prior to restart of a unit. This issue was  
10 specifically addressed by the NRC in guidance on confirmatory action letters  
11 contained in the NRC Executive Director for Operations report to the  
12 Commission dated October 14, 1992 (SECY-92-347):

13  
14  
15  
16  
17  
18  
19  
20

Since CALs do not establish legally binding requirements, orders must be used whenever there is a need to ensure that an enforceable requirement is in place. For example, use of a CAL is not sufficient if the staff wants a legally binding requirement for NRC approval prior to resumption of licensed activities.

21 Based on my regulatory experience, I would note that NRC issuance of a CAL to  
22 FPC, rather than an Order, is itself evidence that the NRC had not lost  
23 confidence in the integrity of FPC management and did not have concerns about  
24 FPC management's willingness or ability to effectively implement the actions the  
25 Company had committed to undertake in the CAL. My opinion is consistent  
26 with the same NRC guidance cited above, which states:

27  
28  
29  
30

Orders should be issued instead of CALs where there is an integrity issue, where there is some likelihood that a licensee may not comply with a commitment, or where the [NRC]



1 staff lacks the reasonable assurance that the CAL will effect  
2 the desired outcome.  
3

4 Q. DO YOU AGREE WITH DR. JACOBS' ASSERTION (PAGE 27, LINES 5-8)  
5 THAT LOW PROBABILITY OF RISK DOES NOT RELIEVE THE RESPONSIBILITY  
6 OF DESIGNING TO WITHSTAND THE POSTULATED SINGLE FAILURE?

7 A. No. He is not correct. The single-failure criterion is not intended to be  
8 used in those instances where the postulated scenario is simply not credible.  
9 The industry guidance document, IEEE Standard 603-1980, *IEEE Standard*  
10 *Criteria for Safety Systems for Nuclear Power Generating Stations*, indicates  
11 that performance of a probabilistic assessment of safety systems may be used  
12 to demonstrate that certain postulated failures need not be considered in the  
13 application of the single-failure criterion. A probabilistic assessment may be  
14 used to eliminate consideration of events and failures that are not credible. As  
15 a practical matter, the NRC utilizes 10<sup>-6</sup> to 10<sup>-7</sup> failures per reactor year (one  
16 failure in one million to ten million years of reactor operation) as the cutoff point  
17 for determining whether or not a failure scenario is credible.

18

19 Q. DO YOU AGREE WITH DR. JACOBS' ASSERTION (PAGE 51, LINES 7-8)  
20 THAT IF EMERGENCY FEEDWATER PUMP 1 IS TRIPPED AT 500 PSIG AND  
21 EMERGENCY FEEDWATER PUMP 2 IS NOT AVAILABLE , THAT THE PLANT IS  
22 WITHOUT A SOURCE OF COOLING FROM 500 PSIG TO 185 PSIG?

23 A. No, Dr. Jacobs is not correct. Under those circumstances, the plant  
24 operators would provide cooling by manually restarting EFP-1.

25

26 V. EVALUATION OF BROAD CONCLUSIONS IN DR. JACOBS' TESTIMONY

1 Q. IN REVIEWING DR. JACOBS' TESTIMONY, DID YOU FIND THAT IT  
2 CONTAINED CONCLUSIONS ABOUT FPC MANAGEMENT PERFORMANCE?

3 A. Yes. Dr. Jacobs' testimony includes a number of very sweeping, general  
4 conclusions about FPC management performance at Crystal River 3. The  
5 testimony repeatedly attributes the cause of the current outage to long  
6 standing, serious and pervasive management deficiencies at CR-3. Examples of  
7 these general conclusions can be found on pages 8, 10, 11, 54, and 57 of Dr.  
8 Jacobs' testimony.

9

10 Q. DID YOU FORM AN OPINION AS TO THE VALIDITY OF DR. JACOBS'  
11 ASSERTIONS, OPINIONS AND CONCLUSIONS ABOUT FPC MANAGEMENT  
12 PERFORMANCE AT CRYSTAL RIVER 3?

13 A. Yes I did. I consider Dr. Jacobs' assertions, opinions and conclusions  
14 about FPC management performance at Crystal River 3 to be without foundation  
15 and contradicted by the available record. In fact, Dr. Jacobs never specifically  
16 identifies any deficiencies in management performance that could accurately be  
17 characterized as "long standing," "serious" or "pervasive." Nor does he link  
18 any specific deficiencies in FPC management performance to the causes of the  
19 current outage, without relying on hindsight analyses. For example, Section II  
20 of Dr. Jacobs' testimony, which purports to provide an overview of CR-3  
21 management problems, is based entirely on self-critical investigative and  
22 corrective action documents written by the Company and FPC presentations to  
23 the NRC (MCAP II; the Poole Report; the report of the FPC Management Review  
24 Panel; and FPC presentations to the NRC at the Predecisional Enforcement  
25 Conferences held on February 27, 1996 and January 24, 1997). All of these

1 sources are informed by hindsight, were intended to be critical, and focus on  
2 areas for improvement. None of these sources was intended to, and none of  
3 them does, provide a balanced view of FPC management performance at CR-3.  
4 By contrast, as discussed below, I believe the record of FPC management  
5 performance at CR-3 is substantially at odds with the views of that performance  
6 presented in Dr. Jacobs' testimony.

7

8 **Q. HAVE YOU ANALYZED ANY FPC PROCESSES OR PROGRAMS THAT**  
9 **WERE IN EFFECT CONTEMPORANEOUS WITH THE ISSUES DISCUSSED IN DR.**  
10 **JACOBS' TESTIMONY?**

11 A. Yes, I have reviewed several of the pertinent FPC processes and  
12 procedures from a contemporaneous perspective.

13

14 **Q. WHAT WERE THE RESULTS OF YOUR REVIEW?**

15 A. I found the processes and procedures to be generally consistent with the  
16 practices used throughout the nuclear industry.

17

18 **Q. PLEASE DISCUSS THE VARIOUS PROCESSES AND PROCEDURES YOU**  
19 **REVIEWED AND YOUR CONCLUSIONS.**

20 A. I reviewed the following processes/procedures and arrived at the stated  
21 conclusions:

22

23 1. 10CFR50.59 Safety Evaluations

24 In order to determine whether FPC management direction and guidance to the  
25 staff was consistent with contemporaneous NRC requirements and nuclear

1 industry practices, I reviewed several revisions of the FPC procedures for  
2 implementing the 10CFR50.59 safety evaluation process. Nuclear Operations  
3 Department Procedure, NOD-11 is the document that governs the conduct of  
4 10CFR50.59 evaluations. Revision 0 of NOD-11 was only 6 pages in length  
5 and provided minimal guidance; however, it did provide for approval of the  
6 responsible functional manager. Revision 1, issued in June 1987, expanded the  
7 guidance to 11 pages and referenced additional NRC guidance documents which  
8 could impact the FPC staff decision whether issues needed to be covered by a  
9 50.59 evaluation. By June 1993 (Revision 3), NOD-11 had grown to 29 pages  
10 and contained staff guidance developed from the industry guidance document,  
11 NSAC-125. My review of the referenced revisions of FPC's procedures for  
12 conduct of the 10CFR50.59 evaluation process indicates that it was consistent  
13 with contemporaneous nuclear industry practices.

14

15 2. Emergency Diesel Generator (EDG) Loading Calculations

16 I reviewed the FPC procedural controls for managing EDG loads and loading  
17 calculations. The stated purpose of Nuclear Engineering Procedure, NEP-224, is  
18 to provide direction to Nuclear Engineering personnel for the control of loads on  
19 the EDGs at Crystal River Unit 3. The procedure applies to Nuclear Engineering  
20 review and approval of maintenance, operations, and modification activities  
21 which may affect the loading on the EDGs. The procedure also applies to the  
22 development and maintenance of associated calculations generated during  
23 Nuclear Engineering review of the aforementioned activities. The procedure  
24 establishes guidance and assigns responsibility for assessing the effect of swing  
25 loads on EDG running loads, assessing the effect of maintenance on EDG loads,

1 assessing the effect of valve throttle positions on EDG loads, assessing the  
2 effect of modifications on EDG running loads, and controlling the 120 volt  
3 receptacle loads on the EDGs. The procedure also contains or refers to a listing  
4 of EDG equipment loads. Based on this review, I conclude that FPC  
5 management has provided adequate guidance to the FPC staff for controlling  
6 the loading of the EDGs. Prior to the issuance of NEP-224 in 1988, NEP-1,  
7 *Safety Identification and Design Input Requirements*, required consideration of  
8 power sources for modifications.

9

10 3. Control of Makeup Tank (MUT) Overpressure

11 In order to determine whether FPC management had provided adequate  
12 guidance to the on-shift operators for the maintenance of hydrogen  
13 overpressure in the MUT, I reviewed the plant procedures in effect during  
14 September 1994. The governing procedure is Operating Procedure, OP-402,  
15 which provides direction for operation of the Makeup and Purification System.  
16 Section 4.19 of OP-402 (Rev 75) provides specific directions for hydrogen  
17 addition and venting of the MUT, including the control of hydrogen overpressure  
18 as limited by the curve 8 series set forth in OP-103B (Rev 12), Plant Operating  
19 Curves. It is noted that Alarm Response Procedure, AR-403 (Rev 21), required  
20 operators to take action to restore MUT pressure to within limits when the alarm  
21 "Makeup Tank Pressure High/Low" is received. Review of the foregoing  
22 procedures indicates that FPC management took responsible actions to establish  
23 appropriate and unambiguous direction to the operators for the operation of the  
24 MUT, including filling, venting, control of hydrogen overpressure, and actions to

1 take in the event the limits for hydrogen pressure were exceeded. These  
2 initiatives are indicative of appropriate and reasonable management by FPC.

3

4 4. Oversight Activities

5 Independent oversight activities are important to the safe and efficient operation  
6 of nuclear power plants. In order to determine whether FPC oversight activities  
7 for the operation of CR-3 were consistent with the activities conducted at other  
8 nuclear plants, I reviewed a portion of the activities conducted by the Nuclear  
9 General Review Committee (NGRC) and selected audits conducted by the  
10 Quality Assurance organization. I chose these two aspects of independent  
11 oversight for review since they tend to bracket the independent review activities  
12 conducted at a nuclear plant. The NGRC activities are at the high end whereas  
13 the QA activities are at the "grass roots" end of independent review activities.

14

15 a. NGRC Activities. I reviewed the minutes of the NGRC activities covering  
16 the period January 11, 1995-January 15, 1997. This period encompasses the  
17 time frame leading up to the September 1996 voluntary shutdown of the plant  
18 and the January 1997 NRC decision to place CR-3 on the Watchlist.

19

20 The NGRC met every two months. Routine meetings lasted from 4.5 to 9  
21 hours. The average length of the meetings was about 6.5 hours. The NGRC  
22 was supported by four Standing Subcommittees which met before the NGRC  
23 meetings. The NGRC and its Subcommittees routinely reviewed plant status,  
24 operational issues, audit results, Licensee Event Reports, NRC inspection  
25 reports, Plant Review Committee meeting minutes, significant problem reports,

1 Corrective Action Program issues, Operating Experience Review Program,  
2 maintenance activities, NRC correspondence, Operability Determinations, QA  
3 results, significant modification activities, and other similar technical and  
4 managerial issues. The NGRC provided prompt feedback to the Senior Vice-  
5 President and actions taken in response to the feedback were provided to the  
6 NGRC. My review of the NGRC minutes indicates that the NGRC activities were  
7 comparable to the Safety Review Committee activities at other nuclear facilities  
8 and were an appropriate mechanism for FPC management to receive  
9 independent critical review of CR-3 operations.

10

11 b. Quality Assurance (QA) Activities. I selected five audit reports covering  
12 diverse functional areas for review to determine whether the independent  
13 quality assurance activities were comparable to the scope and depth of similar  
14 activities at other plants in the nuclear industry.

15

16 1. Audit Report 95-02 dated March 21, 1995, assessed the functional  
17 and material condition of the Make-up and Purification System and its ability to  
18 meet operational performance functions, and the ability of corrective actions to  
19 improve the performance and reliability of the system. The audit concluded that  
20 the system can reliably perform its specified functions. The audit identified 4  
21 Findings, 24 recommendations for enhancement, and 2 strengths.

22

23 2. Audit Report 95-04 dated May 22, 1995, assessed the areas of  
24 chemistry, radiation protection, environmental monitoring, and waste. The audit  
25 concluded that Chemistry, Radiation Protection, and Facility Services are

1 effectively implementing the QA program and are performing their activities in a  
2 safe manner. The audit identified 2 Findings, 30 recommendations for  
3 enhancements, and 13 strengths.

4

5       3. Audit Report 95-07 dated August 7, 1995, assessed the conduct of  
6 plant maintenance. The audit concluded that Nuclear Plant Maintenance and  
7 interfacing organizations are effectively implementing the QA program and are  
8 performing maintenance activities consistent with the Event Free Operation  
9 philosophy. The audit identified no Findings, 12 recommendations for  
10 enhancements, and 5 strengths.

11

12       4. Audit Report 95-09 dated October 5, 1995, assessed the conduct of  
13 plant operations with emphasis on control of fuel, Plant Review Committee  
14 review of plant safety, revisions to the Emergency Operating Procedures, and  
15 system and component lineups. The audit concluded that Nuclear Operations is  
16 effectively implementing the QA program and is performing its activities in a  
17 safe manner. The audit identified no Findings, 2 recommendations for  
18 enhancements, and 3 strengths.

19

20       5. Audit Report 96-04 dated July 29, 1996, assessed the areas of fire  
21 protection and emergency planning. The audit concluded that the quality  
22 assurance program in the assessed areas was being effectively implemented.  
23 The audit identified no Findings, 17 recommendations for enhancements, and 8  
24 strengths. It is noted that after Senior Management review, 3 of the  
25 recommendations were elevated to Findings.



1           **Conclusions From Reviewing the Audit Reports.**

2 My review of selected audit reports covering many diverse areas over an  
3 extended period of time revealed several noteworthy facts. The audits all  
4 utilized technical specialists to augment the assessors from the Quality  
5 Assurance organization. In addition, the use of experts from other nuclear  
6 utilities in all but one of the audits is a positive initiative by the QA organization.  
7 I noted that the audits were structured in such a manner through prepared  
8 questions to ensure that the salient aspects desired to be covered by the  
9 assessors were covered. The results of the audits indicate that the QA  
10 organization is not reluctant to identify deficiencies (Findings) in the procedures  
11 and processes or proactively identify areas which may be amenable to  
12 enhancement (Recommendations). In addition, QA appropriately balances its  
13 reports by identifying areas where performance is exemplary (Strengths).  
14 Senior management's upgrading of 3 Recommendations in Audit Report 95-04  
15 to the status of Findings indicates that senior management closely reviews and  
16 reacts to the assessment reports from the QA organization. My review of the  
17 indicated audit reports indicates that the scope and depth of the audit oversight  
18 functions at CR-3 is comparable to those at other nuclear facilities and is  
19 indicative of reasonable management action in establishing the QA oversight  
20 program at CR-3.

21

22 5.    System Engineering

23 Since the mid-to-late 1980s the concept of System Engineers has been  
24 recognized throughout most of the nuclear industry as a viable means of  
25 overseeing the overall effective operation, maintenance and modification of key

1 plant systems. In order to determine whether FPC was keeping abreast of  
2 industry developments in this area, I reviewed several versions of the System  
3 Engineering guidelines which were established by FPC management.

4

5 FPC promulgated a *System Engineering Manual* in October 1989 to guide the  
6 activities of the System Engineers. The manual was well done and contained  
7 adequate guidance regarding System Engineer functions, as well as qualification  
8 and training requirements for the System Engineers. I also reviewed the  
9 December 1995 version of the *System Engineering Manual* (now entitled  
10 *Nuclear Plant Technical Support Manual*) to determine whether FPC  
11 management was updating its guidance consistent with regulatory  
12 developments such as the Maintenance Rule (10CFR50.65) and industry wide  
13 concepts for utilization of System Engineers. I found that the overall content  
14 and quality of both the original FPC System Engineering Manual and the  
15 December 1995 version are consistent with contemporaneous nuclear industry  
16 general concepts of system engineering.

17

#### 18 6. Modifications

19 Modifications to plant systems and components is an ongoing day-to-day  
20 activity at nuclear power plants. Accordingly, it is important that adequate  
21 guidance be provided for the staff conducting such activities. Therefore, I  
22 reviewed the guidance FPC management provided for the staff in the mid-1980  
23 and the mid-1990 time frames. The earlier staff guidance was contained in  
24 Nuclear Engineering Procedure, NEP-1(Rev 9) dated September 1986 and the  
25 mid-1990 guidance was contained in NEP-210 dated January 1996. Both

1 versions of this document contained the scope and depth of guidance generally  
2 found throughout the nuclear industry during those respective time frames. The  
3 guidance documents identify key engineering issues and how they are to be  
4 treated and documented. Examples of issues covered by the guidance  
5 documents include Safety Classifications, Design Input Requirements such as  
6 net positive suction head and source of electrical power, 10CFR50.59  
7 Screening and Evaluation Requirements, Program Impact Requirements,  
8 Installation Requirements, Environmental Qualification Reviews, Radiological  
9 Impacts, and other design considerations important when performing plant  
10 modifications. Although both revisions I reviewed are adequate  
11 contemporaneous guidance for conduct of modifications, the January 1996  
12 revision clearly reflects an increasing emphasis on design control activities  
13 which is reflective of the rising NRC expectations for design control which I  
14 discussed previously.

15

16 7. Maintenance of Design Bases Documentation

17 Maintenance of Design Bases Documentation has been an evolving issue in the  
18 nuclear industry over the past 10 years and has recently received much  
19 increased regulatory attention. As the NRC defined in 10CFR50.2, the Design  
20 Bases is, "Information which identifies the specific function to be performed by  
21 a structure, system, or component of a facility, and the specific values or  
22 ranges of values chosen for controlling parameters as reference bounds for  
23 design." Although NRC regulations do not require a formal design bases  
24 documentation program, most licensees have developed a process for updating  
25 the original design bases of the plant. This is a good engineering practice which

1 provides an effective reference point for subsequent modifications to the plant.  
2 Accordingly, I reviewed the procedures governing maintenance of Design Bases  
3 Documentation at CR-3 to determine whether such controls at CR-3 were  
4 commensurate with contemporaneous activities at other nuclear plants  
5 regarding maintenance of Design Bases Documentation.

6

7 FPC management guidance and direction to the staff for maintenance of Design  
8 Bases Documentation is found in Nuclear Engineering Procedure, NEP-216,  
9 entitled Design Basis Document. The original issuance of NEP-216 occurred in  
10 June 1988, which was the same general time frame in which the issue began  
11 receiving industry and NRC attention. NEP-216 was updated on an  
12 approximately annual basis. I reviewed the original issuance and several  
13 revisions to determine whether FPC management was reflecting  
14 contemporaneous developments in the nuclear industry. The latest revision I  
15 reviewed was Revision 6 dated June 1995. Based on my review I concluded  
16 that FPC management was providing adequate contemporaneous guidance to its  
17 staff regarding the maintenance of Design Bases Documentation.

18

19 VI. CONCLUSIONS

20

21 Q. WHAT ARE THE OVERALL CONCLUSIONS OF YOUR TESTIMONY?

22 A. My conclusions are as follows:

23 • The standards used by the U. S. Nuclear Regulatory Commission (NRC) to  
24 regulate the safety of nuclear power plants differ from the standards used to  
25 evaluate the reasonableness of utility company management. The NRC

1 evaluates the results of management actions and decisions. They do not  
2 evaluate the reasonableness of management actions and decisions based upon  
3 consideration of contemporaneous information and data. The NRC takes action  
4 and imposes sanctions on nuclear power plant management based on licensee  
5 and NRC knowledge gained through hindsight.

6

7 • The testimony of Dr. Jacobs inappropriately relies upon retrospective NRC  
8 documents and documents prepared retrospectively by FPC. These documents  
9 were prepared for the purpose of identifying potential weaknesses in FPC  
10 processes and programs so that performance can be improved. The  
11 retrospective evaluations contained in these FPC documents are required by the  
12 NRC, must be consistent with NRC criteria and guidance, and, the results  
13 distributed to relevant licensee managers. When appropriate, they are also  
14 provided to the NRC. By their nature, these FPC documents rely on hindsight.

15

16 • Dr. Jacobs' criticisms of FPC management regarding the 1994 Makeup  
17 Tank operations are not valid. It is an undisputed fact that the on-shift  
18 operators took actions that were unauthorized and contrary to relevant FPC  
19 procedures. Contemporaneous FPC procedures provided appropriate and  
20 unambiguous direction to the on-shift operators for the correct operation of the  
21 Makeup Tank.

22

23 • Dr. Jacobs' criticism of FPC management regarding the emergency  
24 feedwater system modifications in 1987 and the potential for an unreviewed  
25 safety question (USQ) are not valid because he has evaluated the Company's

1 performance against current standards and practices using hindsight  
2 information, rather than contemporaneous standards, practices and information.  
3 My review of relevant contemporaneous FPC procedures and management  
4 direction shows that they were consistent with industry practices of the time.  
5 Later revisions of the FPC procedures have kept pace with the rising industry  
6 practices in this area, which are continuing to rise up to the present time. I  
7 have also concluded that FPC management provided appropriate guidance to its  
8 staff regarding maintenance of design bases documentation, consistent with  
9 contemporaneous industry practice, over time.

10

11 • Dr. Jacobs' criticism of FPC management regarding emergency diesel  
12 generator (EDG) loading is unwarranted. Contemporaneous documents  
13 demonstrate that FPC procedures provided appropriate guidance to FPC  
14 personnel for the control of EDG loading as a result of modifications and  
15 maintenance activities. The existence of such guidance exemplifies reasonable  
16 FPC management action. Likewise, the decision of FPC management to  
17 improve EDG capabilities once problems were identified, demonstrates  
18 appropriate and reasonable contemporaneous management action.

19

20 • Dr. Jacobs' assertion that the current outage was caused by "long  
21 standing", "pervasive", or "serious" management deficiencies is not supported  
22 by evidence in his testimony. Likewise, based upon my review, I have found no  
23 evidence to support such assertions by Dr. Jacobs. Also, I did not find  
24 evidence that the NRC had serious concerns about FPC's ability or commitment  
25 to safely operate the plant or that the NRC thought the plant was unsafe.

1 Additionally, based upon my review of Nuclear General Review Committee  
2 activities and selected QA Audit Reports, I have concluded that FPC  
3 management established safety oversight functions which were appropriate and  
4 consistent with practices at other nuclear power plants.

5