March 15, 2006

[redacted]

Ex 6

Dear Mr. [redacted]

Ex 6

In response to your letter of November 7, 2005, the staff of the U.S. Nuclear Regulatory Commission (NRC) has reconsidered the proposed denial issued to you on October 20, 2005, and reviewed the grading of the operating test administered to you on September 12–15, 2005. In spite of the additional information you supplied, the staff has determined that you did not pass the simulator operating test. The results of our review are enclosed.

Consequently, the proposed denial of your license application is sustained. If you accept the proposed denial and decline to request a hearing within 20 days as discussed below, the proposed denial will become a final denial. You may reapply for a license in accordance with Title 10, Section 55.35, of the *Code of Federal Regulations* (10 CFR 55.35), subject to the following conditions:

a. Because you passed a written examination and the administrative/systems walkthrough operating test, administered on September 19 and 12-15, 2005, respectively, you may request a waiver of those portions.

b. Because you did not pass the simulator operating test administered to you on September 12–15, 2005, you will be required to retake that portion.

c. You may reapply for a license 2 months from the date of this letter.

If you do not accept the proposed denial, you may, within 20 days of the date of this letter, request a hearing pursuant to 10 CFR 2.103(b)(2). Submit your request in writing to the Office of the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attention: Rulemakings and Adjudications Staff, with a copy to the Associate General Counsel for Hearings, Enforcement, and Administration, Office of the General Counsel, at the same address. (Refer to 10 CFR 2.302 for additional filing options and instructions.)

Pursuant to 10 CFR 55.35, you may not reapply for a license until your license application has been finally denied. Failure on your part to request a hearing within 20 days constitutes a wavier of your right to demand a hearing. For the purpose of reapplication under 10 CFR 55.35, such a wavier renders this letter a notice of final denial of your application, effective as of the date of this letter.

Ex 6

If you have any questions, please contact Mr. Neil O'Keefe, Acting Chief, Operator Licensing and Human Performance Branch, Office of Nuclear Reactor Regulation at (301) 415-1017.

Sincerely,

***/RA/***

Michael J. Case, Director
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

Docket No. [redacted]

Ex 6

Enclosure: As stated

[redacted]



Ex 6

If you have any questions, please contact Mr. Neil O'Keefe, Acting Chief, Operator Licensing and Human Performance Branch, Office of Nuclear Reactor Regulation at (301) 415-1017.

Sincerely,

*/RA/*
Michael J. Case, Director
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

Docket No. [redacted]

Ex 6

Enclosure: As stated

cc:
[redacted] Site Vice President, Crystal River 3 Nuclear Plant
[redacted] General Manager
[redacted] Training Manager

Ex 6

Accession Number: ML060690225

| OFFICE | IOLB:DIRS | BC:IOLB:DIRS | D:DIRS:NRR |
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| NAME | LVick | DCTrimble | MJCase |
| DATE | 03/06/06 | 03/10/06 | 03/10/06 |

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Ex 6

INFORMAL REVIEW RESULTS—[redacted]
SENIOR REACTOR OPERATOR APPLICANT—CRYSTAL RIVER 3

In response to the applicant's letter of November 7, 2005, the U.S. Nuclear Regulatory Commission (NRC) reconsidered the proposed denial issued on October 20, 2005, and reviewed the grading of the operating test administered to the applicant on September 12–15, 2005. In spite of the information supplied by the applicant, the NRC has determined that the applicant did not pass the operating test. The following outlines the results of the NRC's review.

OVERALL SUMMARY

The applicant requested an informal review of his performance on the simulator operating test, in which he was evaluated as the operator at the controls (OAC) during Scenario 1 and as the control room supervisor (CRS) during Scenarios 2 and 3. The findings of this review agreed with the original grading of the applicant's performance overall as unsatisfactory, in conformance with Section ES-303, "Documenting and Grading Initial Operating Tests," of Revision 9 to NUREG-1021, "Operator Licensing Examination Standards for Power Reactors."

The following Table provides a summary of the rating factor (RF) and competency scores determined by the examiner following the operating test and the scores determined by this informal review.

Enclosure

SUMMARY OF APPEAL FOR INFORMAL REVIEW OF NRC GRADING

| Competency/RFs | Original RF Score/ Grades | Original Compentency Grades | Review RF Score RF Grades | Review Competency Grades |
|---|---|---|---|---|
| 1. Interpretation/Diagnosis | | 1.80 | | 1.60 |
| a. Recognize & Attend | 1 / 0.20 | | 1 / 0.20 | (Reviewed) |
| b. Ensure Accuracy | 2 / 0/40 | | 1 / 0.20 | (Reviewed) |
| c. Understanding | 1 / 0.30 | | 1 / 0.30 | (Reviewed) |
| d. Diagnose | 3 / 0.90 | | 3 / 0.90 | (Not Reviewed) |
| 2. Procedures | | 3.00 | | 3.00 |
| a. Reference | 3 / 0.90 | | 3 / 0.90 | (Not Reviewed) |
| b. EOP Entry | 3 / 0.90 | | 3 / 0.90 | (Not Reviewed) |
| c. Correct Use | 3 / 1.20 | | 3 / 1.20 | (Not Reviewed) |
| 3. Control Board Operations | | 2.67 | | 2.34 |
| a. Locate & Manipulate | 3 / 1.02 | | 3 / 1.02 | (Not Reviewed) |
| b. Understanding | 3 / 0.99 | | 3 / 0.99 | (Not Reviewed) |
| c. Manual Control | 2 / 0.66 | | 1 / 0.33 | (Reviewed) |
| 4. Communications | | 2.60 | | 2.60 |
| a. Clarify | 2 / 0.80 | | 2 / 0.80 | (Not Reviewed) |
| b. Crew & Others Informed | 3 / 1.20 | | 3 / 1.20 | (Not Reviewed) |
| c. Received Information | 3 / 0.60 | | 3 / 0.60 | (Not Reviewed) |
| 5. Directing Operations | | 2.50 | | 2.20 |
| a. Timely & Decisive Action | 3 / 0.90 | | 3 / 0.90 | (Not Reviewed) |
| b. Oversight | 2 / 0.60 | | 1 / 0.30 | (Reviewed) |
| c. Solicit Crew Feedback | 3 / 0.60 | | 3 / 0.60 | (Not Reviewed) |
| d. Monitor Crew Activities | 2 / 0.40 | | 2 / 0.40 | (Reviewed) |
| 6. Technical Specifications | | 3.00 | | 3.00 |
| a. Recognize & Locate | 3 / 1.20 | | 3 / 1.20 | (Not Reviewed) |
| b. Compliance | 3 / 1.80 | | 3 / 1.80 | (Not Reviewed) |

REVIEW RECOMMENDATION: SUSTAIN LICENSE DENIAL

APPEAL AREA 1

1.1 Pertinent Competency

Applicant Appeal Area 1 involves SRO Competency 1 (Interpretation/Diagnosis), which includes, among other things, the ability to diagnose plant conditions to guard against and mitigate conditions that do not meet specifications. It also includes the abilities to prioritize one's attention in keeping with the severity and importance of the annunciators and alarms and to correctly interpret the significance of each alarm and verify that it is consistent with plant and system conditions. Competency 1.b (Ensure Accuracy) involves a demonstration of the applicant's knowledge and ability to ensure the collection of correct, accurate, and complete information and reference material on which to base diagnoses.

1.2 Original NRC Grading:

The applicant received an unsatisfactory grade of 1.80 for SRO Competency 1, based on the following assigned RF scores:

SRO RF score for competency: 1.a = 1, 1.b = 2, 1.c = 1, and 1.d = 3

*1.2.1 NRC Examiner Comments*:

With regard to Competency 1.b, the examiner assigned a RF of 2 based on the applicant's performance during Scenario 3, Event 5. Event 5 is a spurious closure of MUV-258 (reactor coolant pump (RCP)-1A seal return controlled bleed-off (CBO) line isolation valve to the makeup and purification system).

The examiner contends that the applicant, as SRO (CRS), failed to first ensure that operators refer to the appropriate annunciator response procedure (ARP) (upon receiving alarm "RC Pump Seal Bleed-Off High") before taking any action to secure RCP-1A at his command. Instead, the examiner contends that the applicant, as SRO (CRS), immediately directed the reactor operator (RO) to secure RCP-1A based on limited information received from the balance of plant (BOP) operator without verifying whether a RCP-1A seal failure actually existed. The examiner contends that the applicant failed to ensure that the crew collected correct, accurate, and complete information that would have aided the crew in a correct diagnosis. The examiner asked two followup questions—(1) "What would the indications be if the seal injection [correction—seal return] valve were to spuriously close?" and (2) "What other indications would help differentiate between an actual [RCP] seal failure and a [RCP] seal injection [correction—seal return] valve closure?" In answer to the first question, the examiner contends that the applicant replied that the indications for a spurious incident would be the same as those he observed during the scenario. The applicant's reply to the next question was to the effect that he could have looked at seal temperatures, but he did not. The examiner noted that the applicant could have looked at Annunciator I-4-4, "RCP Seal Upper Stage Temp High," which remained off, to help diagnose that the RCP-1A seal had not failed.

In summary, the examiner assigned a score of 2 since the applicant directed an improper action based on an inaccurate diagnosis that resulted from the applicant's failure, as SRO (CRS), to ensure that all available and necessary information was correctly collected and assessed.

1.3 Applicant's Contention:

The applicant contends that the RF score of 2 was too severe and that some information upon which the RF score is based is incorrect. The applicant correctly asserts that MUV-258 is not the seal injection inlet (valve) for RCP-1A but is used to isolate (seal return) CBO for RCP-1A. (The review acknowledges the incorrect description by the examiner.)

The applicant contends that, following receipt of alarm "RCP Seal Bleed-Off High," he directed the BOP operator to monitor the RCP seal recorder to determine the cause of the RCP-1A seal problem. He received a report from the BOP operator who reviewed the RCP seal recorder and reported that RCP-1A first and second stage seals had failed. The applicant asserts that he personally observed on the Computer Alarm monitor that RCP-1A second and third stage seal cavity pressures exceeded 1500 pounds per square inch gauge (psig). He determined that the plant was in the initial phase of a transient and therefore decided not to direct the use of ARPs. The applicant argues that his actions to suspend normal three-way communications, suspend acknowledgment of alarms, and suspend use of ARPs during the initial phase of a plant transient were consistent with his knowledge of administrative instruction (AI)-505 (Conduct of Operations During Abnormal and Emergency Events).

Additionally, the applicant asserts that operating procedure (OP)-302 (Reactor Coolant Pump Operation) supports his diagnosis that RCP-1A seals had failed (i.e., seal degradation), as evidenced by both the second and third stage seal cavity pressures exceeding 1500 psig. He asserts that he properly directed the shutdown of RCP-1A in accordance with OP-302, Step 4.7.1.3. The applicant contends that because of the need to secure RCP-1A with the observed indications, referring to the ARPs at the time was not appropriate.

The applicant contends that, based on his previous training and experience as both a RO and operations instructor, he properly recognized the actions needed to promptly secure the RCP. He also contends that training demonstrated a seal failure that was caused by clogging one of the RCP seal pressure breakdown devices. He personally ran this particular failure on the simulator, designating the third stage seal pressure breakdown device for RCP-1A as the affected component. He states that, for this type of failure, he was trained to shut down RCP-1A in accordance with Step 4.7.1.3 of OP-302, for the same reasons stated above. The applicant contends that he also ran the closure (failure) of MUV-258 for approximately 10 minutes and concluded that in comparing the two failure plots (i.e., clogged seal pressure breakdown devices versus closure of MUV-258) one can conclude that the two events provide very similar indications. The applicant contends that his decision to proceed directly to shut down RCP-1A was prudent and conservatively taken to minimize the possibility of a loss-of-coolant accident (LOCA) due to uncontrolled seal leakage.

The applicant disagrees with the examiner's comment that the applicant could have looked at Annunciator I-4-4, "RCP Seal Upper Stage Temp High," which was off, to determine that a seal failure did not exist. He maintains that the indications he observed showed that the first and second stage seals had failed. According to the applicant, the referenced alarm (I-4-4) is for the third stage seal, which did not indicate failure. The applicant contends that the examiner's statement is also too severe in that he is not trained to look at alarms that are not actuated to determine the status of failed equipment during the initial phase of a component failure or plant transient.

Finally, the applicant disagrees with the examiner's comment that he failed to request all of the information required from the team to make a correct diagnosis of plant conditions. He contends that the RCP seal recorder information as well as his own observation of pertinent computer points indicated seal failure and that he had ascertained all the information necessary to make a correct diagnosis.

1.4 Reviewer's Analysis:

With regard to Competency 1.b, the review finds that the applicant, as SRO (CRS), made errors in at least two areas.

1.4.1 *Area 1—Failure to ensure that operators collected correct, accurate, and complete information regarding the status of the RCP-1A seal parameters on which to diagnose whether or not seal failure occurred.*

Based on the following, the review finds the applicant, as SRO (CRS), failed to ensure that the operators collected correct, accurate, and complete information regarding the true status of the RCP-1A seal parameters while operating the reactor in ITS (Improved Technical Specifications) Mode 1.

As background, the review notes that the NRC examiners' had planned to initiate Event 6 (RCP-1A Seal Failure) 30 seconds following any re-opening of MUV-258 by the operators. However, Event 6 was not initiated nor used at any time during the NRC operating test. In other words, no RCP-1A seal failure occurred at any time during the operating test. This was because the applicant, as SRO (CRS), incorrectly diagnosed the problem and prematurely directed operators to trip RCP-1A, without ever realizing that Event 5 (MUV-258 closure) isolated the RCP-1A seal return CBO flowpath and subsequently de-staged first, second, and third stage seal pressures (i.e., second and third stage seal pressures equalized with first stage pressure).

The candidate's contention under Appeal Area 1 is that his diagnosis was correct in concluding that RCP-1A seals had failed is rendered moot by the fact that seal failure was never initiated within the as-given scenario. Nonetheless, the review gave due consideration to the applicant's contentions.

The review finds the applicant's rationale, that a plant transient was ongoing at the time prior to his directing that RCP-1A be secured, is flawed. On the contrary, prior to the securing of RCP-1A, the crew had just completed surveillance procedure (SP)-321, Enclosure 1, Data Sheet 1 (Off-Site to On-Site Breaker/Power Verification). A review of the record shows that the plant remained at steady-state ITS Mode 1 conditions for at least an additional 7 minutes following completion of SP-321 (Event 4) before the applicant directed RCP-1A to be stopped.

The review finds that the applicant's error primarily involves issues with not complying with AI-500 (Conduct of Operations Department Organization and Administration), OP-302 (Reactor Coolant Pump Operation), AI-505 (Conduct of Operations During Abnormal and Emergency Events), and ARP H-04-05 (Alarm "RC Pump Seal Bleed-Off High").

1.4.1.1 AI-500 (Conduct of Operations Department Organization and Administration)

Contrary to Step 3.2.1 (regarding licensed SRO responsibilities), the review finds the applicant, as SRO (CRS), among other things, did not ensure that crew members performed according to station operating practices. Specifically, the operators did not fully investigate condition-indicating signals and perform appropriate remedial actions where applicable. In other words, the applicant, as well as the operators under his purview, completely disregarded and ignored an alarm procedure (RC Pump Seal Bleed-Off High) as appropriate reference material to aid in diagnosing the cause of RCP-1A high second and third stage seal pressures.

Contrary to Step 3.2.3, the review finds that the applicant, as SRO (CRS), did not ensure that the plant (i.e., RCP-1A) was rigorously monitored in a timely manner and that operating activities were conducted in accordance with applicable administrative controls. The review finds that although the applicant had up 5 minutes to determine the state of the RCP-1A seals before taking any action, he directed a trip of the pump within 3 minutes after receiving the high CBO alarm. In this case, the applicant did not make good use of the time available to fully investigate the cause of the high seal pressures (i.e., MUV-258 closure). The applicant did not ensure that other supporting indicators (e.g., status of CBO line pathway) were checked to determine if the indications were faulty.

The applicant contends that his actions were based on a report from the BOP operator that the RCP-1A 1st and 2nd stage seals had failed, his own observations of high pressures in the 2nd and 3rd stage seal cavities, and his training and experience. He did not base his actions on procedural direction or guidance. Thus, the applicant did not take advantage of all the information available to the crew to ascertain the true status of the RCP-1A seals and understand accurately and completely the reason for the elevated seal pressures.

Contrary to Appendix 3 (Control Room Activities) to AI-500, the applicant, as SRO (CRS), did not ensure that operators collected available reference material such as ARPs to discern whether or not MUV-258 was a possible reason for the RCP-1A elevated seal pressures. Previous review comments given above also apply to this error review.

1.4.1.2 OP-302 (Reactor Coolant Pump Operation)

Contrary to Step 3.2.6 (regarding limits and precautions), the applicant, as SRO (CRS), did not take advantage of the maximum allowable time (5 minutes) to operate RCP-1A with its CBO line secured with its associated seal injection and/or SW (Nuclear Service Closed Cycle Cooling Water) cooling maintained. In other words, more than enough time was available to re-establish proper seal staging.

Contrary to Step 4.7.3.3 (with regard to abnormal seal injection flow), the applicant, as SRO (CRS), did not give due consideration to the ACTION statement, "IF Seal injection flow is Low THEN DETERMINE cause and return seal injection flow to normal." Furthermore, the applicant gave no consideration to the DETAILS statement, "ENSURE CBO valves are open. IF an isolated CBO flowpath is NOT restored with 5 minutes THEN SHUTDOWN affected RCP ...." The review finds that absent the establishment of any CBO flowpath, seal injection flow would decrease below its expected range. The review finds that ample condition-indicating signals existed to provide cues that the CBO line was isolated rather than that the seals had failed.

Contrary to Enclosure 4 (RCP Seal Leak Rate Determination), Steps 1.1 through 2.2, the applicant, as SRO (CRS), could have made use of the provided methodology for calculating and determining RCP-1A seal leakage and readily concluded that no seal failure occurred.

Contrary to Enclosure 3 (Calculated CBO Flow), the applicant, as SRO (CRS), could have reviewed reference material and determined the expected CBO flow (in gallons per minute (gpm)) based on third stage cavity pressure (in pounds per square inch (psi)) and readily concluded that no CBO flowpath existed.

Finally, contrary to Steps 4.7.1.2 and 4.7.1.3 (with regard to seal degradation), the applicant, as SRO (CRS), erroneously concluded that seal degradation had occurred when in fact it had not. The applicant argues that based upon the NOTE prior to the steps, he considered the seals degraded (and therefore failed). The review finds that the applicant's conclusion is too narrowly focused and that he did not stop, think, and understand the guidance provided by the NOTE. The NOTE stated that, "Seal degradation may be indicated by one or more of the following symptoms...abnormal or fluctuating seal cavity pressure...." The applicant erroneously considered the "may" portion of the note as an absolute instead of also considering that the term "may" relates to other possibilities. In this case, no seal degradation took place, only seal de-staging occurred. The review finds that no other symptom such as high seal temperatures, high seal leakage flow, or high pump vibration occurred that could bolster the applicant's argument. The applicant's basis for securing the RCP was flawed.

1.4.1.3 AI-505 (Conduct of Operations During Abnormal and Emergency Events)

Contrary to Step 3.1.7 (with regard to normal operation), the applicant, as SRO (CRS), did not ensure that operators, based on plant conditions (i.e., no abnormal or emergency event procedure was applicable at the time of Event 5), collected or obtained and made correct use of operating procedures and ARPs that were applicable. As noted earlier, the review finds no basis for the applicant's contention that the plant was in a transient state at the time when MUV-258 spuriously closed (Event 5).

1.4.1.4 ARP H-04-05 (Alarm "RC Pump Seal Bleed-Off High")

Contrary to "Operator Actions for a Valid Alarm," the applicant, as SRO (CRS), did not ensure proper CBO flowpath by checking that MUV-258 (inboard isolation valve) and/or MUV-253 (outboard isolation valve) were open. The applicant as well as the crew failed to identify or diagnose at any time that MUV-258 had closed and remained so for the remainder of the operating test.

1.4.2 *Area 2—After the RCP was stopped, the applicant had another opportunity and failed a second time to collect correct, accurate, and complete information regarding the status of the RCP-1A seals.*

The review finds that after the RCP-1A was stopped, the applicant, as SRO (CRS), had another opportunity and failed a second time to ensure that operators collected correct, accurate, and complete information regarding the status of the RCP-1A MUV-258 to diagnose a seal de-staging event rather than a seal failure event (which did not exist). The review finds that the applicant's error primarily involves issues with AI-500, AI-505, ARP-H-04-05, and OP-302.

1.5 Reviewer's Conclusion:

With regard to Competency 1.b, the review finds that the applicant failed to ensure the collection of correct, accurate, and complete information and reference material on which to base diagnoses. In light of the number of errors, the review concludes that a score of 1 is more appropriate for this RF than a score of 2 given by the examiner. Therefore, the examiner's overall evaluation of the applicant's performance, as SRO (CRS), during Scenario 3, Event 5, is downgraded, and the SRO RF score of 2 is changed to 1 with a RF grade change from 0.40 to 0.20.

With respect to the criteria specified in 10 CFR 55.45(a) during this event, the applicant, as SRO, failed to:

- (Item 3)—Identify annunciators and condition-indicating signals and perform appropriate remedial actions where appropriate.
- (Item 4)—Identify the instrumentation systems and the significance of facility instrument readings.
- (Item 7)—Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems, and identify the relations of the proper operation of these systems to the operation of the facility.
- (Item 12)—Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.
- (Item 13)—Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.

## APPEAL AREA 2

2.1 Pertinent Competency

Applicant Appeal Area 2 also involves SRO Competency 1, which includes, among other things, the ability to diagnose plant conditions to guard against and mitigate conditions that do not meet specifications. Competency 1.a (Recognize & Attend) involves a demonstration of the applicant's knowledge and ability (1) to prioritize one's attention in keeping with the severity and importance of the annunciators and alarms and (2) to correctly interpret the significance of each alarm and verify that it is consistent with plant and system conditions.

2.2 Original NRC Grading:

The applicant received an unsatisfactory grade of 1.80 for SRO Competency 1, based on the following assigned RF scores:

SRO RF score for competency: 1.a = 1, 1.b = 2, 1.c = 1, and 1.d = 3

2.2.1 *NRC Examiner Comments*:

With regard to Competency 1.a, the examiner assigned a RF score of 1 based, in part, on the applicant's performance during Scenario 1, Event 2. Event 2 is a 55 gpm reactor coolant system (RCS) pressure boundary leak into the reactor building (RB).

The examiner noted that the applicant, as RO (OAC), among other things, determined that RCS leakage was approximately 60 gpm. The examiner also noted that RB air pressure had increased from ambient to 1.7 psig and was rising. The examiner asserts that the crew unnecessarily delayed the start of the plant shutdown for more than 30 minutes after determining that significant RCS leakage existed. The examiner also asserts that RB air pressure was continuing to rise towards the 4.0 psig engineered safeguard (ES) actuation signal.

The examiner contends that the crew failed to take prompt and prudent action, as a result of the unnecessary delay, to place the plant in a condition that would lessen the leak rate and remove the challenge to the RB containment barrier. The examiner contends that, when the crew decided to shut down the plant, they decided to use OP-204 (Power Operation) rather than abnormal procedure (AP)-510 (Rapid Power Reduction). The examiner contends that the applicant, as RO, did not question the SRO's decision to ramp the unit down at the lower rate (0.5 percent per minute) instead of at a higher rate even though it was apparent that Event 2 involved a significant leak. The examiner contends that the applicant did not recognize the severity of the RB pressure trend in response to the RCS leak and failed to take actions to address deteriorating conditions of RB pressure. Failure to take prompt and prudent actions to ramp the unit down in a timely manner allowed the plant to remain in an operational condition that could have allowed the leak to worsen.

With regard to Competency 1.a, the examiner contends that the applicant, as RO, was given a grade of 1 due, in part, to his failing to recognize the severity of the RCS leak into the RB and to therefore take the unit off line in a timely manner as RB conditions deteriorated.

2.3 Applicant's Contention:

The applicant contends that his actions were appropriate and consistent with the actions required of the RO position. He points out that Operations and Training Management representatives at Crystal River 3 who observed and/or reviewed his crew's performance have stated that use of either OP-204 or AP-510 was acceptable for the scenario event.

The applicant contends that the controlling procedure at the time was AP-520 (Loss of RCS Coolant or Pressure), which does not specifically direct performance of AP-510. He points out that Step 3.17 of AP-520 directs that a plant shutdown and cooldown should begin within 4 hours, with no procedure reference or required power reduction rate specified. The applicant contends that during RCS leaks that are within normal makeup capability, operators are trained first to perform those sections of AP-520 which may potentially isolate the leak and terminate the event; then, if the leak is not isolated using the guidance contained in AP-520, an orderly plant shutdown is required. The applicant contends that AP-510 does not provide for or require higher ramp rates than those allowed by OP-204. The applicant contends that if it was imperative to begin a plant shutdown immediately after exceeding the ITS limit for unidentified leakage, rather than within 4 hours, then the associated ITS actions would have directed that a shutdown be initiated immediately.

The applicant disagrees that the crew delayed beginning the plant shutdown for more than 30 minutes after determining that significant leakage existed while RB pressure was continuing to rise. He contends that no credit was given for the prompt actions taken by the crew during this time period in an attempt to identify and isolate the leak. As RO, the applicant contends that he closely monitored RCS parameters (RCS pressure and pressurizer level) and did not observe any increase in the magnitude of the RCS leak.

He further contends that immediately following completion of AP-520, the CRS, as SRO, directed use of OP-204 for plant shutdown, and a power reduction was commenced within the required timeframe. The applicant contends that following initiation of the plant shutdown, the crew monitored the RB air pressure trend and decided that the use of AP-510 (at a 2 percent per minute ramp rate) would be more appropriate and was now justified based on the increase in RB pressure.

The applicant contends that the examiner's comment that "The applicant, as RO, did not question the SRO's decision for ramping the unit down at the lower rate even though it was apparent that this was a significant leak" is too severe because the rate at which the unit should be shut down is not identified as a criterion applicable to the RO position.

The applicant contends that the examiner's comment that "The applicant did not recognize the severity of the trend of RB pressure and failed to take actions to address deteriorating conditions of RB pressure which indicated a non-recoverable RCS leak" is incorrect, in that, during this type of event it is not the responsibility of the RO (OAC) to perform actions to increase RB cooling and perform leak isolation steps in AP-520. He contends that these actions are performed by the BOP operator under the direction of the CRS.

The applicant contends that the examiner's comment that "Failure to take prompt and prudent actions to ramp the unit down in a timely manner allowed the plant to remain in an operational condition that could have allowed the leak to get worse" is too severe, since appropriate actions were taken to assure that plant conditions were maintained in accordance with ITS and applicable plant procedures.

Finally, the applicant contends that he functioned within the control room team appropriately by participating in the diagnosis of the RCS leak and subsequently performing a very accurate RCS leak rate calculation. According to the applicant, he communicated his concurrence with the entry into AP-520 and performed RO actions as directed by the CRS. He contends that he adhered to AI-505 (Conduct of Operations During Abnormal and Emergency Events) and correctly applied ITS limitations associated with RCS leakage. He notes that he did not challenge any additional ITS limitations or amendments while shutting down the plant.

2.4 Reviewer's Analysis:

With regard to Competency 1.a, the examiner arrived at his RF score of 1 based, in part, on the applicant's performance as RO (OAC) during Scenario 1, Event 2.

With regard to Scenario 1, Event 2, the review was unable to substantiate that the applicant committed any error.

2.4.1 *Observation —The applicant apparently did not fully recognize that the increase seen during this event in RB pressure was not indicative of a further increase in RCS leakage (i.e., leak rate remained at 55 gpm).*

As detailed below, the review finds that the applicant, as RO and a member of the shift crew, may not have fully recognized and communicated in a timely manner that the increase seen during this event in RB pressure was not indicative of a further increase in RCS leakage (i.e., leak rate remained at 55 gpm). The applicant appeared to not exhibit a level of understanding commensurate with that of a licensed operator in terms of recognizing, analyzing, and understanding the effect of a relatively small RCS pressure boundary leak (55 gpm) on the very large volume (2 million cubic feet) RB containment air temperatures and air pressure over time.

The review finds that Event 2 is a relatively small RCS pressure boundary leak that over an extended period of time slowly increases the RB average bulk air temperature from ambient (assuming normal lineup and operation of RB cooling units and RB area cooling fans). In turn, this temperature increase slowly raises the RB bulk air pressure above ambient. For Event 2, the rate of increase in the RB average air temperature and air pressure was primarily limited by the rate of heat removal and water vapor condensation of the RB cooler(s). The simulator operating test data show that the net effect of the 55 gpm RCS leak is a slow increase in RB average air temperature and air pressure parameters. During Event 2, RB cooling ventilation was in its normal lineup, maintaining the RB average air temperature at less than 130 °F.

The review finds that the RCS leakage rate in Event 2 did not (and could not) cause a significant change (i.e., rapid increase) in RB average air temperature and thus RB air pressure

in the 30-minute timeframe of concern (i.e., from the onset of Event 2 until entry into AP-510). The review finds that although RB temperature and pressure increased (and stabilized), they did not rise so fast and were not so significant that these increases alone would mandate more aggressive operator action.

Simulator data provided by the facility licensee shows, absent any operator action, the RB pressure would not (and did not) challenge the RB 4.0 psig ES actuation set point or any ITS limiting conditions for operations (LCOs) with regard to RB average air temperature or RB air pressure. The governing reasons for the power reduction are, for the most part, related to prudence and the ITS action statement of 4 hours to reduce the RCS leakage to less than the ITS LCO limits. There is no threat to the RB 4.0 psig ES actuation, unless RB cooling is significantly reduced or the RCS leakage becomes greater than the cooling capacity. Only during Event 5 (a 200 gpm RCS leak rate) did RB pressure increase, and then only to approximately 2.4 psig. Event 5 was introduced into the scenario after the crew had entered AP-510.

While the applicant contends that, as RO (OAC), he closely monitored the RCS pressure and pressurizer level and did not observe any increase in the magnitude of the leak rate, it is not clear that he fully recognized and communicated this to the CRS. This was evidenced by the CRS's decision to shutdown faster based on increasing containment pressure.

2.5 Reviewer's Conclusion:

With regard to Competency 1.a, as it relates to Scenario 1, Event 2, the review was not able to substantiate an error by the applicant. The review did not fault the crew's decision to increase the rate of shutting down the plant, which was a conservative decision given the existence of a significant small break loss of coolant event.

## APPEAL AREA 3

3.1 Pertinent Competency

Applicant Appeal Area 3 also involves SRO Competency 1, which includes, among other things, the ability to diagnose plant conditions to guard against and mitigate conditions that do not meet specifications. Competency 1.a involves a demonstration of the applicant's knowledge and ability (1) to prioritize one's attention in keeping with the severity and importance of the annunciators and alarms and (2) to correctly interpret the significance of each alarm and verify that it is consistent with plant and system conditions.

3.2 Original NRC Grading:

The applicant received an unsatisfactory grade of 1.80 for SRO Competency 1, based on the following assigned RF scores:

SRO RF score for competency: 1.a = 1, 1.b = 2, 1.c = 1, and 1.d = 3

3.2.1 *NRC Examiner Comments*:

With regard to Competency 1.a, the examiner assigned a RF score of 1 based, in part, on the applicant's performance during Scenario 1, Events 3 and 4. Event 3 is a failure of Feedwater (FW) Loop "A" station controller automatic mode demand output (fails "as-is"). Event 4 is a manual power decrease (i.e., reactivity manipulation).

The examiner contends that the applicant, as RO (OAC), failed to diagnose an FW flow mismatch, which resulted in the BOP operator placing the turbine in manual mode in an attempt to control turbine header pressure. The examiner asserts that the applicant monitored the diverging FW flows but failed to take action or inform other crew members. The examiner contends that the CRS, as SRO, noticed FW Loop "A" flow straight lining and subsequently directed the applicant to place the reactor demand Bailey and both FW Loop "A" and "B" flow control stations in manual mode. The examiner noted that the applicant placed the reactor demand Bailey in manual mode but failed to place both of the FW control stations in manual mode until redirected a second time by the CRS.

The examiner contends that the applicant failed to recognize the off-normal FW trends and respond in a timely manner to preclude the unnecessary placement of several Integrated Control System (ICS) controls into manual mode, which in turn made it more difficult to control RCS temperature and pressure and pressurizer level later in the scenario.

Additionally, the examiner contends that the applicant's actions (that resulted in several ICS controllers in manual rather than automatic mode) compounded the excessive heat transfer event in that it caused several ES actuations resulting in three automatic starts of the high-pressure injection (HPI)-1C pump. The examiner contends that the three starts exceeded the starting duty limitations listed in the precaution and limitations in Section 3.2 of OP-402 (Make-Up and Purification System).

The examiner contends that the applicant, as RO, was given a grade of 1 in this competency due in part to his failure to recognize and attend to in a timely manner the FW flow mismatch caused by FW Loop "A" station controller failing as-is in automatic mode.

3.3 Applicant's Contention:

With regard to Scenario 1, Events 3 and 4, the applicant, as RO, contends that he was graded incorrectly and/or too severely. The applicant acknowledges that the communications between himself and the BOP operator were not as crisp as desired.

The applicant contends that the examiner's comment, "The RO monitored FW flow which indicated a divergence. However, he failed to take actions addressing the divergence in FW flow, or inform other crew members of the problem," is incorrect. The applicant contends that during this time he was monitoring several parameters, including FW flow. The applicant contends that because of the scaling on the FW flow (0–6 million lbm/hr) chart recorder, he did not notice an appreciable divergence in FW flows at the time. The applicant contends that shortly after the main turbine was placed in manual mode, the CRS noted that it appeared that FW flows were diverging. The applicant contends that the CRS obtained this information from the overhead CRT (left side of panels) and that the scaling of the CRT FW flow indication made small divergences in FW flows more readily apparent to the CRS, as compared to the main control board (MCB) chart recorder that the applicant was monitoring. He contends that he subsequently observed the CRT FW flows and then concurred with the observation of the CRS. The applicant contends that he then observed FW flows, once-through steam generator (OTSG) levels, RCS pressure, and the change in temperature of the cold-leg of the RCS loop on the MCB to qualify, validate, and verify the information in an to attempt to diagnose the reason FW flows were diverging. The applicant contends that at this time no alarms were associated with instrument failures. The applicant contends that while he was attempting to diagnose the source of the FW flow divergence, the CRS, as SRO, directed him to place the reactor and FW controls in manual mode, which he did at that time. He also contends that had the CRS allowed him more time to finish his qualification, validation, and verification process, he is confident that he would have correctly diagnosed the failure of the FW Loop "A" demand station and would have recommended placing the appropriate stations in manual mode.

The applicant contends that the examiner's comment, "Failing to recognize off-normal trends and respond in a timely manner could have delayed the response required to mitigate events," is incorrect. He contends that the response he took did not prevent mitigating the effects of the FW Loop "A" demand failure "as-is," and that when directed by the CRS, he successfully placed the reactor and FW controls in manual mode and established stable conditions.

The applicant contends that the following comment by the examiner, with regard to taking manual control of ICS stations, is incorrect:

> This made it more difficult to control RCS temperature, pressurizer level and RCS pressure. This compounded the excessive heat transfer event in that it caused several ES actuations resulting in three starts of the IC HPI pump.

The applicant contends that the main turbine was placed in manual mode before the reactor was tripped and, therefore, prior to the excessive heat transfer event. The applicant contends

that once the reactor was tripped, so too was the turbine, thereby removing the status of the main turbine station in manual mode as a contributor to the excessive heat transfer event that occurred shortly after the reactor trip.

The applicant contends that several ES actuations followed termination of the excessive heat transfer event, but they were not attributable to the additional station (i.e., main turbine) being taken to manual mode during Events 3 and 4. The applicant contends that the ES actuations were caused by less than desirable coordination between himself, as RO, and the BOP operator when throttling HPI and stabilizing RCS temperature using the OTSG "B" turbine bypass valves following the termination of the excessive heat transfer event. The applicant contends that this could have been averted had he, as RO, and the BOP operator communicated their plant manipulations better to one another or had the CRS, as SRO, provided coordinating guidance.

3.4 Reviewer's Analysis:

With regard to Competency 1.a, the examiner arrived at his RF score of 1 based, in part, on the applicant's performance as RO (OAC) during Scenario 1, Events 3 and 4.

With regard to Scenario 1, Events 3 and 4, the review finds that the applicant, as RO (OAC), made at least two errors.

*3.4.1 Error 1—Failure to recognize a FW Loop "A" station controller failure*

The FW Loop "A" station controller failure occurred at 0800. According to the examiner's notes, at 0808, a down-power was commenced, which is the point of and cause for an increasing divergence between FW Loop "A" and Loop "B" flow. The applicant did not recognize this divergence until 0823 (15 minutes after the divergence began). While the applicant informed the crew of the divergence, he did not take action (i.e., place the Loop "A" FW or other controllers in manual) until ordered to do so by the CRS at 0826. The review finds that 15 minutes is more than ample time for a RO (OAC) to recognize, investigate, diagnose, and/or recommend or take action to correct off-normal FW loop flow trends.

The applicant argues that the scaling on the FW Loop "A" and "B" chart recorder made it difficult to recognize a significant mismatch in flows given the complexity of events already occurring at the time (i.e., ongoing power reduction as well as ongoing RCS leakage). The review finds that although no control room annunciators had yet alarmed to warn of the mismatch, the applicant, as RO (OAC), is nevertheless accountable for controlling parameters, including FW loop flow to OTSGs, under his purview. The review finds that ample control room indications were available to the applicant to warn of a problem, including, but not limited to, ICS FW Loop "A" versus "B" flow control station deviations, MFP-3A versus MFP-3B turbine speed deviations, OTSG "A" versus "B" level deviations, and deviations between FW Loop "A" versus "B" flow.

The applicant contends that "communications between myself as the RO and BOP were not as crisp as desired." The review finds that the applicant had more than adequate time to inform others that off-normal FW-related trends were occurring as he reduced reactor power. The review finds that the applicant's contention that the primary reason for his error, that "due to the

scaling on the chart recorder for FW flow (0–6 million lbm/hr) I did not notice an appreciable divergence in FW flows at this time," is inconsistent with the need for heightened awareness of plant parameters during reactor power reduction operations.

*3.4.2 Error 2—Failure to fully carry out actions to attend to increasing mismatch in FW flow.*

The review found that the applicant, even after being alerted to an increasing FW divergence, only partially complied with the CRS's directive (i.e., only placed the reactor demand controller in manual) and had to be directed a second time to also place the feedwater controller stations in manual. Contrary to Step 4.3 of procedure AI-500 (Conduct of Operations Department and Administration), the review finds that, during the reactor down-power evolution, the applicant improperly relied on ICS system deviation alarms.

3.5 Reviewer's Conclusion:

The review finds that, during Event 3, the applicant had sufficient time to discern and evaluate the situation with regard to off-normal FW trends, inform the CRS that FW loop flows were diverging, and then take action to place the malfunctioning FW Loop "A" (and/or "B") station controller(s) into manual mode or otherwise stop the evolution before being directed by the CRS. It also found that the applicant only partially complied with the CRS's directive and had to be directed a second time to place the feedwater control stations in manual.

With regard to Competency 1.a, as it relates to Scenario 1, Events 3 and 4, the review finds that the applicant exhibited at least two substantiated errors. The examiner's overall evaluation of the applicant's performance on Competency 1(a) (Recognize and Attend), as RO (OAC), during Scenario 1, Events 3 and 4 is sustained and the SRO RF score of 1 with a RF grade of 0.20 was appropriately assigned.

With respect to the criteria specified in 10 CFR 55.45(a) during these events the applicant, as RO (OAC), failed to:

- (Item 3)—Identify annunciators and condition-indicating signals and perform appropriate remedial actions where appropriate.
- (Item 4)—Identify the instrumentation systems and the significance of facility instrument readings.
- (Item 5)—Observe and safely control the operating behavior characteristics of the facility.
- (Item 6)—Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.
- (Item 12)—Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.
- (Item 13)—Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.

## APPEAL AREA 4

4.1 Pertinent Competency

Applicant Appeal Area 4 also involves SRO Competency 1, which includes, among other things, the ability to diagnose plant conditions to guard against and mitigate conditions that do not meet specifications. Competency 1.c (Understanding) involves a demonstration of the applicant's knowledge of system operation, such as set points, interlocks, or automatic actions, or the understanding of how one's actions affect the plant and system conditions, unless that knowledge is evaluated under Competency 3 (Control Board Operations).

4.2 Original NRC Grading:

The applicant received an unsatisfactory grade of 1.80 for SRO Competency 1, based on the following assigned RF scores:

SRO RF score for competency: 1.a = 1, 1.b = 2, 1.c = 1, and 1.d = 3

4.2.1 *NRC Examiner Comments*:

With regard to Competency 1.c, the examiner assigned a RF of 1 based on the applicant's performance, in part, during Scenario 2, Event 2. Event 2 is a small vacuum leak with a failure of air removal pump ARP-1B to automatically start.

The examiner contends that the applicant, as SRO (CRS), with the reactor at 2 percent rated thermal power (RTP), appropriately directed the BOP operator to start the standby vacuum pump ARP-1B to recover and re-establish main condenser vacuum. The examiner contends that the applicant, believing that vacuum was not corrected, continued throughout the remainder of the scenario to search for air in-leakage. The examiner contends that in looking for leakage, the applicant displaced more important actions, such as restoring complex cooling ventilation after an isolation signal from radiation monitor (RM)-A5G (Gas) (Event 3). In order to understand the applicant's persistence in looking for vacuum leaks, the examiner asked the followup question, "What was maintaining main condenser vacuum prior to the vacuum leak?" The examiner contends that the applicant incorrectly replied that condensing steam was maintaining condenser vacuum. The examiner contends that he then reminded the applicant that reactor power was at 2 percent RTP. After receiving this cue, the applicant then replied that the air removal pump would be maintaining vacuum, and that he had forgotten that the plant was at such a low power. The examiner contends that the applicant's response failed to demonstrate his understanding of how the plant, systems, and components operate and interact at this low-power condition, and this lack of understanding could lead to improper decisions. The examiner contends that such an improper decision was made when the applicant allowed Control Complex (CC) temperatures to increase and exceed the design time and temperature limitations described in the CAUTION statement of AP-250 (Radiation Monitor Actuation), Enclosure 5 (RM-A5 Actions). The examiner contends that the applicant did not understand or was unable to demonstrate adequate knowledge and ability, as appropriate to the assigned position of SRO (CRS), to assume the responsibilities associated with the safe operation of the facility.

4.3 Applicant's Contention:

With regard to Scenario 2, Event 2, the applicant contends that he was graded too severely. He asserts that the examiner did not take into full consideration the technical and procedural basis for actions during the event. The applicant contends that it was his responsibility to identify the source of the main condenser vacuum leak; therefore, he appropriately directed the secondary plant operator (SPO) to look for potential vacuum leaks in accordance with OP-607 (Condenser Vacuum System), Section 4.5 (Condenser Air Removal). The applicant asserts that with both air removal pumps running to maintain condenser vacuum, a significant vacuum leak still existed that would have detrimental affects on secondary plant chemistry, specifically oxygen level. The applicant contends that an increase in the oxygen level caused by the presence of an unmitigated leak can lead to increased corrosion of secondary plant components, in particular the acceleration of some oxygen-dependent forms of steam generator tube corrosion mechanisms. The applicant contends that since corrosion of steam generator tubes can lead to primary and secondary tube leaks, he felt it important to continue efforts to identify the source of the vacuum leak.

The applicant contends that RM-A12 was considered inoperable. The applicant contends that because RM-A12 is the primary instrument used for detecting the presence of steam generator tube leaks, coupled with concerns regarding oxygen in-leakage, it was very important to continue efforts to identify the source of the vacuum leak. The applicant contends that he did not continue to look for the vacuum leak for the remainder of the scenario. He contends that once the pressurizer-level instrument failed, he focused his attention on attending to that failure and all subsequent failures in the remainder of the scenario.

With regard to the examiner's question on what was maintaining condenser vacuum, the applicant contends that he correctly answered the question based on normal operation at 100 percent power. The applicant contends that when the examiner reminded him that the plant was at 2 percent power, he replied with the correct answer. He further contends that if he did not understand how the plant, systems, and components operate and interact at low-power conditions, he would not have given the correct answer once reminded of the current low-power condition.

The applicant contends that the examiner's remarks that the applicant, as SRO, displaced important actions that allowed the CC temperature to increase and exceed the time listed in the CAUTION statement of AP-250, Enclosure 5, are too severe. The applicant contends that given the type of failure observed for RM-A5G, he determined that the actuation was not valid at Step 3.5 of AP-250. He also contends that he considered RM-A5G to be inoperable since it had failed high. The applicant points out that DETAIL 2 for Step 3.5 of AP-250 would not be applicable since RM-A5G was not operable. The applicant contends that the performance of Enclosure 5 was not required and therefore the CAUTION statement was not read, nor was it required to have been read.

Finally, the applicant contends that he directed the restoration of ventilation in accordance with Section 4.10 of OP-409 (Plant Ventilation), which does not have a CAUTION statement regarding CC temperature exceeding 95 °F in 30 minutes. The applicant contends that with RM-A5G failed high and inoperable, he proceeded through AP-250 to Step 3.5 and exited

without performing Enclosure 5 for the reasons stated above. The applicant contends that he directed the performance of Section 4.10 of OP-409 without ever having read a CAUTION statement that CC temperature may exceed 95 °F in 30 minutes.

4.4 Reviewer's Analysis:

With regard to Competency 1.c, the examiner arrived at his RF score of 1 based, in part, on the applicant's performance as the SRO (CRS) during Scenario 2, Event 2.

With regard to Scenario 2, Event 2, the review substantiated only one of the two errors identified by the examiner.

4.4.1 (Unsubstantiated) *Error 1—Failure to demonstrate an understanding, with regard to condenser vacuum, of how the plant, systems, and components operate and interact at low-power conditions*

The examiner contends that the applicant, as SRO (CRS), failed to demonstrate an understanding, with regard to condenser vacuum, of the operation and interaction of the plant, systems, and components at low-power conditions. Specifically, the examiner based this contention, for the most part, upon the applicant's ongoing and persistent action to determine the source of the main condenser vacuum air in-leakage that required the operation of two air removal pumps, rather than one, to recover and maintain adequate condenser vacuum. Additionally, the examiner's followup questioning (with regard to the maintenance of main condenser vacuum while at low power) and the applicant's initial response/answer led the examiner to conclude that the applicant exhibited a lack of understanding of the relationship between low-power operations and maintaining main condenser vacuum. The error review primarily involves OP-607.

4.4.1.1 OP-607 (Condenser Vacuum System)

In accordance with Step 4.5.5, the applicant, as SRO (CRS), notified available personnel to visually inspect the turbine building for vacuum leaks and resolve them if possible. The review finds that the applicant, as SRO (CRS), was not precluded from trying to understand where the vacuum leak was occurring. The review finds the applicant ensured that both air removal pumps were operating and recovering vacuum. With regard to Event 2, the review finds that the applicant's directives and actions, as SRO (CRS), were reasonable based upon the fact that main condenser vacuum could not be maintained with one air removal pump only given the size of the vacuum leak.

Although the applicant had difficulty in correctly answering one of the examiner's followup questions, the review finds that the applicant adequately corrected his response once the examiner reminded him that power was at 2 percent RTP. Hence, on balance, the review finds the error unsubstantiated.

4.4.2 *(Substantiated) Error 2—Failed to demonstrate sufficient understanding of the operation and interaction of the protective instrumentation for the plant's radiation monitoring system and the CC ventilation system and associated components to preclude exceeding the facility's maximum allowed temperatures for personnel habitat and safety-related equipment in the CC.*

As detailed below, the review finds that the applicant, as SRO (CRS), failed to demonstrate sufficient understanding of the operation and interaction of the protective instrumentation for the plant's radiation monitoring system and the CC ventilation system and associated components to preclude exceeding the facility's maximum allowed temperatures for personnel habitat and safety-related equipment in the CC.

Event 3 (RM-A5G fails high) resulted in the automatic shutdown and isolation of the CC ventilation system (i.e., control room and ES switchgear room ventilation). The review substantiated that Event 3 had been ongoing for approximately 49 minutes when the applicant, as SRO (CRS), with prompting from the BOP operator, directed the BOP operator to place the CC ventilation in emergency recirculation mode.

The reviewer examined whether the applicant properly addressed a loss of cooling within the CC during the operating portion of the exam. The scenario initiated a loss of control room cooling when a radiation monitor failure tripped the ventilation fans. The design basis supports the reliable performance of the equipment in the control room and the operators by providing cooling through ventilation. Without cooling, the heat load from humans (small) and electrical equipment (much larger), will cause the control room to heat up. Based on the design basis, equipment reliability and human performance will begin to suffer above 95°F. The CC is designed to have a mild environment, so the equipment contained therein is not environmentally qualified to operate reliably under conditions of high temperature, humidity, or radiation. The licensee's analyses and Technical Specification Bases have determined that the control room temperature can reach the 95°F design basis limit in about 30 minutes. Once temperatures exceed this limit, equipment will no longer be operating within their qualified parameters; equipment in operation may no longer continue to function properly, and equipment called upon to mitigate a subsequent or concurrent accident may not actuate and function as designed.

In some situations, including the one in this test scenario, the safety of the plant relies on operators to take manual action to restore CC cooling prior to reaching the temperature above which equipment and operator performance begins to be affected. This reliance was determined to be translated into procedure steps in various procedures, which covered a spectrum of situations which could interrupt cooling.

In particular, Abnormal Procedure AP-520 (Radiation Monitor Actuation) addresses the failure of the radiation monitor. Steps 3.5 and 3.8 were required to be performed concurrently; the former step was performed, but the latter step was missed. The review concluded that following this latter step would direct the operator to Enclosure 5, Step 5.1 to continue to restore the ventilation system to operation. Between Steps 5.1 and 5.2, the procedure contained a caution statement which reads: "With all CC ventilation stopped, the CC may reach its design limit of 95°F in 30 minutes." The applicant was expected to have reached this step and concluded that action to restore cooling to the CC was needed within 30 minutes to remain within the design analysis.

Additionally, since cooling was not restored, an alarm was received during the exam indicating that a high temperature condition was present in a switchgear area of the CC (104°F setpoint). This indicated that critical equipment was above the design temperature, and should have triggered corrective action to restore cooling.

The reviewer determined that the action to restore cooling to the CC within 30 minutes meets the criteria for a critical action, because successful completion of this action was necessary to ensure the reliable operation of mitigation equipment during the subsequent steam generator tube rupture. This action was not initiated for 31 minutes, when the applicant instructed the BOP operator to restore CC ventilation in the emergency recirculation mode. However, this action was not taken, and the applicant did not ensure that the action was completed. This was recognized several minutes later, when the applicant was prompted by the RO. The failure to restore CC cooling within the required 30 minutes represents a problem with following procedures and supervising operators. Based on the above, the reviewer considers this to represent a failure of a critical action on the part of the applicant.

The following paragraphs, included for reference, provide excerpts from licensee documents which provided the technical basis for the summary above.

4.4.2.1 AI-500 (Conduct of Operations Department and Administration)

Contrary to Section 3.2.1 with regard to SRO safety responsibilities, the applicant, as SRO (CRS), did not recognize and avoid activities that impact safe operating limits. Specifically, the applicant, as SRO (CRS), did not give proper consideration to AP-250's CAUTION statement, "With all CC ventilation stopped, the CC may reach its design limit of 95°F in 30 minutes." The review finds that the applicant failed to monitor the status and safely control the operation of the facility's CC so as to preclude exceeding the design temperature limitations.

4.4.2.2 AP-250 (Radiation Monitor Actuation)

Contrary to Step 3.8, the review finds that the applicant did not demonstrate an understanding of the interaction of the upscale high trip actuation of the RM-A5G and the automatic shutdown and isolation of the CC ventilation. Specifically, the applicant did not perform the followup actions in Enclosure 5, Step 5.1, regarding the RM-A5G radiation monitor reaching its trip set point.

The applicant's rationale for not adhering to the procedure also shows his lack of understanding of the interactions that were ongoing. For example, the applicant asserts that because of the type of RM-A5G failure, he determined that RM-A5G was inoperable and therefore the actuation was not valid. He then asserts that Enclosure 5 to AP-250 is not required to be performed. This ignores the fact that, regardless of whether the radiation monitor actuation was valid, the CC ventilation had stopped, and actions were necessary to restore ventilation.

4.4.2.3 OP-409 (Plant Ventilation)

Contrary to OP-409, Step 3.2.6 (with regard to limits and precautions), the applicant did not demonstrate an understanding of the interaction of CC ventilation with important ES safety-related equipment/components, as evidenced by the fact that his actions did not appropriately consider the CAUTION statement, "Maximum Switchgear Room temperature is 104 °F." By the time the applicant, as SRO (CRS), directed that CC ventilation emergency recirculation be placed into service, the critical time for taking action had passed.

4.4.2.4 FSAR Section 9.7.2.7 (CC Emergency Air)

The applicant did not demonstrate an awareness of FSAR, Section 9.7.2.7, regarding CC emergency ventilation, which points out the necessity for starting the CC emergency ventilation system within 30 minutes following a loss of normal CC ventilation to ensure room temperatures in the habitability envelope of the CC will be acceptable to support proper functioning of safety related equipment located therein.

4.4.2.5 ITS B.3.7.18 (CC Cooling System)

The applicant, as SRO (CRS), did not demonstrate an awareness of ITS B.3.7.18 regarding the effect of CC ventilation area air temperatures on control room habitability and environment and on other portions of essential ES safety-related equipment cooled by CC emergency fans.

4.4.3 Appendix D to NUREG-1021 Appendix D (regarding CTs)

In accordance with Appendix D(1)(a) and (b) to NUREG-1021, the review finds that the time-critical restarting/restoration of the CC ventilation system within 30 minutes is a CT, in that the task is essential to safety if its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant. For a CT to be valid, an external stimulus must prompt at least one operator to perform the task. In this case, at least two external stimuli (related alarm and indication of fan(s) status) were apparent. Hence the applicant, as SRO (CRS), missed a CT. This emphasizes the seriousness of the error.

4.5 Reviewer's Conclusion:

With regard to Competency 1.c, Scenario 2, Event 2, the review finds that the applicant exhibited a substantiated error. (This review also considers the error identified in Appeal Area 5.) The applicant's directives and actions failed to demonstrate an understanding of the operation and interaction of the plant, systems, and components (including set points, interlocks, and automatic actions). Because this was a critical error, the examiner's overall evaluation of the applicant's performance, as SRO, during Scenario 2, Event 2 (and Scenario 3, Events 8, 9, and 10) is sustained, and the SRO RF score of 1 with a RF grade of 0.30 was appropriately assigned. Furthermore, this error should also be combined with the error discussed under Area 5, which also dictates that a RF score of 1 be assigned.

With respect to the criteria specified in 10 CFR 55.45(a) during this event the applicant, as SRO, failed to:

- (Item 3)—Identify annunciators and condition-indicating signals and perform appropriate remedial actions where appropriate.
- (Item 4)—Identify the instrumentation systems and the significance of facility instrument readings.
- (Item 12)—Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.