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Power**  
CORPORATION

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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**

**RALPH G. BIRD**

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**FLORIDA POWER CORPORATION  
DOCKET NO. 970261-EI**

**REBUTTAL TESTIMONY OF  
RALPH G. BIRD**

1 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2 **A. Ralph G. Bird, P.O. Box 20328, Jackson, Wyoming 83001.**

3

4 **Q. PLEASE DESCRIBE YOUR BACKGROUND, EXPERIENCE AND**  
5 **QUALIFICATIONS.**

6 **A. These subjects are discussed in my testimony dated April 14, 1997, pages**  
7 **1-3.**

8

9 **Q. WHAT IS THE PURPOSE OF THIS TESTIMONY?**

10 **A. The purpose of this testimony is to respond to certain issues addressed in**  
11 **the direct testimony of Dr. William R. Jacobs submitted in this proceeding**  
12 **and dated April 28, 1997.**

13

14 **Q. WHAT IS YOUR OVERALL EVALUATION OF DR. JACOBS' TESTIMONY**  
15 **DATED APRIL 28, 1997?**

16 **A. In my judgment, Dr. Jacobs has not attempted to reach balanced**  
17 **conclusions about the reasonableness of FPC management of Crystal River**  
18 **3 based on what management knew, or should have known, at the time**  
19 **decisions were made and actions were taken. Although he acknowledges**  
20 **that use of hindsight is inappropriate, he proceeds to rely almost entirely on**  
21 **documents and statements which were clearly made with full benefit of**

1 hindsight, and he apparently considered only the most negative portions of  
2 that hindsight information. His testimony also does not appear to be based  
3 on any independent research, analysis or evaluation of other available  
4 information.

5  
6 **Q. WHAT IS THE APPROPRIATE STANDARD WHICH SHOULD BE USED TO**  
7 **EVALUATE THE REASONABLENESS OF FPC MANAGEMENT OF CRYSTAL**  
8 **RIVER 3 DURING THE TIME BEFORE THE CURRENT OUTAGE?**

9 **A.** The appropriate standard is one of reasonableness as discussed on page 3  
10 of my testimony dated April 14, 1997. As also emphasized in that  
11 testimony, the use of hindsight in evaluating the reasonableness of nuclear  
12 power plant operations is not appropriate.

13  
14 **Q. WHAT STANDARD DID YOU USE IN YOUR EVALUATION OF FLORIDA**  
15 **POWER CORPORATION (FPC) MANAGEMENT?**

16 **A.** I used a standard of reasonableness as discussed on page 3 of my  
17 testimony dated April 14, 1997. As also discussed in that testimony, I  
18 avoided use of hindsight in my evaluation of the reasonableness of FPC's  
19 management of Crystal River 3.

20  
21 The standard used here is one of reasonable management performance by  
22 FPC. In particular, this evaluation examines whether the decisions that  
23 were made and the actions that were taken were consistent with nuclear  
24 reactor safety, utility system needs, and the interests of the owners and  
25 ratepayers. This evaluation examines whether the actions that were taken

1 were consistent with those which a reasonable manager, with appropriate  
2 education, training and experience, would take in light of the information  
3 available at the time the actions were taken. The facts considered are  
4 those that were reasonably available to FPC management at the time  
5 actions were taken.

6  
7 This evaluation avoids hindsight, i.e., judgments based upon the results of  
8 management decisions or based upon information that could reasonably  
9 have become known only after the decisions were made. It does not judge  
10 FPC management performance against the optimum or against a standard  
11 of perfection. Perfection should not be the standard, nor is it attainable,  
12 because the NRC's regulatory standards as well as the industry standards  
13 promulgated by the Institute of Nuclear Power Operations ("INPO") are  
14 continually rising.

15  
16 In reviewing Dr. Jacobs' testimony, I have noted that his evaluation is  
17 largely, and inappropriately, based on FPC and NRC documents which were  
18 prepared with full benefit of hindsight. Those documents do not evaluate  
19 the reasonableness of management actions based on what management  
20 should reasonably have known at the time those actions were taken. The  
21 most important reason that NRC documents cannot be used for this  
22 purpose is because the NRC frequently judges events after the fact against  
23 standards that have evolved as a result of the event itself and subsequent  
24 related events. Prior to the event, the specific NRC standard thus may be  
25 unpredictable both to the licensee and to the NRC itself.

1 Hindsight is not a proper basis for objectively evaluating the reasonableness  
2 of management actions and performance. Use of hindsight can and  
3 sometimes does lead to erroneous conclusions concerning management  
4 performance, which is properly evaluated using a real-time perspective.  
5

6 **Q. WHAT IS THE NUCLEAR REGULATORY COMMISSION'S ROLE?**

7 **A.** The purpose of the NRC's inspection and enforcement activities as stated  
8 in the Code of Federal Regulations, Title 10 is to ensure that licensee  
9 activities are conducted in accordance with regulatory requirements "to  
10 promote and protect the radiological health and safety of the public,  
11 including employees' health and safety...." The NRC also uses the  
12 inspection and enforcement process to impose rising standards of  
13 performance.  
14

15 The NRC's standards and expectations for licensees have been continually  
16 rising for many years. What would have been considered to be good  
17 performance in the past may be considered only marginally acceptable now.  
18 Failure to improve performance in line with regulatory expectations can lead  
19 to criticism. For example, in the SALP report for Pilgrim Station issued on  
20 July 27, 1988, the NRC specifically stated its application of a rising  
21 standard of nuclear power plant licensee performance:

22 "It should also be noted that the industry continues to be subject  
23 to rising performance expectations. For example, NRC expects  
24 licensees to actively use industry-wide and plant-specific  
25 operating experience to effect performance improvement. Thus,

1 a licensee's safety performance would be expected to show  
2 improvement over the years in order to maintain consistent SALP  
3 ratings."

4  
5 A recent example of the NRC's application of rising standards was stated  
6 by a senior NRC staff member during a public briefing of the commission on  
7 January 29, 1997:

8 "Second, it is apparent that the number of stations on the watch  
9 list has increased. I believe that this is due in part to the recent  
10 refocus on NRC's attention to the engineering design area. As  
11 you know, this area had not been a major focus of NRC's  
12 inspection activities since the early 90's and weaknesses in this  
13 area contribute directly to the addition of two stations to the  
14 watch list."

15  
16 The rising standards applied by the NRC can create difficulty for licensees  
17 because they are often not explicitly described, are unpredictable, and are  
18 sometimes applied after the fact in response to an operating event. They  
19 are often revealed through the interaction between NRC regional offices and  
20 licensees, involving a process of meetings, inspections, enforcement  
21 actions and reports. This interaction is part of the NRC's process of  
22 determining compliance with regulatory requirements, communicating to the  
23 licensee the NRC's interpretation of those requirements, and judging  
24 licensee compliance with those requirements.

25

1 This ongoing process involves application of judgment by the NRC, and a  
2 continuing technical interaction and communication between the licensee  
3 and the NRC. The specific changes in the NRC's standards cannot  
4 generally be predicted. Licensees learn through an iterative process with  
5 the NRC. The result is that regulatory statements often cannot be used to  
6 measure the reasonableness of management decisions and actions based  
7 on what management knew at the time the decisions were made or the  
8 actions were taken.

9  
10 NRC Commissioner Diaz recently reaffirmed the NRC's role in a speech on  
11 April 7, 1997. He said "...there is one area, where the NRC has no  
12 business but the industry has: the good management practices area." In  
13 the same speech, he also noted that "At times it appears that NRC has  
14 found a scapegoat, "the management" who is blamed for mechanical,  
15 electrical, or human failures, whether or not they are warranted." He  
16 further stated that "...we still have too many uncertainties in our regulations  
17 and their applications, resulting from patchwork, developed over time in a  
18 less than systematic fashion. These uncertainties affect regulatory burden,  
19 encumber the regulator, and inhibit public understanding." He also clearly  
20 stated another important point which applies to this proceeding: "Safety  
21 and compliance are not the same thing."

22  
23 **Q. WHAT IS THE MOST IMPORTANT CRITERION BY WHICH MANAGEMENT**  
24 **OF A NUCLEAR POWER PLANT SHOULD BE JUDGED?**

- 1    **A.** Nuclear reactor safety is the most important consideration in management  
2    decisions regarding a nuclear power plant as I discussed on pages 5-7 of  
3    my April 14, 1997 testimony, and it is the most important criterion by  
4    which management should be judged. It is important to keep in mind,  
5    however, the principle stated by Commissioner Diaz that safety and  
6    compliance are not the same thing. All U.S. commercial nuclear power  
7    plants experience cases of non-compliance with regulatory requirements.  
8  
9
- 10   **Q.** **WHAT IS DR. JACOBS' ASSESSMENT OF NUCLEAR REACTOR SAFETY IN**  
11    **HIS TESTIMONY OF APRIL 28, 1997?**
- 12    **A.** Dr. Jacobs does not explicitly assess Crystal River 3 nuclear reactor safety  
13    in his testimony, but he implies that the plant was not safely managed.  
14
- 15    **Q.** **WAS THE CRYSTAL RIVER 3 PLANT SAFELY MANAGED BY FPC?**
- 16    **A.** Yes.  
17
- 18    **Q.** **WHAT IS THE BASIS FOR YOUR ASSESSMENT THAT CRYSTAL RIVER 3**  
19    **WAS SAFELY MANAGED?**
- 20    **A.** I interviewed responsible and knowledgeable present and former FPC  
21    personnel concerning the operation, performance and condition of the plant,  
22    toured the plant and inspected the equipment and plant areas of importance  
23    to this evaluation, and reviewed documents including plant records and  
24    performance indicators. I relied upon the documents and information  
25    contemporaneously available to FPC management at the time decisions



1        were made concerning the events at issue in this proceeding. I evaluated  
2        the information obtained during this review using my knowledge and  
3        experience acquired in about thirty years of management experience in  
4        naval and commercial nuclear power plant operation.

5  
6        The implications in Dr. Jacobs' report that the Crystal River 3 Plant was  
7        unsafe are not supported by the facts. To the contrary, the record supports  
8        the conclusion that FPC management's first priority was safety.

9  
10       Dr. Jacobs has selectively quoted from or described communications  
11       between FPC and the NRC that center on after-the-fact issues of  
12       compliance. He has not shown that these issues involved failure to manage  
13       the plant safely. Furthermore, Dr. Jacobs did not put the documents into  
14       the proper regulatory context so that actual plant safety can be assessed.

15  
16       For example, a number of actions are required to be taken by plant  
17       personnel and by the NRC if unsafe conditions are found. The fact that  
18       none of these actions was taken is further demonstration of the plant's safe  
19       management and operation. The types of actions which could have been  
20       taken if circumstances required them, but were not taken, are discussed in  
21       the following paragraphs.

22  
23       If the plant was unsafe, FPC personnel were required by law to report that  
24       fact to the NRC.

25

1 If at any time the NRC had reason to believe that Crystal River 3 was  
2 unsafe, they would have been obligated to issue a shutdown order. The  
3 NRC has issued approximately 15 shutdown orders to commercial nuclear  
4 power plants. For example, in 1987 the NRC issued an immediately  
5 effective order suspending power operations to Peach Bottom. The NRC  
6 did not issue a shutdown order to Crystal River 3 related to the current  
7 outage.

8  
9 The NRC's willingness to shut down a plant which is unsafe was recently  
10 reaffirmed by a senior NRC staff member during a public briefing of the  
11 commission on January 29, 1997:

12 "I would like to highlight a few points. First, because a plant is  
13 listed on the watch list does not mean that it is unsafe to  
14 operate. If we conclude that a plant cannot safely operate, we  
15 will issue orders to shut the plant down in order to ensure  
16 adequate protection of the public health and safety."

17  
18 **Q. YOU HAVE STATED THAT DR. JACOBS HAS NOT ATTEMPTED TO**  
19 **REACH BALANCED CONCLUSIONS ABOUT THE REASONABLENESS**  
20 **OF FPC MANAGEMENT BASED ON WHAT MANAGEMENT KNEW, OR**  
21 **SHOULD HAVE KNOWN, AT THE TIME DECISIONS WERE MADE AND**  
22 **ACTIONS WERE TAKEN. CAN YOU PROVIDE AN EXAMPLE OF**  
23 **SIGNIFICANT INFORMATION THAT WAS KNOWN TO FPC**  
24 **MANAGEMENT AND THAT SHOULD THEREFORE BE INCLUDED IN**

1           **ANY ASSESSMENT OF MANAGEMENT REASONABLENESS IN THIS**  
2           **PROCEEDING?**

3    A.    Yes. Quantitative performance indicators were part of the information  
4           available to management at the time actions were taken. These  
5           indicators provide management with prompt, timely feedback on plant  
6           performance relative to its industry peers, and thus are appropriate for  
7           use in evaluating the reasonableness of management actions in light  
8           of the information available to management. The performance  
9           indicators include comparisons of capacity factors and other objective  
10          comparisons of Crystal River 3 performance against the industry as a  
11          whole and its peer group of plants designed by Babcock and Wilcox  
12          (B&W).

13  
14    Q.    **WHAT DO THESE PERFORMANCE INDICATORS SHOW?**

15    A.    Capacity factor is a commonly used benchmark for evaluating the  
16           relative productivity of commercial nuclear power plants. A pattern of  
17           consistent and large improvements in Crystal River 3 capacity factor  
18           performance during recent years before 1996 is shown in exhibits to  
19           the direct testimony of Mr. Percy M. Beard, Jr., filed in this proceeding  
20           and dated April 14, 1997. In 1989 the capacity factor for the first ten  
21           years of Crystal River 3 operation was 53%, which placed it 78th of  
22           107 plants. During the next few years under Mr. Beard's leadership,  
23           Crystal River 3 dramatically improved its capacity factor performance.  
24           For the period 1993-1995, Crystal River 3 ranked 5th out of 108 units  
25           with a capacity factor greater than 88%. In 1995 Crystal River 3 had

1 a capacity factor of about 100%, one of the best in the world. This  
2 steady improvement in capacity factor indicated to FPC management  
3 overall sound long-term management, operation, and maintenance of  
4 Crystal River 3 such that they would not have had reason to believe  
5 there was a need for major changes to management direction or  
6 approach.

7  
8 Other performance indicators for Crystal River 3 would have told FPC  
9 management that during the years before 1996, Crystal River 3 was  
10 generally as good as, and in some areas considerably better than, its  
11 peer plants and the industry as a whole. Some examples are  
12 discussed briefly in the following paragraphs.

13  
14 The number of automatic scrams (automatic reactor shutdowns) while  
15 the reactor was critical is a widely accepted performance indicator of  
16 plant safety and is affected by such important elements of  
17 management effectiveness as operator performance, maintenance and  
18 procedure quality, and the level of personnel adherence to procedures.  
19 The number of automatic scrams while critical declined steadily from  
20 three in 1991, to two in 1992, to one in 1993, and to zero in 1994  
21 and 1995. Therefore, FPC management was receiving information  
22 that Crystal River 3's performance in this important area dramatically  
23 improved over these years to a level clearly superior to its peers and  
24 to the industry average.

25

1 Examples of other performance indicators which told FPC  
2 management during the period prior to the outage that Crystal River  
3 performance was generally as good as or better than its peer plants  
4 and the industry average include the number of safety system failures,  
5 the number of safety system activations, the forced outage rate, the  
6 number of significant events and the collective radiation exposure.

7  
8 In addition, the cost of generation is significant information that FPC  
9 management was tracking and using in its decision-making process.  
10 Although not as important as safety performance, the cost of  
11 generation is an indicator of economic performance which is widely  
12 followed and which is important to FPC and its customers because it  
13 affects the price of their electrical supply. The U.S. government also  
14 considers this indicator important to an assessment of management  
15 reasonableness. For example, Title 8, Part 1718, Subpart B,  
16 Appendix A, page 245, states:

17 *Prudent Utility Practice* shall mean any of the practices,  
18 methods and acts which, in the exercise of reasonable  
19 judgement, in light of the facts, including, but not limited to, the  
20 practices, methods and acts engaged in or approved by a  
21 significant portion of the electric utility industry prior thereto,  
22 known at the time the decision was made, would have been  
23 expected to accomplish the desired result consistent with cost-  
24 effectiveness, reliability, safety and expedition. It is recognized  
25 that Prudent Utility Practice is not intended to be limited to

1 optimum practice, method or act to the exclusion of all others,  
2 but rather is a spectrum of possible practices, methods or acts  
3 which could have been expected to accomplish the desired result  
4 at the lowest reasonable cost consistent with cost-effectiveness,  
5 reliability, safety and expedition. (emphasis added)

6  
7 The cost of generation of electricity by Crystal River 3 continually improved  
8 from 1992 through 1995. By 1995, excellent generation cost of less than  
9 two cents per kilowatt-hour had been achieved.

10  
11 In summary, the performance indicators at Crystal River 3 for the years  
12 preceding this outage told FPC management that the results it was  
13 achieving in terms of overall Crystal River 3 performance were generally  
14 consistent with or better than its industry peers. Based on this information,  
15 I would have expected FPC management to identify specific areas for  
16 improvement and take actions to achieve specific improvements. However,  
17 I would not expect FPC management to have initiated major programmatic  
18 improvement programs in response to these performance indicators.  
19 Furthermore, these performance indicators would not have led FPC  
20 management to anticipate the emergence of the types of issues with which  
21 they are now dealing in this outage.

22  
23 In conclusion, the performance indicators are significant information which  
24 was developed and used by FPC in management of Crystal River 3. This  
25 type of information and its use should be considered in assessing

1           reasonableness of management. I found no indication in Dr. Jacobs'  
2           testimony that he considered information such as this which was available  
3           to management.

4  
5   **Q. DR. JACOBS' APRIL 28, 1997, TESTIMONY DISCUSSES FPC ACTIONS**  
6   **DESCRIBED BY MR. FRAN SULLIVAN DURING EFFORTS TO RESOLVE**  
7   **QUESTIONS CONCERNING POSSIBLE UNREVIEWED SAFETY QUESTIONS**  
8   **AT CRYSTAL RIVER 3. DR. JACOBS QUOTES MR. SULLIVAN'S**  
9   **STATEMENT MADE AT ONE POINT DURING THIS ONGOING EFFORT**  
10   **THAT, "I DON'T KNOW WHERE WE ARE," AND CONCLUDES THAT THIS**  
11   **STATEMENT INDICATED A VERY SERIOUS SITUATION. WHAT**  
12   **CONCLUSIONS DO YOU DRAW FROM MR. SULLIVAN'S STATEMENTS?**

13   **A. Both the forthright, questioning attitude of Mr. Sullivan and the subsequent**  
14   **FPC management decision to keep the unit shut down were appropriate and**  
15   **consistent with the philosophy of conservatism and care which I mentioned**  
16   **in my April 14, 1997 testimony.**

17  
18   **Q. WHAT CONCLUSIONS DID YOU REACH CONCERNING THE**  
19   **CONSERVATISM AND CARE WITH WHICH FPC MANAGED CRYSTAL**  
20   **RIVER 3?**

21   **A. My evaluation led me to conclude that FPC management applied an**  
22   **appropriately high level of conservatism and care to the management of**  
23   **Crystal River 3, and that this conservatism and care played a major role in**  
24   **the decision to enter the present outage, and to initiate the actions planned**

1 to be done during the outage to achieve a high probability of continued safe  
2 and reliable operation.

3  
4 **Q. DO YOU AGREE WITH DR. JACOBS' OPINION ON PAGE 4, LINE 12, THAT**  
5 **THE BEST SOURCES OF INFORMATION ABOUT THE CRYSTAL RIVER**  
6 **OUTAGE ARE, "CONTEMPORANEOUS DOCUMENTS GENERATED AT THE**  
7 **TIME OF THE EVENTS UNDER REVIEW OR SHORTLY THEREAFTER"?**

8 **A.** I agree to the extent that the documents are truly contemporaneous and are  
9 used to assess what responsible managers knew at the time decisions were  
10 made. Examples of such contemporaneous documents could include those  
11 which predated the decisions or which were part of the decision-making  
12 process. However, documents which he cites as examples of  
13 contemporaneous documents include "Company correspondence and  
14 presentations to the NRC explaining the facts and circumstances relevant  
15 to the outage, assessments and root cause analyses performed to  
16 determine the fundamental causes of the problems, and other  
17 contemporaneous documents prepared during the normal course of  
18 business." Many of these documents were generated with full benefit of  
19 hindsight and are therefore inappropriate for use in judging the  
20 reasonableness of FPC management's actions in light of what management  
21 knew, or should reasonably have known, at the time the actions were  
22 taken.

23  
24 **Q. DO YOU AGREE WITH DR. JACOBS' OPINION ON PAGE 15 THAT IT IS**  
25 **APPROPRIATE TO USE DOCUMENTS PRODUCED BY THE NUCLEAR**



1       **REGULATORY COMMISSION (NRC) OR THE INSTITUTE OF NUCLEAR**  
2       **POWER OPERATIONS (INPO) IN AN EVALUATION OF THE**  
3       **REASONABLENESS OF MANAGEMENT OF A NUCLEAR POWER PLANT?**

4    **A. No. It is not possible to arrive at an informed and balanced opinion about**  
5       **the reasonableness of decisions made by management of a nuclear power**  
6       **plant from an examination of documents prepared by the NRC or INPO for**  
7       **the following reasons. These documents are written with full benefit of**  
8       **hindsight. The standards used are not standards of reasonableness, but are**  
9       **the very high and continually rising standards of performance well above**  
10       **those necessary to maintain adequate plant safety. The NRC evaluates not**  
11       **only whether a licensee has complied with NRC regulatory requirements but**  
12       **also whether safety could be enhanced through improvements in the**  
13       **licensee's plant, programs, or personnel. INPO evaluates whether further**  
14       **improvements could be made to achieve the highest industry standards of**  
15       **excellence.**

16  
17       **INPO is an industry group formed in 1979 whose membership includes all**  
18       **U.S. nuclear utilities. Its purpose is to promote the highest levels of safety**  
19       **and reliability--to promote excellence--in commercial nuclear power plant**  
20       **operation. It promulgates goals for industry performance as well as**  
21       **guidelines and good practices for nuclear power plant operation,**  
22       **maintenance, engineering, and administration. As the performance of U.S.**  
23       **commercial nuclear power plant has improved over time, industry**  
24       **performance standards promulgated by INPO have also risen.**

25

1 INPO conducts periodic evaluations of each operating commercial nuclear  
2 power plant in the U.S. These evaluations are conducted to promote the  
3 highest levels of excellence in the operation, maintenance, and support of  
4 operating nuclear plants. The standard is not one of compliance with  
5 safety standards, but it is a rising standard of excellence which represents  
6 a summation of the best practices in the industry. The focus of the  
7 evaluation is on areas where further improvements could be made in the  
8 pursuit of excellence. The evaluation is made with full benefit of hindsight,  
9 and the reasonableness of management decisions is not considered.  
10 Because of the standards used by INPO evaluators, the evaluation results  
11 are not appropriate for judging the reasonableness of management actions.

12  
13 The fact that NRC and INPO documents contain criticisms or deficiencies  
14 is not evidence of unreasonable management. Criticisms are directed at  
15 times to all U.S. commercial nuclear power plants. For example, the NRC  
16 Systematic Assessment of Licensee Performance (SALP) reports for even  
17 the best nuclear power plants generally contain criticisms and/or  
18 exhortations to improve performance. Similarly, INPO plant evaluation  
19 reports normally find areas in need of improvement.

20  
21 The harsh criticisms typically contained in NRC and INPO documents are  
22 intended to promote rising standards of excellence and are directed in  
23 particular toward maintaining the high standards of excellence. They are  
24 not intended to, and should not, be used to assess the reasonableness of  
25 nuclear power plant management.

1 Q. IN SUPPORT OF HIS OPINION THAT NRC DOCUMENTS SHOULD BE  
2 CONSIDERED IN EVALUATING THE REASONABLENESS OF FPC  
3 MANAGEMENT, DR. JACOBS ON PAGE 6, LINE 17, NOTES THAT MR.  
4 BEARD WAS INTERESTED IN THE NRC'S ASSESSMENT OF CRYSTAL  
5 RIVER 3 PERFORMANCE. WAS MR. BEARD'S INTEREST IN NRC  
6 INFORMATION APPROPRIATE?

7 A. Yes. One of his responsibilities was to deal with the NRC. Therefore, Mr.  
8 Beard needed to inform himself about NRC's perception of Crystal River 3  
9 regulatory performance.

10

11 Q. DOES THIS MEAN THAT SUCH NRC INFORMATION SHOULD BE  
12 CONSIDERED IN THIS PROCEEDING IN EVALUATING THE  
13 REASONABLENESS OF FPC MANAGEMENT?

14 A. No. As explained elsewhere in my testimony, NRC evaluations based on  
15 hindsight are not appropriate for evaluating the reasonableness of FPC  
16 management in the context of this proceeding.

17

18 Q. DO YOU AGREE WITH DR. JACOBS' USE OF THE MANAGEMENT  
19 CORRECTIVE ACTION PLAN PHASE II (MCAP II), BEGINNING ON PAGE 11  
20 OF HIS TESTIMONY, APPARENTLY AS A BASIS FOR ASSESSING FPC  
21 MANAGEMENT OF CRYSTAL RIVER 3?

22 A. No. Dr. Jacobs attempts to misrepresent the improvement efforts of MCAP  
23 II as an indication of management failure.

24

1       MCAP II is an improvement plan based on a retrospective review by FPC  
2       management as part of an aggressive effort to improve performance. As  
3       an improvement effort, it is appropriately self-critical. It does not indicate  
4       that these areas were unsatisfactory or that management was  
5       unreasonable. Such improvement efforts are, contrary to Dr. Jacobs'  
6       attempted misuse of them, an indication of good management.

7  
8       The areas identified in MCAP II as needing attention are not unusual. Dr.  
9       Jacobs' statement that FPC had "long standing, pervasive management  
10      problems" could not be true in light of the overall good performance of  
11      Crystal River 3.

12  
13     It is also important to note that if nuclear power plant licensee self-  
14     assessments, written in the open and critical manner that is customary in  
15     the industry, are used as evidence of unreasonable management, licensees  
16     may become less willing to engage in such self-criticism with the result that  
17     areas appropriate for improvement are less clearly identified. This would  
18     not promote reactor safety and would not be in the public interest.

19  
20    **Q. DO YOU AGREE WITH DR. JACOBS' CONCLUSION ON PAGE 13 OF HIS**  
21    **TESTIMONY THAT THE OVERSIGHT ORGANIZATIONS AT CRYSTAL**  
22    **RIVER 3 COULD NOT BE EFFECTIVE DUE TO THE FAILURES OF LINE**  
23    **MANAGEMENT?**

24    **A. No. Dr. Jacobs provides no basis for this inappropriate conclusion.**  
25

1 Q. DO YOU AGREE WITH DR. JACOBS' APPARENT CONCLUSION ON PAGE  
2 13 THAT THE CURRENT OUTAGE WAS REQUIRED TO RESOLVE ISSUES  
3 IDENTIFIED IN MCAP II?

4 A. No. As stated in my direct testimony and elsewhere in this testimony, the  
5 current outage resulted from the need to address certain design issues.  
6 MCAP II communicates management expectations and provides direction  
7 to the FPC Nuclear Operations Organization focused on achieving superior  
8 performance at Crystal River 3. Actions are set forth in a broad range of  
9 management areas to achieve this desired improvement. These actions did  
10 not cause the outage.

11

12 Q. IN HIS TESTIMONY, ON PAGES 15 THROUGH 18, DR. JACOBS  
13 DISCUSSES CERTAIN EVENTS INVOLVING THE OPERATION OF THE  
14 MAKEUP TANK (MUT) BY OPERATORS AT CRYSTAL RIVER 3 IN  
15 SEPTEMBER, 1994, AND CONTENDS THAT FPC EVALUATIONS OF  
16 THOSE EVENTS PROVIDED "EARLIER INDICATIONS OF MANAGEMENT  
17 PROBLEMS AT FPC." DO YOU AGREE WITH DR. JACOBS' CONCLUSION  
18 REGARDING THOSE EVENTS?

19 A. No. In response to the event which was identified in September, 1994 as  
20 well as concerns which the NRC expressed about it, FPC management took  
21 prompt action to investigate by convening the Management Review Panel  
22 (MRP) to which Dr. Jacobs refers. This was a reasonable and proper  
23 management action in light of the unauthorized individual operator actions  
24 which caused the event. The MRP conclusions and recommendations  
25 formed the foundation of the Event-Freq. Operations Program and the

1 program developed in Spring 1995 which later came to be known as the  
2 Management Corrective Action Plan (MCAP). These programs addressed  
3 the areas for improvement which were identified by the MRP. The MRP  
4 recommendations and the MCAP action plans do not indicate  
5 mismanagement, but rather show reasonable management efforts to  
6 identify and carry out programs to improve performance.

7  
8 Similarly, when follow-on investigations revealed that individuals had failed  
9 to disclose the second unauthorized test involving the MUT in September  
10 1994, FPC management properly convened a separate inquiry to determine  
11 the facts regarding this, which resulted in the Poole report. Again, rather  
12 than showing any mismanagement, FPC's actions to determine the facts  
13 of the situation were an appropriate response.

14  
15 In sum, my evaluation indicates that Dr. Jacobs' conclusions that the FPC  
16 investigations of the MUT events showed "pervasive problems" in  
17 management are not supported by the facts.

18  
19 **Q. DO YOU AGREE WITH DR. JACOBS' CONCLUSION THAT THE SCOPE OF**  
20 **THE PRESENT OUTAGE GREW FROM A RELATIVELY FEW TECHNICAL**  
21 **ITEMS TO A COMPREHENSIVE REVIEW OF FPC'S NUCLEAR OPERATION**  
22 **BECAUSE OF NRC CONCERNS RESULTING FROM POOR MANAGEMENT**  
23 **PERFORMANCE FOR SEVERAL YEARS PRIOR TO THE OUTAGE?**

24 **A. No, I do not agree. Although Dr. Jacobs' description of the restart issues**  
25 **could lead the reader to conclude that the items for restart were NRC**

1 mandates, many of these items had been identified by FPC as issues for  
2 improvement. Their existence does not indicate prior unreasonable  
3 management. To the contrary, the effort by FPC management to identify  
4 and deal with those issues is an indication of good management.

5  
6 The number of items on the restart issues list is not significant, in itself.  
7 Many of the items are not of a nature to require substantial efforts to close,  
8 either by FPC or by the NRC. The first checklist published by the NRC  
9 Restart Panel contained approximately 160 individual items, not then  
10 categorized as to whether inspection and closure were required prior to  
11 restart. A more recent edition dated February 24, 1997, contained 106 line  
12 items requiring inspection prior to restart as well as a number of items not  
13 required for restart. It should be noted that there are a number of issues on  
14 the list which are duplicates. This is an expected outcome of efforts to  
15 ensure that nothing significant is missed.

16  
17 As the outage progresses the list will be revised. Duplicate items should be  
18 removed. Items will be closed as they are completed. New issues will  
19 likely be identified and added to the list as a result of ongoing analytical  
20 work and plant systems reviews.

21  
22 About 76 of the items on the February 24, 1997 list of restart items are the  
23 type which is normally tracked and closed out in consultation with the NRC  
24 Resident Inspectors as part of the normal process of running a nuclear  
25 power plant. These items include such things as unresolved issues,



1 enforcement actions, violations (both old and current) and inspector follow  
2 items.

3  
4 **Q. WHAT IS THE RELEVANCE OF DR. JACOBS' TESTIMONY BEGINNING ON**  
5 **PAGE 30 CONCERNING THE FPC CRYSTAL RIVER 3 RESTART PANEL TO**  
6 **AN ASSESSMENT OF THE REASONABLENESS OF FPC MANAGEMENT?**

7 **A. Dr. Jacobs' description of the FPC Restart Panel actions supports my**  
8 **conclusion that FPC managed Crystal River 3 safely and reasonably. The**  
9 **formation of the FPC internal restart panel and development of the restart**  
10 **issues matrix did not cause the current outage. FPC compiled the restart**  
11 **issues matrix in order to effectively manage the resources needed to bring**  
12 **the issues to closure. As is appropriate, this is also comprehensive.**  
13 **Extensive lists of items to be done, analyzed, inspected and closed are the**  
14 **norm during extended shutdown periods such as the present CR-3 outage.**  
15 **The Restart Panel actions were appropriate, reasonable and relatively**  
16 **common practices for a plant undergoing a complex outage.**

17  
18 Furthermore, these actions by FPC management were reasonable steps to  
19 insure that maximum long-term benefit is derived from the current outage  
20 and to help assure that post-outage performance of Crystal River 3 will  
21 continue to be safe and reliable.

22  
23 **Q. DR. JACOBS STATES ON PAGE 34 OF HIS APRIL 28, 1997 TESTIMONY**  
24 **THAT THE FOLLOWING TWO REASONS FOR THE NRC TO FOLLOW THE**  
25 **NRC INSPECTION MANUAL, CHAPTER 0350, ARE CLEARLY APPLICABLE**



1 TO CRYSTAL RIVER 3: (1) SERIOUS NRC QUESTIONS ABOUT LICENSEE  
2 MANAGEMENT EFFECTIVENESS AND (2) IDENTIFICATION OF A  
3 COMPLEX HARDWARE PROBLEM OR A DEGRADATION OF A  
4 STRUCTURE, SYSTEM OR COMPONENT TO THE EXTENT THAT IT MAY  
5 NOT PERFORM ITS INTENDED SAFETY FUNCTION AND REQUIRES  
6 COMPREHENSIVE NRC EVALUATION BEFORE RESTART. DO YOU AGREE  
7 WITH HIS STATEMENT?

8 A. No. Dr. Jacobs' statements about the significance of the NRC Restart  
9 Panel appear to be based on speculation. The NRC Inspection Manual,  
10 Chapter 0350, is a generic document intended to cover a variety of  
11 circumstances. Although NRC correspondence concerning the Crystal River  
12 3 Restart Panel did identify some concerns, I found no support for Dr.  
13 Jacobs' statement concerning which portions of Chapter 0350 specifically  
14 describe Crystal River 3.

15  
16 Q. WHAT IS THE RELEVANCE OF DR. JACOBS' TESTIMONY BEGINNING ON  
17 PAGE 37 CONCERNING THE OUTAGE CRITICAL PATH TO AN  
18 ASSESSMENT OF REASONABLENESS OF FPC MANAGEMENT?

19 A. Dr. Jacobs first states that the actual critical path for the outage will not  
20 be known until the outage is complete. I agree.

21  
22 Dr. Jacobs' speculation about possible effects of resolution of regulatory  
23 issues on the critical path is not relevant to an assessment of  
24 reasonableness of FPC management. It is apparently an attempt to refute  
25 the Company's present estimates with no facts to support his assertions.

1 It is common practice, and indeed necessary, to use the concept of a  
2 planned critical path in order to manage the complexities of a major outage  
3 at a nuclear power plant. To do this, utility management must evaluate  
4 known work and anticipated emergent work and estimate which item or  
5 items will constitute the critical path. This estimate is reassessed as work  
6 items are completed, new work is identified and work scope changes are  
7 identified. This planned critical path must be understood for managers to  
8 apply resources where they are most needed to minimize the duration of  
9 the outage. As changes in the planned critical path become apparent,  
10 resources are reassigned appropriately. The fact that today's planned  
11 critical path may not turn out to be the actual critical path, which can only  
12 be determined by a detailed retrospective evaluation after the outage is  
13 complete, does not mean that management is somehow unreasonable in  
14 using it. To the contrary, devoting resources to the planned critical path  
15 during the outage is reasonable management of a complex and changing  
16 situation.

17  
18 Regulatory issues can be resolved concurrently with modification and  
19 maintenance work with little or no impact on the critical path, and thus  
20 have little or no impact on the duration of the outage. This is particularly  
21 true when substantial long-range design and procurement must be  
22 completed before outage modifications can be accomplished. It is also  
23 possible that regulatory issues will have a large impact on the outage  
24 duration and scope, but this would not indicate unreasonable management

1           If the impact of the regulatory issues was caused by unpredictable and after  
2           the fact changes in regulatory standards.

3

4   **Q. DO YOU AGREE WITH DR. JACOBS' SUMMARY OF THE CURRENT**  
5   **OUTAGE BEGINNING ON PAGE 52, LINE 3, IN WHICH HE STATES THAT**  
6   **FPC'S REASONS FOR FORMING A RESTART PANEL INCLUDED "...THE**  
7   **SERIOUS AND PERVASIVE NATURE OF THE PRESENT PROBLEMS..."?**

8   **A. No. As I have explained previously in this testimony, FPC's formation of**  
9   **a restart panel was a reasonable action.**

10

11   **Q. DO YOU AGREE WITH DR. JACOBS' CONCLUSIONS SUMMARIZED ON**  
12   **PAGES 8 AND 53 THAT THE CURRENT OUTAGE WAS AVOIDABLE?**

13   **A. No, I do not agree. Dr. Jacobs' conclusion on this point is based on**  
14   **speculation about what might or might not have been done had certain**  
15   **facts been known sooner. The safety evaluation performed for the 1987**  
16   **modification used established procedures and practices. The safety**  
17   **evaluation did not identify the potential for cavitation of the EFW pump**  
18   **under certain hypothetical conditions. The NRC was aware of the**  
19   **modification before and after it was installed. They did not identify the**  
20   **potential cavitation problem. On several occasions over the succeeding five**  
21   **years, issues relating to: (1) EFW pump operation at or near pump runout**  
22   **conditions and (2) potential steam generator overcooling were identified**  
23   **and investigated. Modifications were installed or more detailed analysis**  
24   **was done to resolve the issues as they were identified. On those**  
25   **occasions, the potential for pump cavitation was not identified. It was only**

1 through the continued close attention paid to the EFW system by FPC  
2 engineers that the potential for cavitation was identified in 1996.

3  
4 Dr. Jacobs contends that if the cavitation potential had been identified  
5 earlier, somehow the necessary modifications would have been  
6 implemented at some other time without having an effect on plant  
7 availability. This conclusion does not reflect the actual complexities of  
8 making modifications to nuclear power plants and the necessarily limited  
9 resources which are available.

10  
11 As I noted in my direct testimony, a plant modification carries with it costs  
12 and difficulties which go beyond simply designing and installing the  
13 modification. Manuals, drawings and other documentation must be  
14 accurately revised to reflect the change. Plant operating and maintenance  
15 procedures may have to be changed. Operations, maintenance and  
16 engineering personnel may have to be trained on the modification. All of  
17 these activities must be integrated with innumerable other activities, usually  
18 including other modifications and repair work done in parallel.

19  
20 With complicated modifications such as the installation of cavitating  
21 venturis, the design and procurement aspects are extensive and time-  
22 consuming. Planned outages at nuclear power plants are managed to fully  
23 employ available resources, including engineering and construction  
24 manpower. Whenever the cavitation issue had been identified, an effort  
25 equivalent to that presently being undertaken would have been needed. As

1 a result, other work which was actually performed in refueling outages  
2 subsequent to the 1987 modification would have had to be deferred or  
3 rescheduled. Without conducting a detailed analysis of each outage, it is  
4 not possible to establish the precise effect of the additional effort on outage  
5 duration. Major modifications of the scope of cavitating venturi installation,  
6 for example, cannot be accommodated into operations or outages without  
7 an impact.

8  
9 I conclude that Dr. Jacobs' assertion regarding the present outage is based  
10 on hindsight evaluation, on speculation as to what might have happened  
11 had things been different, and on an unreasonable standard of perfection.  
12 Design-related issues, not unreasonable management, caused the outage.  
13 Even perfect management, with perfect foresight, would not have avoided  
14 the need for an extended outage, only possibly have shifted it to another  
15 time.

16  
17 **Q. DO YOU AGREE WITH DR. JACOBS' CONCLUSION SUMMARIZED ON**  
18 **PAGE 8 AND PAGE 54 THAT THE CURRENT OUTAGE IS THE RESULT OF**  
19 **LONG-STANDING DEFICIENCIES IN FPC'S OPERATION AND**  
20 **MANAGEMENT OF CRYSTAL RIVER 3?**

21 **A.** No. Dr. Jacobs does not specifically identify long-standing deficiencies in  
22 management which are associated with the causes of the outage. As  
23 discussed in my April 14, 1997 testimony and earlier in this testimony, FPC  
24 managed Crystal River 3 safely and reasonably. The outage was necessary  
25 to address certain design issues. The events which led up to the initiation

1 of the outage are discussed in my direct testimony, beginning on page 13.  
2 When subtle system interactions which had been introduced through plant  
3 modifications over a period of years were identified, FPC management took  
4 prompt and appropriate action to extend this outage and investigate the  
5 situation.

6  
7 Further, as I have described, Dr. Jacobs arrives at his conclusion based on  
8 hindsight NRC or FPC self-critical assessments, while he apparently does  
9 not consider information which was available to FPC management at the  
10 time. The reasonableness of management actions should be assessed in  
11 light of the information available to management at the time the actions  
12 were taken. For example, in February 1991, NUREG 1397, "An  
13 Assessment of Design Control Practices and Design Reconstitution  
14 Practices in the Nuclear Power Industry" provided the results of a survey  
15 conducted at several nuclear power plants. The survey results showed a  
16 lack of standardized methodology for achieving design control and also  
17 showed that the requirements were not well defined or clearly understood  
18 on an industry-wide basis--a situation which continues today. An important  
19 result of the survey, however, was the identification of one plant which had  
20 developed a good approach, cited as a model for the industry--Crystal River  
21 3. This NUREG is (1) the type of information that was available to FPC  
22 management in assessing whether its programs were consistent with  
23 industry practices and, therefore (2) the type of information which should  
24 be considered in an evaluation of the reasonableness of FPC management  
25 performance after that information became available.

1 Q. PLEASE SUMMARIZE YOUR CONCLUSION.

2 A. Dr. Jacobs' analysis is improperly based on hindsight. Proper analysis and  
3 evaluation do not support his allegations of poor management. The Crystal  
4 River 3 plant was safe and its management was reasonable. This  
5 conclusion is based upon investigation into what actions Crystal River 3  
6 managers actually took during the relevant time periods in light of the  
7 information available to them at the time decisions were made.

8

9