Licensee's Post Written Examination Comments and NRC Resolutions

Following the administration of the written examination on July 22, 2010, the licensee submitted post exam comments for three written exam questions (i.e., RO 28, RO 35 and SRO 86) that were received by the NRC on August 17, 2010. During the exam there were no questions asked by the applicants regarding these three questions. The NRC's resolution for these post exam comments is based on the independent reviews that were conducted by the two NRC senior examiners assigned to the exam team as well as two other Regional senior examiners and the Branch Chief.

QUESTION

Q 28

The plant is at 100% power.

The following events occur:

- At 1530, the 22 RCP BEARING COOLANT LOW FLOW Alarm annunciates.
- Upper bearing temperature 176°F and rising at 5°F/minute.
- Lower bearing temperature 186°F and rising at 5°F/minute.

Seal injection flow has been maintained to the RCP.

Which ONE of the following describes the MAXIMUM time allowed before the crew must stop the 22 RCP?

A. 1530

B. 1532

C. 1533

D. 1535

ANSWER

Answer: B

Explanation/Justification:

A. Incorrect. Plausible because the bearing temperatures are close to but below the trip setpoints.

B. Correct because the procedure (2-AOP-CCW-001 step 4.3 of Rev. 3) specifies tripping the RCP if CCW is lost for 2 minutes.

C. Incorrect. Plausible because at this point the lower bearing temperature will exceed 200F

D. Incorrect Plausible because at this point both bearing temperatures will exceed 200F.

REFERENCE

Procedure 2-AOP-CCW-1, Rev.2, Step 4.3 specifies tripping the RCP if CCW is lost for 2 minutes.

Facility Position:

The Stem of the question states,

- At 1530, the 22 RCP BEARING COOLANT LOW FLOW Alarm annunciates.
- Upper bearing temperature 176°F and rising at 5°F/minute.
- Lower bearing temperature 186°F and rising at 5°F/minute.

The set point for the 22 RCP BEARING COOLANT LOW FLOW Alarm is 155 gpm (Reference, 2-ARP-SGF page 26 of 62)

A separate flow element measures the bearing cooling flow for each individual RCP. If the measured flow is reduced to a value less than 155 gpm for any RCP an alarm is generated in the Control Room for each individual RCP. There is no indication in the Control Room of actual CCW flow to the RCPs. The Plant Computer system provides indication of RCP bearing Temperatures in the Control Room. Therefore the Control Room operator does not have the ability to determine if there is inadequate flow (less than 155 gpm) or a complete loss of flow (0 gpm) to 22 RCP bearings given the information provided in the stem of the question.

Procedure 2-AOP-CCW-1, Rev.2, Step 4.3 was listed as the reference document for this question.

2-AOP-CCW-1 Step 4.3 is an If AT Any Time step which states that if either CCW flow is lost to any RCP for greater than or equal to 2 minutes OR RCP motor bearing temperature exceeds 200°F then (if reactor is critical) trip the Reactor, Trip affected RCP and initiate E-0.

The following is from the background document for 2-AOP-CCW-1 Step 4.3

> Steps 4.3 - 4.7 provide protection for RCPs. These steps implement a precaution and limitation from SOP 4.1.2, Component Cooling System Operation. These steps are worded slightly differently from the direction in SOP 4.1.2 in that CCW flow does not have to be lost for the actions to trip an RCP if motor bearing temperature reaches 200 degrees. This takes into account that SW to CCW could be lost yet CCW flow is still available. The end result is that high motor bearing temperature could result. In this path, the leak could affect one or more RCPs. For this reason, Step 4.6 is worded to

allow stopping only the affected RCPs. Step 4.4 is a routing step to determine the applicability of Step 4.5. Step 4.7 determines if the EOP network is applicable and implements it if it is.

During the post exam review, the candidates stated that based on the information provided in the stem of the question, it was possible to diagnose 2 separate events.

One event would be a complete loss of CCW flow to 22 RCP. Some candidates felt this was the case due to the information provided in the stem of the question that 22 RCP bearing temperatures are rising at 5°F/minute.

The second event would be inadequate CCW flow to 22 RCP, since the alarm set point is 155gpm (Reference, 2-ARP-SGF page 26 of 62).

EVENT 1:

If the operator diagnosed a complete loss of CCW then he would implement the first part of 2-AOP-CCW-1 Step 4.3 and have to stop 22 RCP when 2 minutes were exceeded from the time when the alarm annunciated at 1530.

This would require the operator to stop 22 RCP when 1532 was exceeded.

For this event the operator would select answer B as the correct answer.

Event 2:

If the operator diagnosed inadequate CCW flow to 22 RCP then he would implement the second part of 2-AOP-CCW-1 Step 4.3 and have to stop 22 RCP when 22 RCP motor bearing temperatures exceeded 200°F.

Using the information provided in the stem of the question (Lower bearing temperature 186°F and rising at 5°F/minute) would result in 22 RCP lower bearing exceeding 200°F at 1532 and 48 seconds.

The candidates stated that taking the time to trip the reactor and verify the reactor was tripped then stopping 22 RCP would result in stopping 22 RCP when 1533 was exceeded and selected answer C as the correct answer.

Although the actions are the same, for either a complete loss of CCW flow or inadequate flow to 22 RCP the time frame in which the actions are required to be performed is different. That is if the operator diagnoses a complete loss of flow the actions must be completed when 2 minutes are exceeded. If the operator diagnoses inadequate flow the actions must be completed when 22 RCP bearing temperature exceeds 200°F at approximately 3 minutes.

IPEC feels that both answers B & C should be accepted for Question 28 based on the candidates comments and the information provided in the stem of the question. Since there is no value of CCW flow to 22 RCP provided in the stem of the question the candidates had to diagnose the problem based on the alarm and changes in bearing temperature provided. IPEC procedures and lesson plans do not provide any correlation to bearing temperature rise versus

flow. IPEC agrees with the diagnosis of the 2 separate events and selection of two different answers.

Question 28 was a common question. 3 of the candidates selected answer B and 6 of the candidates selected answer C.

REFERENCES:

2-ARP-SGF	Rev. 32	Page 26 of 62
2-AOP-CCW-1	Rev.32	Page 7 of 41
2-AOP-CCW-1-BGD	Rev2	Page 2 of 16

NRC Resolution for RO Question #28:

The NRC conducted detailed reviews of all references provided and concluded that the NRC accepts the licensee's recommendation to accept both B & C choices as correct answers to this question.

The NRC agrees it is possible to diagnose two separate events either a complete loss of component cooling water (CCW) (0 gpm) or degraded CCW flow to the 22 reactor coolant pump (RCPs) bearings (less than 155 gpm) since the question stem did not provide either actual CCW flow to 22 RCP nor the status of the CCW pumps (i.e., number of pumps running, flow rates and discharge pressures).

2-AOP-CCW-1, step 4.3 states, If AT Any Time (IAAT) either of the following conditions exist: CCW flow to any RCP is lost, for greater than or equal to 2 minutes OR RCP motor bearing temperature exceeds 200F then (if reactor is critical) trip the Reactor, Trip affected RCP and initiate E-0.

The NRC agrees that the original designated correct answer "B" is still a correct answer. If the examinee conservatively diagnosed a complete loss of CCW based on receiving the 22 RCP BEARING COOLANT LOW FLOW Alarm together with increasing bearing temperatures then "B" is the correct answer since the first part of 2-AOP-CCW-001 step 4.3 specifies tripping the RCP if CCW is lost for 2 minutes.

The NRC also agrees that answer choice "C" is a correct answer. If the examinee diagnosed inadequate CCW flow to 22 RCP after receiving the 22 RCP BEARING COOLANT LOW FLOW Alarm then "C" is the correct answer since the second part of 2-AOP-CCW-1, Step 4.3 specifies tripping 22 RCP when the motor bearing temperatures exceeded 200F at approximately three minutes.

In summary, the NRC has concluded that both "B" and "C" are correct answers to this question and Choices "A" and "D" remain incorrect.

QUESTION

Q 35

Unit 2 is cooling down and depressurizing the RCS at the start of a refueling outage. During the process of lowering pressure from NOP to 900 psig, the following actions are performed. Which of the following lists the proper sequence of actions during RCS depressurization?

1. Monitor pressure using OPS pressure indicators PI-413K, PI-433K, or PI-443K

2. PZR pressure control must be transferred to manual

3. Block low pressurizer pressure safety injection

4. Monitor pressure using RCS hot leg pressure recorders PT-402 or PT-403

A. 2, 3, 4, 1

B. 3, 2, 4, 1

C. 2, 3, 1, 4

D. 3, 2, 1, 4

ANSWER

Answer: B

Explanation/Justification:

The correct sequence for lowering pressure is to start by lowering pressure in automatic, which is the preferred method. While manual could be done it does not have to be done until 1700 psi (low range of automatic control) and the procedure specifies 1750 psi. At about 1900 psi, low pressure SI must be blocked so it is the first action of the choices given. The next is transfer pressure control to manual at 1750 psi. When pressure is between 1500 and 1700 psi, the only means of monitoring pressure is using PT-402 or 403, so this is the next step in the sequence. The final item is to use the OPS pressure monitors.

A. Incorrect but plausible. It is plausible (and would work) that manual control would be used to lower pressure, but that is not what procedure specifies.

B. Correct per POP-3.3

C. See A, also it is plausible an operator could be confused on when each pressure indicator is used.

D. See C

REFERENCE

Procedure 2-POP-3.3, PLANT COOLDOWN – HOT TO COLD SHUTDOWN.

Facility Position:

Pressure Controller 455K controls pressurizer heaters and pressurizer spray valves. To reduce RCS pressure, Pressure Controller 455K would be manipulated to operate pressurizer spray valves to lower RCS pressure. In automatic Pressure Controller 455K compares a setpoint that is manually adjusted by the operator to a selected channel of pressurizer pressure. When the setpoint is below the actual pressure of the RCS the controller will open the spray valves to reduce RCS pressure to the setpoint. In manual the operator adjusts the output of the controller to actuate the spray valves to reduce RCS pressure. Therefore, to lower RCS pressure with, Pressure Controller 455K in automatic the operator would lower the setpoint of the controller or to lower RCS pressure with Pressure Controller 455K in manual the operator would adjust the output of the controller to actuate the spray valves.

When pressurizer pressure is reduced to a value less than 1940 psig an interlock is made-up that allows the operator to BLOCK the Low Pressurizer Pressure Safety Injection. This action is manually performed by the operator at 1900 psig (procedurally), but cannot be performed until the RCS pressure is reduced to less than 1940 psig.

Procedure 2-POP-3.3, PLANT COOLDOWN – HOT TO COLD SHUTDOWN

Step 4.2.7 states WHEN RCS temperature is approximately 530 °F, THEN DEPRESSURIZE RCS to approximately 1900 psig by slowly REDUCING Pressurizer Pressure Controller 455K auto setpoint to approximately 25 percent or using manual control as directed by CRS

Step 4.2.8 states WHEN PZR pressure is below 1940 psig, THEN manually BLOCK Low Pressurizer Pressure Safety Injection (Switches located on CCR Panel SBF-2):

Step 4.2.10 states WHEN RCS pressure is approximately 1750 PSIG, THEN TRANSFER PZR Pressure Control to MANUAL using one of the following:

> PLACE Pressurizer Pressure Master Pressure Controller 455K to manual.
>
> PLACE both spray valve controllers in Manual.

The question stem states:

> Unit 2 is cooling down and depressurizing the RCS at the start of a refueling outage. During the process of lowering pressure from NOP to 900 psig, the following actions are performed. Which of the following lists the proper sequence of actions during RCS depressurization?

The first sentence of stem provides the framework for why the plant is performing the depressurization. The depressurization is for normal plant operations (vs. abnormal or

emergency operations). The second sentence in the stem provides the interval of the depressurization to be analyzed. The interval to be evaluated is from the start of depressurization (2235 psig) to 900 psig in the reactor coolant system. The second sentence also uses the term "process of lowering pressure." This led the candidates to look at this question in two different ways. The first case being what process actions would be needed to lower RCS pressure from NOP to 900 psig from the listed actions and in what sequence. The second case being that pressure is already lowering and based on pressure lowering chose in what sequence the actions provided would occur.

Case 1

> If the candidate believed the question was asking for what process actions would support lowering RCS pressure from NOP to 900 psig, then some manipulation of Pressure Controller 455K would have to be performed to cause RCS pressure to begin lowering. Since the operator cannot BLOCK Low Pressurizer Pressure Safety Injection until the RCS pressure is less than 1940 psig by interlock, and 1900 psig by procedure, this action (action 3) would have to occur after the action to initiate the pressure reduction. The only action (action 2) that was provided for the operator to begin lowering RCS pressure was to place Pressure Controller 455K in manual. This action would have to occur first. This manipulation of Pressure Controller 455K (placing in manual) is allowed by step 4.2.7 of procedure 2-POP-3.3, PLANT COOLDOWN – HOT TO COLD SHUTDOWN. The candidate would select sequence 2, 3, 4, 1, and answer A as the correct answer to the question.

Case 2

> If the candidate believed the question was strictly asking for sequence of actions based on RCS pressure already lowering (depressurizing), then no action to manipulate Pressure Controller 455K to initiate the RCS pressure reduction would be required. The candidate would then select sequence 3, 2, 4, 1, and answer B as the correct answer to the question.

The Explanation/Justification for question 35 stated that answer A was incorrect but plausible. It is plausible (and would work) that manual control would be used to lower pressure, but that is not what the procedure specifies. Procedure 2-POP-3.3 Step 4.2.7 allows either auto or manual operation of Pressure Controller 455K at the direction of the CRS. The procedure does not specify one option over the other.

IPEC supports accepting both answers A and B as correct answers to Question 35.

Question 35 was a common question. 8 of the candidates selected answer A and 1 of the candidates selected answer B.

Reference:

2-POP-3.3 Rev. 75 Page 18 of 90

NRC Resolution for RO Question #35:

The NRC conducted detailed reviews of all references provided and concluded that the NRC does not agree with the licensee's recommendation to accept two correct answers "A" and "B" and has determined the key answer "B" is correct and all other choices are incorrect.

The Stem of the question states,

Unit 2 is cooling down and depressurizing the RCS at the start of a refueling outage. During the process of lowering pressure from NOP to 900 psig, the following actions are performed. Which of the following lists the proper sequence of actions during RCS depressurization?

The licensee contends that the stem of the question does not provide any information as to the status of Pressure Controller 455K or the current value of pressure of the Reactor Coolant System (RCS). However, the first sentence of the stem states that "**Unit 2 is cooling down and depressurizing**" and the second sentence states "**during the process of lowering pressure from NOP to 900 psig, the following actions are performed.** " Based on these combined statements it is obvious cool down and depressurization from normal operating pressure (NOP) is in progress.

Procedure 2-POP-3.3, PLANT COOLDOWN – HOT TO COLD SHUTDOWN, step 4.2.7 states, "WHEN RCS temperature is approximately 530 °F, THEN DEPRESSURIZE RCS to approximately 1900 psig by slowly REDUCING Pressurizer Pressure Controller 455K auto setpoint to approximately 25 percent or using manual control as directed by CRS." This procedure step initiates a plant cooldown by slowly reducing Pressurizer Pressure Controller **auto setpoint.** Manual control is not used unless directed by the Control Room Supervisor (CRS). NUREG 10.21, Appendix E. Part B, Step 7 states, "When answering a question, do *not* make assumptions regarding conditions that are not specified in the question unless they occur as a consequence of other conditions that are stated in the question."

S2-POP-3.3, step 4.2.8 states, "WHEN PZR pressure is below 1940 psig, THEN manually BLOCK Low Pressurizer Pressure Safety Injection..."

In addition, the stem states in sequence item 2. "PZR pressure control must be transferred to manual." The first time procedure 2-POP-3.3 requires pressure control to be transferred to manual is in step 4.2.10, "WHEN RCS pressure is approximately 1750 PSIG, THEN TRANSFER PZR Pressure Control to MANUAL using one of the following: PLACE Pressurizer Pressure Master Pressure Controller 455K to MANUAL. PLACE both spray valve controllers in MANUAL..."

The correct sequence for lowering pressure in accordance with procedure 2-POP-3.3 is to start by lowering pressure in automatic, which is the preferred method. While manual could be done it does not have to be done until 1750 psig as specified in the procedure. When pressure is below 1940 psig then Safety Injection is blocked. "A" is clearly an incorrect answer since by procedure pressurizer pressure clearly is not required to be placed in manual prior to blocking safety injection.

In summary, the NRC disagrees with the licensee's recommendation to accept two correct answers "A" and "B" and has determined the key answer "B" is correct and all other choices are incorrect.

QUESTION

Q 86

A large break loss of coolant accident (LBLOCA) occurs. All equipment is available at the start of the event and functions as designed. In responding to this event, which of the following pumps could be secured first, and what is the procedural guidance for this action?

A. 21 RHR Pump in E-0, Reactor Trip or Safety Injection.

B. 22 Charging Pump prior to manipulating Recirc Switches in ES-1.3, Transfer to Cold Leg Recirculation.

C. 22 SI Pump from Recirc Switch 1 in ES-1.3, Transfer to Cold Leg Recirculation.

D. 21 and 22 RHR Pumps from Recirc Switch 3 Switches in ES-1.3, Transfer to Cold Leg Recirculation.

ANSWER

Answer: B

Explanation/Justification:

A. Incorrect. Plausible because for most accident conditions (not including LBLOCA) an RHR pump is secured first to prevent "Strong Pump - Weak Pump" interaction.

B. Correct. This action is performed to reduce loads on the 480V buses prior to transferring to recirculation.

C. Incorrect. Plausible because 22 SIP is secured first when Recirc Switch 1 is placed to ON; however, this action is performed after the charging pump is secured.

D. Incorrect. Plausible because 21 and 22 RHR Pumps are secured using Recirc Switch 3; however, this action is performed after the charging pump is secured. Note: Recirc Switch 1 and 3 are placed to on in the same step.

REFERENCE

Procedure 2-ES-1.3, Transfer to Cold Leg Recirculation

Facility Position:

The question stem states that a large break loss of coolant accident (LBLOCA) occurs. All equipment is available at the start of the event and functions as designed. The question stem then asks the candidates to determine two things: 1) which pumps could be secured first, and 2) what is the procedural guidance for this action [securing the pumps]?

To answer this question, the candidates need to analyze the procedural actions that would be performed in responding to the LBLOCA up to the point of operating Recirc Switches 1 and 3. The procedural flow path would be 2-E-0, REACTOR TRIP OR SAFETY INJECTION, then to 2-E-1, LOSS OF REACTOR OR SECONDARY COOLANT, and then to procedure 2-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

IPEC disagrees with the answer key that Answer B (22 Charging Pump prior to manipulating Recirc Switches in ES-1.3, Transfer to Cold Leg Recirculation) is the correct answer. Although the charging pump could be secured first, it would be secured in 2-E-1, prior to entering 2-ES-1.3 for the following reasons:

- Page 9 of 2-E-1 contains a CAUTION that states "If RWST level decreases to less than 15 ft. charging pumps that are started or running should be monitored for loss of suction which may result in pump damage." In the IPEC Unit 2 Simulator the candidates have observed that charging flow begins decreasing when RWST level lowers to 12 ft, with charging flow significantly reduced by the time that RWST level reaches 11 ft. The operators have been trained to secure the charging pumps when they observe charging pump flow decreasing due to loss of suction. During initial charging pump operation starting in 2-E-0, the charging pump is placed in service at maximum speed with charging flow at approximately 65 gpm. Data taken during LBLOCA in the Unit 2 simulator supports that charging pump discharge flow drops significantly (see attached). When RWST level reaches approximately 12.7', flow is observed to begin lowering with the charging pump still at maximum speed. At approximately 10' in the RWST, flow has lowered to 9 gpm. Operators are trained to secure a piece of running equipment when its suction source is lost.
- Answer B does not correctly identify the procedural guidance for securing the charging pump. Although Step 4 of 2-ES-1.3 stops all charging pumps to reduce 480V bus loads, the charging pumps would already be secured in 2-E-1 when RWST level lowered to less than 12 ft but prior to transitioning to 2-ES-1.3 at 9.24 ft.

IPEC agrees that Answer A is incorrect. The first procedure to be performed would be 2-E-0, REACTOR TRIP OR SAFETY INJECTION. Step 8 on page 8 determines whether one RHR pump should be secured to prevent "Strong Pump – Weak Pump" interaction. For a LBLOCA RCS pressure would be low enough that RHR pump flow would be indicated and an RHR pump would NOT be secured.

IPEC believes Answer C is the only correct answer. Both actions in Answers C and D are performed by the operators in 2-ES-1.3 to secure pumps. Step 6 directs the operators to place Safety Injection Recirc Switches 1 and 3 to ON. These actions are not permitted to be performed at the same time. Procedural guidance for when two handed operations (using two hands to perform a manipulation) is allowed is contained in Entergy Nuclear Procedure, EN-OP-115, Conduct of Operations. This guidance is very restrictive and specific. Manipulation of the Safety Injection System Recirc Switches is not listed in the IPEC plant specific addendum as a

two handed operation. Based on procedure adherence and training the operator performs the actions in the order in which they are given. Procedurally the first switch the operators manipulate would be Recirc Switch 1, which secures 22 SI pump. Answer C has both the pump and procedure correct. IPEC recommends changing the correct answer to Question 86 from B to C.

IPEC agrees Answer D is incorrect because placing Recirc Switch 3 to On is the second action in the step's order and would not be performed first.

Question 86 was an SRO only question. All 4 of the candidates selected answer C.

References:

2-E-0	Rev.3	Page 8 of 35
2-E-0	Rev.3	Page 24 of 35
2-E-1	Rev.2	Page 9 of 21
2-ES-1.3	Rev. 4	Page 5 of 34
EN-OP-115	Rev. 9	Pages 42 and 91 of 120
2-E-1 Background	Rev. 0	Page 56

Attached Graphs:

- Unit 2 Simulator PICS – RWST Level and Charging Flow vs. Time
- Unit 2 Simulator PICS – Charging Flow vs. Time
- Unit 2 Simulator PICS – RWST Level vs. Time
- Unit 2 Simulator Parameter Charts
  - RWST Level (LT920) vs. Time
  - Charging Flow (FT128) vs. Time
  - SI Flow to RCS Loop 21 (FT924) vs. Time
  - SI Flow to RCS Loop 23 (FT925) vs. Time
  - SI Flow to RCS Loop 24 (FT926) vs. Time
  - SI Flow to RCS Loop 22 (FT927) vs. Time
  - RCS Wide Range Pressure (PT402) vs. Time
  - RCS Wide Range Pressure (PT403) vs. Time
  - Charging Flow (FT128) vs. RWST Level (LT920)

NRC Resolution for SRO Question #86:

The NRC conducted detailed reviews of all references provided and concluded that the NRC does not accept the licensee's recommendation to change the correct answer to this question from "B" to "C" but instead has determined that both "B" and "C" should be accepted as correct answers to this question.

The NRC position is that "B" answer would always be a correct answer based on the procedural guidance alone: 1) The procedural guidance in 2-E-1, Page 9, CAUTION that states "If RWST level decreases to less than 15 ft. charging pumps that are started or running should be monitored for loss of suction which may result in pump damage." However, this guidance does not provide explicit direction to secure the charging pump(s) based on this caution and in some cases it may be desirable to maintain the pump(s) running as long as possible; 2) In contrast, 2-ES-1.3 does provide explicit guidance on when the charging pumps must be secured. The CAUTION just prior to step 4 states, "Any pumps taking suction from RWST should be stopped if RWST level decreases to 3.0 ft for SI and charging pumps....";

3) 2-ES-1.3, step 4, provides further direction to stop all charging pumps and this is done prior to performing procedural step 6, "Place Safety Injection Recirc Switches 1 AND 3 to ON" that provides the bases for selecting answer choices "C" or "D". The question stem asks which of the following pumps could be secured first, answer choice "B" states, "22 Charging Pump prior to manipulating Recirc Switches in ES-1.3, Transfer to Cold Leg Recirculation". The licensee has provided justification for stating charging pumps may be secured earlier using the guidance in 2-E-1. Given a LBLOCA condition, the charging pumps will always be secured first in the sequence whether using the guidance in 2-E-1 or by using the guidance contained in 2-ES-1.3. Finally, if for any reason the charging pumps are not secured prior to entering procedure 2-ES-1.3 then this procedure directs that the charging pump(s) would be secured prior to taking the action in procedure step 6 that provides the basis for selecting answer choice "C" or "D". The NRC disagrees that key answer B is incorrect.

The question stem asks the candidates to determine two things: 1) which pumps could be secured first, and 2) what is the procedural guidance for this action [securing the pumps]? The NRC concludes that answer "C" (22 SI Pump from Recirc Switch 1 in ES-1.3, Transfer to Cold Leg Recirculation) should also be accepted as a correct answer for the following reasons: 1) The procedural guidance in 2-E-1, Page 9, CAUTION states "If RWST level decreases to less than 15 ft. charging pumps that are started or running should be monitored for loss of suction which may result in pump damage." In addition, the 2-E-1 Background document, page 56, basis section indicates that a section of the charging pump suction piping is at an elevation of 15 feet above the bottom of the Refueling Water Storage Tank (RWST). If RWST level decreases to less than 15 feet a vacuum will be drawn in that section of the piping that may cause a decrease or loss of charging pump suction pressure and flow; 2) The operators have been trained to secure the charging pumps when they observe charging pump flow decreasing significantly due to loss of suction in order to protect plant equipment; and 3) The Unit 2 simulator data provided by the licensee for Large Break Loss of Coolant Accident (LBLOCA) indicates that charging pump discharge flow drops significantly when RWST level lowered to less than 12 feet. 4) Transitioning to 2-ES-1.3 is not done until level in the RWST level decreases to less than 9.24 ft. Therefore, based on guidance in 2-E-1, the simulator data and training provided to the operators, it is conceivable that the operators would be expected to secure any running charging pumps prior to transitioning to procedure 2-ES1.3 (i.e., especially since all other systems are operating normally as the stem of the question indicates. It follows then that if charging pumps are secured earlier in 2-E-1 for all of the reasons stated above (i.e., prior to transitioning to 2-ES1.3) then 22 SI pump could be the first pump secured in 2-ES-1.3.

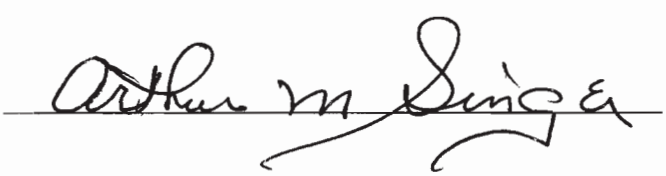
The NRC has determined that in both cases noted above the applicant could transition to 2-ES-1.3 by appropriately using the station procedures and cautions. The result is that the charging pumps could be on or off depending upon the use of the caution step in 2-E-1, prior to entering 2-ES-1.3, which could lead to either answer B or C being correct.

The NRC also agrees answer "D" is incorrect because 2-ES-1.3, step 6 placing Recirc Switch 3 to On is the second action in the step's order and would not be performed first. In addition, Safety Injection Recirc Switches 1 AND 3 are not permitted to be performed at the same time based on the procedural guidance contained in Entergy Nuclear Procedure, EN-OP-115, Conduct of Operations, Revision 9, Addendum 10.4, section 3, "Acceptable Two-Handed Operations", page 91. Based on procedure adherence and training the operator performs the actions in the order in which they are given. Procedurally the first switch the operators manipulate would be Recirc Switch 1, which secures 22 SI pump.

In summary, the NRC has concluded that both "B" and "C" are correct answers to this question and Choices "A" and "D" remain incorrect.

Attachment 4

Comments on Indian Point 2 July 2010 Initial NRC License Examination

Facility Representative: 

QUESTION

Q 28

The plant is at 100% power.

The following events occur:

- At 1530, the 22 RCP BEARING COOLANT LOW FLOW Alarm annunciates.
- Upper bearing temperature 176°F and rising at 5°F/minute.
- Lower bearing temperature 186°F and rising at 5°F/minute.

Seal injection flow has been maintained to the RCP.

Which ONE of the following describes the MAXIMUM time allowed before the crew must stop the 22 RCP?

A. 1530

B. 1532

C. 1533

D. 1535

ANSWER

Answer: B

Explanation/Justification:

A. Incorrect. Plausible because the bearing temperatures are close to but below the trip setpoints.

B. Correct because the procedure (2-AOP-CCW-001 step 4.3 of Rev. 3) specifies tripping the RCP if CCW is lost for 2 minutes.

C. Incorrect. Plausible because at this point the lower bearing temperature will exceed 200F

D. Incorrect Plausible because at this point both bearing temperatures will exceed 200F.

REFERENCE

Procedure 2-AOP-CCW-1, Rev.2, Step 4.3 specifies tripping the RCP if CCW is lost for 2 minutes.

Facility Position:

The Stem of the question states,

- At 1530, the 22 RCP BEARING COOLANT LOW FLOW Alarm annunciates.
- Upper bearing temperature 176°F and rising at 5°F/minute.
- Lower bearing temperature 186°F and rising at 5°F/minute.

The set point for the 22 RCP BEARING COOLANT LOW FLOW Alarm is 155gpm (Reference, 2-ARP-SGF page 26 of 62)

A separate flow element measures the bearing cooling flow for each individual RCP. If the measured flow is reduced to a value less than 155 gpm for any RCP an alarm is generated in the Control Room for each individual RCP. There is no indication in the Control Room of actual CCW flow to the RCPs. The Plant Computer system provides indication of RCP bearing Temperatures in the Control Room. Therefore the Control Room operator does not have the ability to determine if there is inadequate flow (less than 155 gpm) or a complete loss of flow (0 gpm) to 22 RCP bearings given the information provided in the stem of the question.

Procedure 2-AOP-CCW-1, Rev.2, Step 4.3 was listed as the reference document for this question.

2-AOP-CCW-1 Step 4.3 is an If AT Any Time step which states that if either CCW flow is lost to any RCP for greater than or equal to 2 minutes OR RCP motor bearing temperature exceeds 200°F then (if reactor is critical) trip the Reactor, Trip affected RCP and initiate E-0.

The following is from the background document for 2-AOP-CCW-1 Step 4.3

> Steps 4.3 - 4.7 provide protection for RCPs. These steps implement a precaution and limitation from SOP 4.1.2, Component Cooling System Operation. These steps are worded slightly differently from the direction in SOP 4.1.2 in that CCW flow does not have to be lost for the actions to trip an RCP if motor bearing temperature reaches 200 degrees. This takes into account that SW to CCW could be lost yet CCW flow is still available. The end result is that high motor bearing temperature could result. In this path, the leak could affect one or more RCPs. For this reason, Step 4.6 is worded to allow stopping only the affected RCPs. Step 4.4 is a routing step to determine the applicability of Step 4.5. Step 4.7 determines if the EOP network is applicable and implements it if it is.

During the post exam review, the candidates stated that based on the information provided in the stem of the question, it was possible to diagnose 2 separate events.

One event would be a complete loss of CCW flow to 22 RCP. Some candidates felt this was the case due to the information provided in the stem of the question that 22 RCP bearing temperatures are rising at 5°F/minute.

The second event would be inadequate CCW flow to 22 RCP, since the alarm set point is 155gpm (Reference, 2-ARP-SGF page 26 of 62).

EVENT 1:

If the operator diagnosed a complete loss of CCW then he would implement the first part of 2-AOP-CCW-1 Step 4.3 and have to stop 22 RCP when 2 minutes were exceeded from the time when the alarm annunciated at 1530.

This would require the operator to stop 22 RCP when 1532 was exceeded.

For this event the operator would select answer B as the correct answer.

Event 2:

If the operator diagnosed inadequate CCW flow to 22 RCP then he would implement the second part of 2-AOP-CCW-1 Step 4.3 and have to stop 22 RCP when 22 RCP motor bearing temperatures exceeded 200°F.

Using the information provided in the stem of the question (Lower bearing temperature 186ºF and rising at 5ºF/minute) would result in 22 RCP lower bearing exceeding 200°F at 1532 and 48 seconds.

The candidates stated that taking the time to trip the reactor and verify the reactor was tripped then stopping 22 RCP would result in stopping 22 RCP when 1533 was exceeded and selected answer C as the correct answer.

Although the actions are the same, for either a complete loss of CCW flow or inadequate flow to 22 RCP the time frame in which the actions are required to be performed is different. That is if the operator diagnoses a complete loss of flow the actions must be completed when 2 minutes are exceeded. If the operator diagnoses inadequate flow the actions must be completed when 22 RCP bearing temperature exceeds 200°F at approximately 3 minutes.

IPEC feels that both answers B & C should be accepted for Question 28 based on the candidates comments and the information provided in the stem of the question. Since there is no value of CCW flow to 22 RCP provided in the stem of the question the candidates had to diagnose the problem based on the alarm and changes in bearing temperature provided. IPEC procedures and lesson plans do not provide any correlation to bearing temperature rise versus flow. IPEC agrees with the diagnosis of the 2 separate events and selection of two different answers.

Question 28 was a common question. 3 of the candidates selected answer B and 6 of the candidates selected answer C.

REFERENCES:

2-ARP-SGF Rev. 32 Page 26 of 62

QUESTION

Q 35

Unit 2 is cooling down and depressurizing the RCS at the start of a refueling outage. During the process of lowering pressure from NOP to 900 psig, the following actions are performed. Which of the following lists the proper sequence of actions during RCS depressurization?

1. Monitor pressure using OPS pressure indicators PI-413K, PI-433K, or PI-443K
2. PZR pressure control must be transferred to manual
3. Block low pressurizer pressure safety injection
4. Monitor pressure using RCS hot leg pressure recorders PT-402 or PT-403

A. 2, 3, 4, 1

B. 3, 2, 4, 1

C. 2, 3, 1, 4

D. 3, 2, 1, 4

ANSWER

Answer: B

Explanation/Justification:

The correct sequence for lowering pressure is to start by lowering pressure in automatic, which is the preferred method. While manual could be done it does not have to be done until 1700 psi (low range of automatic control) and the procedure specifies 1750 psi. At about 1900 psi, low pressure SI must be blocked so it is the first action of the choices given. The next is transfer pressure control to manual at 1750 psi. When pressure is between 1500 and 1700 psi, the only means of monitoring pressure is using PT-402 or 403, so this is the next step in the sequence. The final item is to use the OPS pressure monitors.

A. Incorrect but plausible. It is plausible (and would work) that manual control would be used to lower pressure, but that is not what procedure specifies.

B. Correct per POP-3.3

C. See A, also it is plausible an operator could be confused on when each pressure indicator is used.

D. See C

REFERENCE

Procedure 2-POP-3.3, PLANT COOLDOWN – HOT TO COLD SHUTDOWN.

Facility Position:

Pressure Controller 455K controls pressurizer heaters and pressurizer spray valves. To reduce RCS pressure, Pressure Controller 455K would be manipulated to operate pressurizer spray valves to lower RCS pressure. In automatic Pressure Controller 455K compares a setpoint that is manually adjusted by the operator to a selected channel of pressurizer pressure. When the setpoint is below the actual pressure of the RCS the controller will open the spray valves to reduce RCS pressure to the setpoint. In manual the operator adjusts the output of the controller to actuate the spray valves to reduce RCS pressure. Therefore, to lower RCS pressure with, Pressure Controller 455K in automatic the operator would lower the setpoint of the controller or to lower RCS pressure with Pressure Controller 455K in manual the operator would adjust the output of the controller to actuate the spray valves.

When pressurizer pressure is reduced to a value less than 1940 psig an interlock is made-up that allows the operator to BLOCK the Low Pressurizer Pressure Safety Injection. This action is manually performed by the operator at 1900 psig (procedurally), but cannot be performed until the RCS pressure is reduced to less than 1940 psig.

Procedure 2-POP-3.3, PLANT COOLDOWN – HOT TO COLD SHUTDOWN

Step 4.2.7 states WHEN RCS temperature is approximately 530 °F, THEN DEPRESSURIZE RCS to approximately 1900 psig by slowly REDUCING Pressurizer Pressure Controller 455K auto setpoint to approximately 25 percent or using manual control as directed by CRS

Step 4.2.8 states WHEN PZR pressure is below 1940 psig, THEN manually BLOCK Low Pressurizer Pressure Safety Injection (Switches located on CCR Panel SBF-2):

Step 4.2.10 states WHEN RCS pressure is approximately 1750 PSIG, THEN TRANSFER PZR Pressure Control to MANUAL using one of the following:

> PLACE Pressurizer Pressure Master Pressure Controller 455K to manual.
>
> PLACE both spray valve controllers in Manual.

The question stem states:

> Unit 2 is cooling down and depressurizing the RCS at the start of a refueling outage. During the process of lowering pressure from NOP to 900 psig, the following actions are performed. Which of the following lists the proper sequence of actions during RCS depressurization?

The first sentence of stem provides the framework for why the plant is performing the depressurization. The depressurization is for normal plant operations (vs. abnormal or emergency operations). The second sentence in the stem provides the interval of the depressurization to be analyzed. The interval to be evaluated is from the start of depressurization (2235 psig) to 900 psig in the reactor coolant system. The second sentence also uses the term "process of lowering pressure." This led the candidates to look at this question in two different ways. The first case being what process actions

would be needed to lower RCS pressure from NOP to 900 psig from the listed actions and in what sequence. The second case being that pressure is already lowering and based on pressure lowering chose in what sequence the actions provided would occur.

Case 1

If the candidate believed the question was asking for what process actions would support lowering RCS pressure from NOP to 900 psig, then some manipulation of Pressure Controller 455K would have to be performed to cause RCS pressure to begin lowering. Since the operator cannot BLOCK Low Pressurizer Pressure Safety Injection until the RCS pressure is less than 1940 psig by interlock, and 1900 psig by procedure, this action (action 3) would have to occur after the action to initiate the pressure reduction. The only action (action 2) that was provided for the operator to begin lowering RCS pressure was to place Pressure Controller 455K in manual. This action would have to occur first. This manipulation of Pressure Controller 455K (placing in manual) is allowed by step 4.2.7 of procedure 2-POP-3.3, PLANT COOLDOWN – HOT TO COLD SHUTDOWN. The candidate would select sequence 2, 3, 4, 1, and answer A as the correct answer to the question.

Case 2

If the candidate believed the question was strictly asking for sequence of actions based on RCS pressure already lowering (depressurizing), then no action to manipulate Pressure Controller 455K to initiate the RCS pressure reduction would be required. The candidate would then select sequence 3, 2, 4, 1, and answer B as the correct answer to the question.

The Explanation/Justification for question 35 stated that answer A was incorrect but plausible. It is plausible (and would work) that manual control would be used to lower pressure, but that is not what the procedure specifies. Procedure 2-POP-3.3 Step 4.2.7 allows either auto or manual operation of Pressure Controller 455K at the direction of the CRS. The procedure does not specify one option over the other.

IPEC supports accepting both answers A and B as correct answers to Question 35.

Question 35 was a common question. 8 of the candidates selected answer A and 1 of the candidates selected answer B.

Reference:

2-POP-3.3 Rev. 75 Page 18 of 90

QUESTION

Q 86

A large break loss of coolant accident (LBLOCA) occurs. All equipment is available at the start of the event and functions as designed. In responding to this event, which of the following pumps could be secured first, and what is the procedural guidance for this action?

A. 21 RHR Pump in E-0, Reactor Trip or Safety Injection.

B. 22 Charging Pump prior to manipulating Recirc Switches in ES-1.3, Transfer to Cold Leg Recirculation.

C. 22 SI Pump from Recirc Switch 1 in ES-1.3, Transfer to Cold Leg Recirculation.

D. 21 and 22 RHR Pumps from Recirc Switch 3 Switches in ES-1.3, Transfer to Cold Leg Recirculation.

ANSWER

Answer: B

Explanation/Justification:

A. Incorrect. Plausible because for most accident conditions (not including LBLOCA) an RHR pump is secured first to prevent "Strong Pump - Weak Pump" interaction.

B. Correct. This action is performed to reduce loads on the 480V buses prior to transferring to recirculation.

C. Incorrect. Plausible because 22 SIP is secured first when Recirc Switch 1 is placed to ON; however, this action is performed after the charging pump is secured.

D. Incorrect. Plausible because 21 and 22 RHR Pumps are secured using Recirc Switch 3; however, this action is performed after the charging pump is secured. Note: Recirc Switch 1 and 3 are placed to on in the same step.

REFERENCE

Procedure 2-ES-1.3, Transfer to Cold Leg Recirculation

Facility Position:

The question stem states that a large break loss of coolant accident (LBLOCA) occurs. All equipment is available at the start of the event and functions as designed. The question stem then asks the candidates to determine two things: 1) which pumps could be secured first, and 2) what is the procedural guidance for this action [securing the pumps]?

To answer this question, the candidates need to analyze the procedural actions that would be performed in responding to the LBLOCA up to the point of operating Recirc Switches 1 and 3. The procedural flow path would be 2-E-0, REACTOR TRIP OR SAFETY INJECTION, then to 2-E-1, LOSS OF REACTOR OR SECONDARY COOLANT, and then to procedure 2-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

IPEC disagrees with the answer key that Answer B (22 Charging Pump prior to manipulating Recirc Switches in ES-1.3, Transfer to Cold Leg Recirculation) is the correct answer. Although the charging pump could be secured first, it would be secured in 2-E-1, prior to entering 2-ES-1.3 for the following reasons:

- Page 9 of 2-E-1 contains a CAUTION that states "If RWST level decreases to less than 15 ft. charging pumps that are started or running should be monitored for loss of suction which may result in pump damage." In the IPEC Unit 2 Simulator the candidates have observed that charging flow begins decreasing when RWST level lowers to 12 ft, with charging flow significantly reduced by the time that RWST level reaches 11 ft. The operators have been trained to secure the charging pumps when they observe charging pump flow decreasing due to loss of suction. During initial charging pump operation starting in 2-E-0, the charging pump is placed in service at maximum speed with charging flow at approximately 65 gpm. Data taken during LBLOCA in the Unit 2 simulator supports that charging pump discharge flow drops significantly (see attached). When RWST level reaches approximately 12.7', flow is observed to begin lowering with the charging pump still at maximum speed. At approximately 10' in the RWST, flow has lowered to 9 gpm. Operators are trained to secure a piece of running equipment when its suction source is lost.
- Answer B does not correctly identify the procedural guidance for securing the charging pump. Although Step 4 of 2-ES-1.3 stops all charging pumps to reduce 480V bus loads, the charging pumps would already be secured in 2-E-1 when RWST level lowered to less than 12 ft but prior to transitioning to 2-ES-1.3 at 9.24 ft.

IPEC agrees that Answer A is incorrect. The first procedure to be performed would be 2-E-0, REACTOR TRIP OR SAFETY INJECTION. Step 8 on page 8 determines whether one RHR pump should be secured to prevent "Strong Pump – Weak Pump" interaction. For a LBLOCA RCS pressure would be low enough that RHR pump flow would be indicated and an RHR pump would NOT be secured.

IPEC believes Answer C is the only correct answer. Both actions in Answers C and D are performed by the operators in 2-ES-1.3 to secure pumps. Step 6 directs the operators to place Safety Injection Recirc Switches 1 and 3 to ON. These actions are

not permitted to be performed at the same time. Procedural guidance for when two handed operations (using two hands to perform a manipulation) is allowed is contained in Entergy Nuclear Procedure, EN-OP-115, Conduct of Operations. This guidance is very restrictive and specific. Manipulation of the Safety Injection System Recirc Switches is not listed in the IPEC plant specific addendum as a two handed operation. Based on procedure adherence and training the operator performs the actions in the order in which they are given. Procedurally the first switch the operators manipulate would be Recirc Switch 1, which secures 22 SI pump. Answer C has both the pump and procedure correct. IPEC recommends changing the correct answer to Question 86 from B to C.

IPEC agrees Answer D is incorrect because placing Recirc Switch 3 to On is the second action in the step's order and would not be performed first.

Question 86 was an SRO only question. All 4 of the candidates selected answer C.

References:

2-E-0	Rev.3	Page 8 of 35
2-E-0	Rev.3	Page 24 of 35
2-E-1	Rev.2	Page 9 of 21
2-ES-1.3	Rev. 4	Page 5 of 34
EN-OP-115	Rev. 9	Pages 42 and 91 of 120
2-E-1 Background	Rev. 0	Page 56

Attached Graphs:

- Unit 2 Simulator PICS – RWST Level and Charging Flow vs. Time
- Unit 2 Simulator PICS – Charging Flow vs. Time
- Unit 2 Simulator PICS – RWST Level vs. Time
- Unit 2 Simulator Parameter Charts
  - RWST Level (LT920) vs. Time
  - Charging Flow (FT128) vs. Time
  - SI Flow to RCS Loop 21 (FT924) vs. Time
  - SI Flow to RCS Loop 23 (FT925) vs. Time
  - SI Flow to RCS Loop 24 (FT926) vs. Time
  - SI Flow to RCS Loop 22 (FT927) vs. Time
  - RCS Wide Range Pressure (PT402) vs. Time
  - RCS Wide Range Pressure (PT403) vs. Time
  - Charging Flow (FT128) vs. RWST Level (LT920)

Q 28

INPUT DEVICE:	FIC-613	21 RCP
	FIC-616	22 RCP
	FIC-619	23 RCP
	FIC-622	24 RCP
SETPOINT:	155 gpm	

1-4, 2-4, 3-4, 4-4

2X RCP
BEARING
COOLANT
LOW FLOW
155 GPM

1.0 CAUSES

1.1 Inadequate CCW flow to Reactor Coolant PUMP (RCP) bearing coolers.

2.0 AUTOMATIC ACTIONS

None

3.0 SUBSEQUENT ACTIONS

3.1 CHECK RCP motor bearings temperatures.

3.1.1 IF bearing temperature is above 200°F:

3.1.1.1 TRIP Reactor.

3.1.1.2 TRIP affected RCP.

3.1.1.3 GO TO E-0, Reactor Trip or Safety Injection.

3.2 IF RCP motor bearing temperature is abnormal, but less than 200°F, THEN :

3.2.1 CHECK local containment RCP bearings cooling water flowmeters and ADJUST to normal, per Attachment (CCW EQUIPMENT FLOW (GPM)) in 2-SOP-4.1.2, Component Cooling System Operation.

3.2.2 IF temperature is high due to loss of CCW, THEN GO TO 2-AOP-CCW-1, Loss of Component Cooling Water.

4. SUBSEQUENT ACTIONS

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.1 __ Are any CCW pumps operating?	__ Start an available CCW pump.
4.2 Do any of the following conditions exist? __ System leak __ Low system flow/pressure __ High system temperature	__ **RETURN** to procedure and step in effect.
4.3 __ **IAAT** either of the following conditions exist: __ CCW flow to any RCP is lost, for ≥ 2 minutes __ RCP motor bearing temperature exceeds 200°F **THEN** perform Steps 4.4 - 4.7.	__ **GO TO** Step 4.8.
4.4 __ Is the reactor critical?	__ **GO TO** Step 4.6.
4.5 __ Trip the reactor.	__ **INITIATE** E-0.
4.6 __ Trip affected RCPs.	
4.7 __ **IF** reactor was tripped, **THEN INITIATE** E-0.	
4.8 **GO TO** applicable step based on condition indicated (in order of priority):	

√	CONDITION	STEP
	System leak	4.9
	Low system flow/pressure	4.61
	High system temperature	4.86

Q 35

CRS

4.2.7 WHEN RCS temperature is approximately 530 °F, THEN DEPRESSURIZE RCS to approximately 1900 psig by slowly REDUCING Pressurizer Pressure Controller 455K auto setpoint to approximately 25 percent or using manual control as directed by CRS.

CAUTION

IF PZR pressure subsequently increases to greater than 1940 psig, THEN the following step SHALL be repeated.

4.2.8 WHEN PZR pressure is below 1940 psig, THEN manually BLOCK Low Pressurizer Pressue Safety Injection (Switches located on CCR Panel SBF-2):

- Safety Injection Block Train A is blocked
- Safety Injection Block Train B is blocked

4.2.9 CONTINUE RCS depressurization to 1750 psig by slowly **reducing** Pressurizer Pressure Controller 455K Auto setpoint to approximately 7 percent or using manual control as directed by CRS.

4.2.10 WHEN RCS pressure is approximately 1750 PSIG, THEN TRANSFER PZR Pressure Control to MANUAL using one of the following:

- PLACE Pressurizer Pressure Master Pressure Controller 455K to MANUAL
- PLACE both spray valve controllers in MANUAL
  - PCV-455A Pressurizer Spray Valve Loop 24
  - PCV-455B Pressurizer Spray Valve Loop 23

Q 35

2.10 ***Instrumentation***:

2.10.1 The following instrumentation SHALL be used for RCS temperature and rate of change monitoring:

- WHEN T_{AVE} greater than 540 °F, THEN T_{AVE} indication SHALL be used.
- WHEN T_{AVE} is less than or equal to 540 °F, and at least one RCP is running, THEN the average of ALL operable wide range cold leg temperature indications on Panel FDF SHALL be used.
- WHEN RHR is in service and **NO** RCPs are running, THEN average of the five highest Core Exit Temperatures from Channel A or B plasma display on Accident Assessment Panel SHALL be used.
- WHEN RHR is in service, **NO** RCPs are running and Core Exit Thermocouples are **NOT** available, THEN RHR heat exchanger inlet temperature of TR-636 or 22 Hot Leg RTD TE-422A (per 2-SOP-4.2.1, Residual Heat Removal System Operation, Attachment) may be used.

2.10.2 The following instrumentation SHALL be used for RCS pressure indication:

RCS Pressure > 1700 psig

- Pressurizer Pressure Narrow Range channels (FBF)

RCS Pressure > 1500 psig <1700 psig

- 24 Hot Leg Pressure Recorder (PT 403, Panel FDF)
- 21 Hot Leg Pressure Recorder (PT 402, Panel SFF)

RCS Pressure < 1500 psig

- OPS Pressure Indicators(s) PI 413K, PI 433K or PI 443K

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

ATTACHMENT 1 (Attachment page 1 of 10)
AUTOMATIC ACTION VERIFICATION

NOTE

This attachment should be terminated upon CRS transition to 2-ECA-0.0, LOSS OF ALL AC POWER

1.	Verify Proper Charging System Operation:	
	a) CHECK Containment Condition - ADVERSE	a) Perform the following: 1) IF CCW available, THEN start one charging pump to maintain RCP seal injection and PRZR inventory AND continue with Step 1c. 2) IF CCW NOT available, THEN continue with Step 1b. 3) WHEN Containment Condition is ADVERSE, THEN perform Step 1b.
	b) Start At Least One Charging Pump In MANUAL At Maximum Speed	b) Go to Attachment 1 Step 2.
	c) Align charging pump suction to the RWST 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C 3) Place RCS makeup control switch to STOP	c) Perform the following: o Open emergency boration valve: o MOV-333 o Place both boric acid pumps in high speed mode

Q 8 B

Number:	Title:	Revision Number:
2-E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 1

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If RWST level decreases to less than 15 ft, charging pumps that are started or running should be monitored for loss of suction which may result in pump damage.

10. Check If Charging Flow Has Been Established:

a. Charging pumps - AT LEAST ONE RUNNING

a. Perform the following:

1) IF CCW flow to RCP(s) thermal barrier is lost, THEN isolate seal injection to affected RCP(s) before starting charging pumps:

- o Locally energize AND close seal injection isolation valves:
  - o MOV-250A, MCC 26AA, A2
  - o MOV-250C, MCC 26AA, B2
  - o MOV-250B, MCC 26BB, L3
  - o MOV-250D, MCC 26BB, M3

- OR -

- o Locally close seal injection needle valves (51 ft. el, Piping Penetration Area):
  - o 241A
  - o 241B
  - o 241C
  - o 241D

2) Start charging pump(s) as necessary.

b. Establish charging flow as necessary:

1) Verify speed controller in MANUAL

2) Adjust charging pump speed

Q 86

Number:	Title:	Revision Number:
2-E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 1

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	Check If RCS Cooldown And Depressurization Is Required:	
	a. RCS pressure - GREATER THAN 320 PSIG (350 PSIG FOR ADVERSE CONTAINMENT)	a. IF RHR pump flow greater than 240 gpm (400 gpm FOR ADVERSE CONTAINMENT), THEN go to Step 18.
	b. Go to 2-ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION, Step 1	
18.	Check If Transfer To Cold Leg Recirculation Is Required:	
	a. RWST level - LESS THAN 9.24 FT	a. Return to Step 16.
	b. Go to 2-ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1 unless previously performed	
19.	Check If SI Accumulators Should Be Isolated:	
	a. At least two RCS hot leg temperatures - LESS THAN 400°F	a. Continue with Step 20. WHEN at least two RCS hot leg temperatures less than 400°F THEN do steps 19b through 19d.
	b. Locally restore power to isolation valves: o 894A (MCC 26A) o 894C (MCC 26A) o 894B (MCC 26B) o 894D (MCC 26B)	

This Step continued on the next page.

Q86

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Any pumps taking suction from RWST should be stopped if RWST level decreases to:

- 3.0 ft for SI, RHR and charging pumps.
- 2.0 ft for containment spray pumps.

4. Reduce 480V Bus Loads:

   a. Stop all charging pumps ✓

   b. Turn off all PRZR heaters

5. One At A Time, Depress Containment Spray Reset Pushbuttons:

   - Spray SYS Reset Train A
   - Spray SYS Reset Train B

6. Place Safety Injection Recirc Switches 1 AND 3 To ON:

a. Check 22 SI pump - STOPPED ✓	a. IF three SI pumps running, THEN stop 22 SI pump.
b. Check 21 containment spray pump - STOPPED	b. IF both pumps running, THEN place 21 containment spray pump in PULLOUT.
c. Check RHR pumps - BOTH STOPPED	c. Manually trip BOTH RHR pumps.

Q 86

STEP DESCRIPTION TABLE FOR 2-E-1 STEP 10 CAUTION 1

CAUTION: If RWST level decreases to less than 15 ft, charging pumps that are started or running should be monitored for loss of suction which may result in pump damage.

PURPOSE: To remind the operator of potential loss of suction flow to the charging pump

BASIS:

A section of the charging pump suction piping is at an elevation corresponding to 15 ft above the bottom of the RWST. If RWST level decreases to less than 15 ft, a vacuum will be drawn in that section of piping until the vacuum is sufficient to allow flow from the RWST over the high point to the charging pump suction. This may cause a decrease or loss of charging pump suction pressure. Charging flow should be monitored when RWST level approaches 15 ft.

ACTIONS:

- Monitor RWST level
- Monitor charging flow

INSTRUMENTATION:

- RWST level indication
- Charging flow indication

CONTROL/EQUIPMENT:

N/A

KNOWLEDGE:

N/A

Q 86

Section 3

Acceptable Two-Handed Operations

Acceptable two-handed activities are as follows:

- Inserting control rods while initiating emergency boration per FR-S.1, Response To Nuclear Power Generation/ATWS
- Controlling RCS pressure using RHR Loop Bypass To Demin Flow Controller AND Letdown PCV while the RCS is solid
- Synchronizing and loading a Diesel Generator
- Operating SG Atmospherics and AFRVs in EOPs
- Operating permissives on a startup
- Initiating or resetting SI, Phase A / B, or VC Ventilation isolation
- Opening MBFP steam stop valves
- Turbine Stop and Control valve testing
- Operation of the Ingersoll-Rand Diesel Air Compressor Bypass, Start, and Ether Injection pushbuttons

Q 86

5.13 EQUIPMENT MANIPULATION AND STATUS CONTROL

[1] The status of plant equipment is known at all times.

[2] All equipment manipulations are performed by qualified personnel in accordance with procedures and/or approved by shift supervision.

[3] The control of plant equipment status is governed by procedures, work orders or tagging. These processes contain specific direction relative to status control - see Attachment 9.5 Equipment Status Control Flow Chart

[4] For situations where no procedural guidance exists for operation of a specific component, and a component is required to be placed in a position differing from its normal alignment, the realignment must be performed in accordance with approved plant specific processes. Component status should be tracked prior to manipulation unless time does not permit logging the component prior to operation.

[5] Whenever an activity or evolution is interrupted, the affected equipment should be placed in a stable condition as soon as practicable.

[6] Self-Checking must be used for manipulating plant components that have the potential to impact the physical plant. Procedure "in hand" use during self-checking is expected for normal operating activities that require procedures. Refer to Plant Specific Addendum – Section 2 Routine Tasks that may be performed without a procedure

[7] Do not manipulate plant equipment using two-handed operation for convenience or unnecessary haste. Refer to Plant Specific Addendum – Section 3 Two-Handed Operation for manipulations that are permitted using two-handed operation.

[8] To minimize the risk of component misoperation, operations personnel will ensure the component is labeled properly.

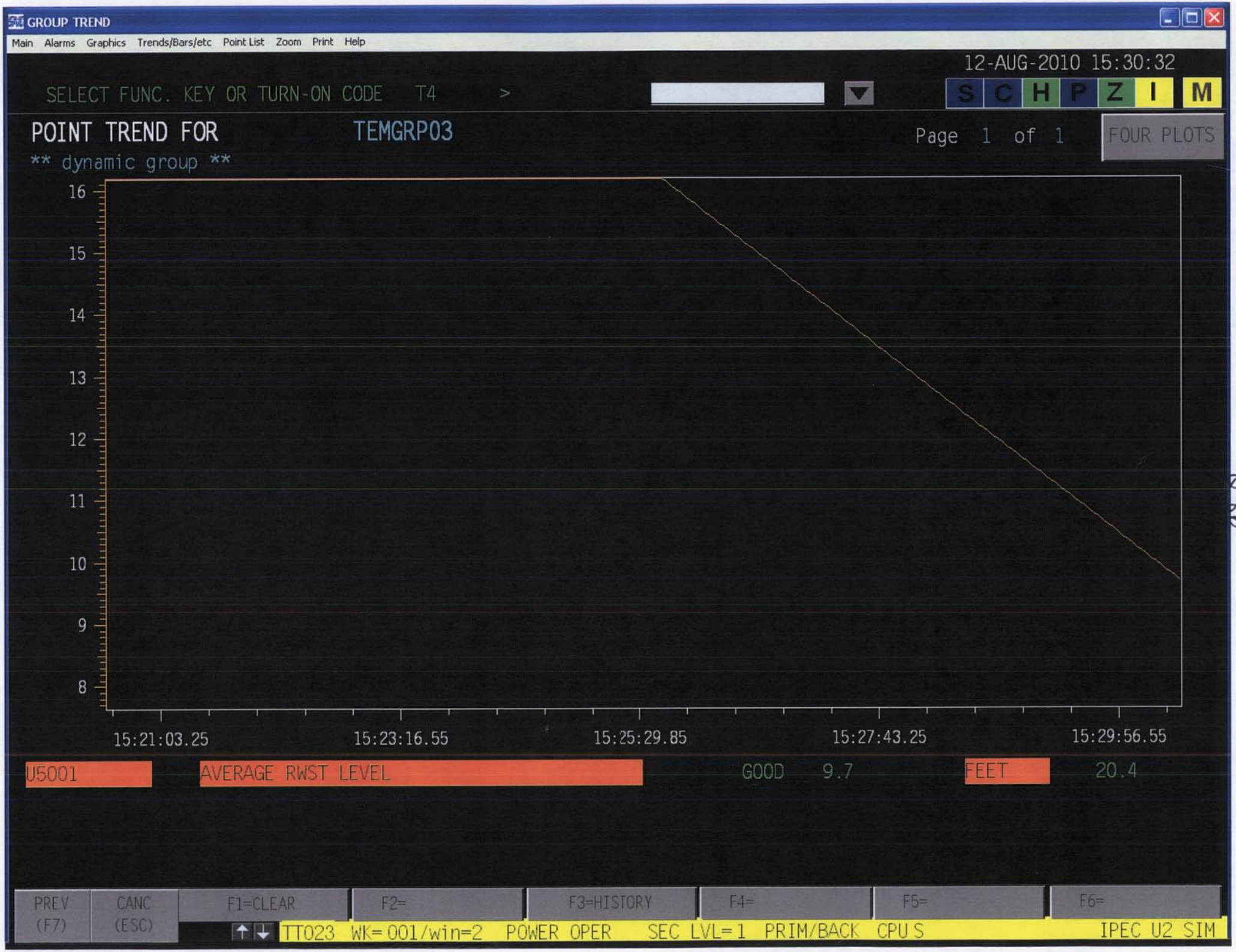
(a) Improperly labeled components should not be operated without first positively verifying proper component, installing a temporary label or initiating a label request, and obtaining permission from shift management.

[9] Notify appropriate department and/or watchstander prior to changing equipment status that will affect their area of responsibility.

[10] Make plant announcements before changing the status of any major equipment.

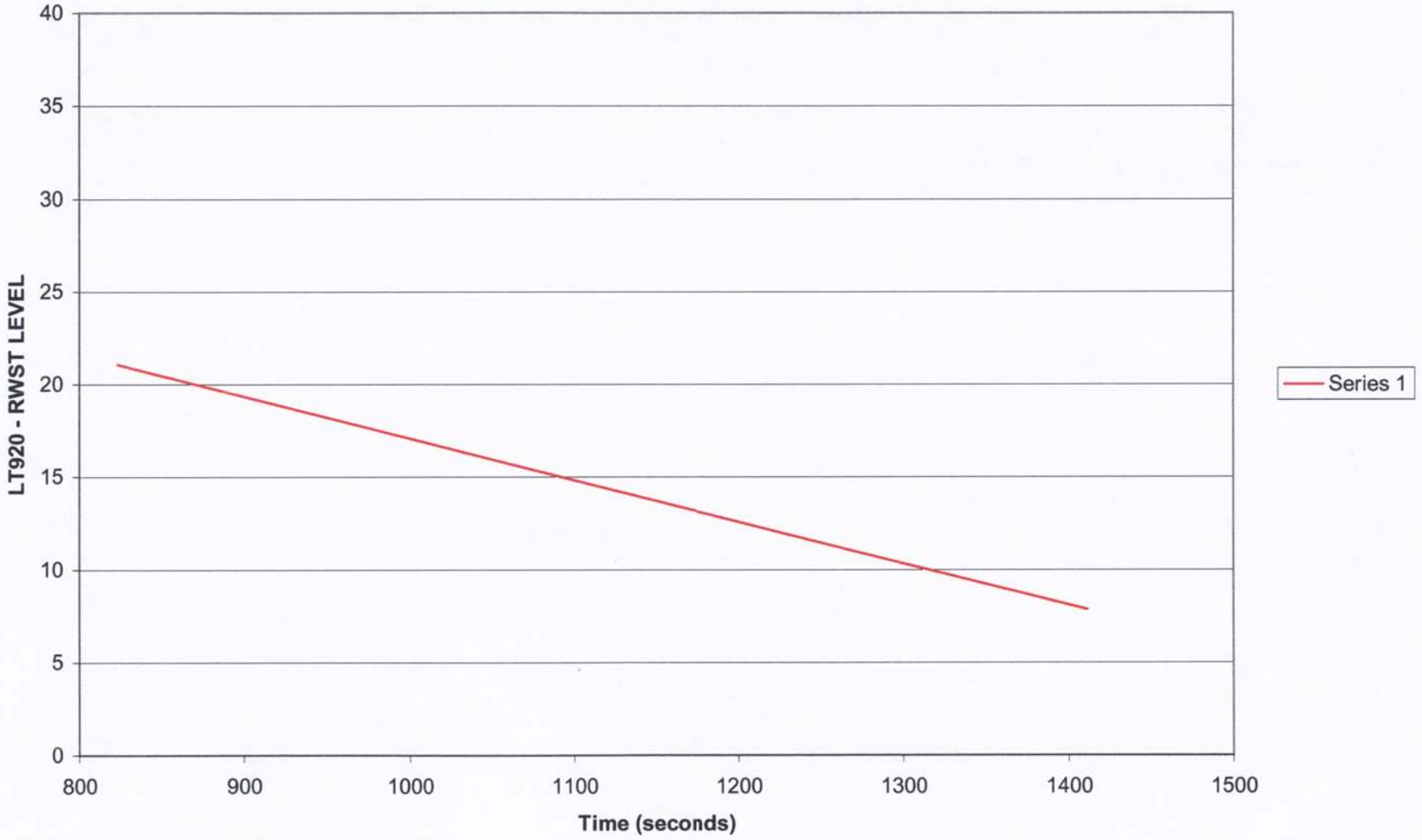

GROUP TREND
Main Alarms Graphics Trends/Bars/etc Point List Zoom Print Help
12-AUG-2010 15:30:36
SELECT FUNC. KEY OR TURN-ON CODE T4 >
S C H P Z I M
POINT TREND FOR TEMGRP02
Page 1 of 1
FOUR PLOTS
** dynamic group **
80 70 60 50 40 30 20 10 0
15:21:04.15
15:23:17.45
15:25:30.85
15:27:44.15
15:29:57.45
FT128-A CHARGING FLOW (TIME FILT) GOOD 9 GPM 66
FT128-A CHARGING FLOW (TIME FILT) GOOD 9 GPM 66
PREV (F7)
CANC (ESC)
F1=CLEAR
F2=
F3=HISTORY
F4=
F5=
F6=
TT026 WK= 001/win=1 POWER OPER SEC LVL=1 PRIM/BACK CPU S
IPEC U2 SIM


GROUP TREND
Main Alarms Graphics Trends/Bars/etc Point List Zoom Print Help
12-AUG-2010 15:30:26
SELECT FUNC. KEY OR TURN-ON CODE T4 >
S C H P Z I M
POINT TREND FOR
Page 1 of 1
FOUR PLOTS
** dynamic group **
120 110 100 90 80 70 60 50 40 30 20 10 0
40 35 30 25 20 15 10 5 0
15:22:29.18
15:24:42.48
15:26:55.78
15:29:09.08
U5001 AVERAGE RWST LEVEL GOOD 9.8 FEET 22.0
FT128-A CHARGING FLOW (TIME FILT) GOOD 9 GPM 66
PREV (F7)
CANC (ESC)
F1=CLEAR
F2=
F3=HISTORY
F4=
F5=
F6=
TT029 WK=004/win=3 POWER OPER SEC LVL=1 PRIM/BACK CPU S
IPEC U2 SIM


GROUP TREND
Main Alarms Graphics Trends/Bars/etc Point List Zoom Print Help
12-AUG-2010 15:30:32
SELECT FUNC. KEY OR TURN-ON CODE T4 >
S C H P Z I M
POINT TREND FOR TEMGRP03
Page 1 of 1
FOUR PLOTS
** dynamic group **
16
15
14
13
12
11
10
9
8
15:21:03.25
15:23:16.55
15:25:29.85
15:27:43.25
15:29:56.55
U5001
AVERAGE RWST LEVEL
GOOD 9.7
FEET
20.4
PREV (F7)
CANC (ESC)
F1=CLEAR
F2=
F3=HISTORY
F4=
F5=
F6=
TT023 WK=001/win=2 POWER OPER SEC LVL=1 PRIM/BACK CPU S
IPEC U2 SIM

Q 86

nrc post exam data - Thu Aug 12 15:58:22 2010



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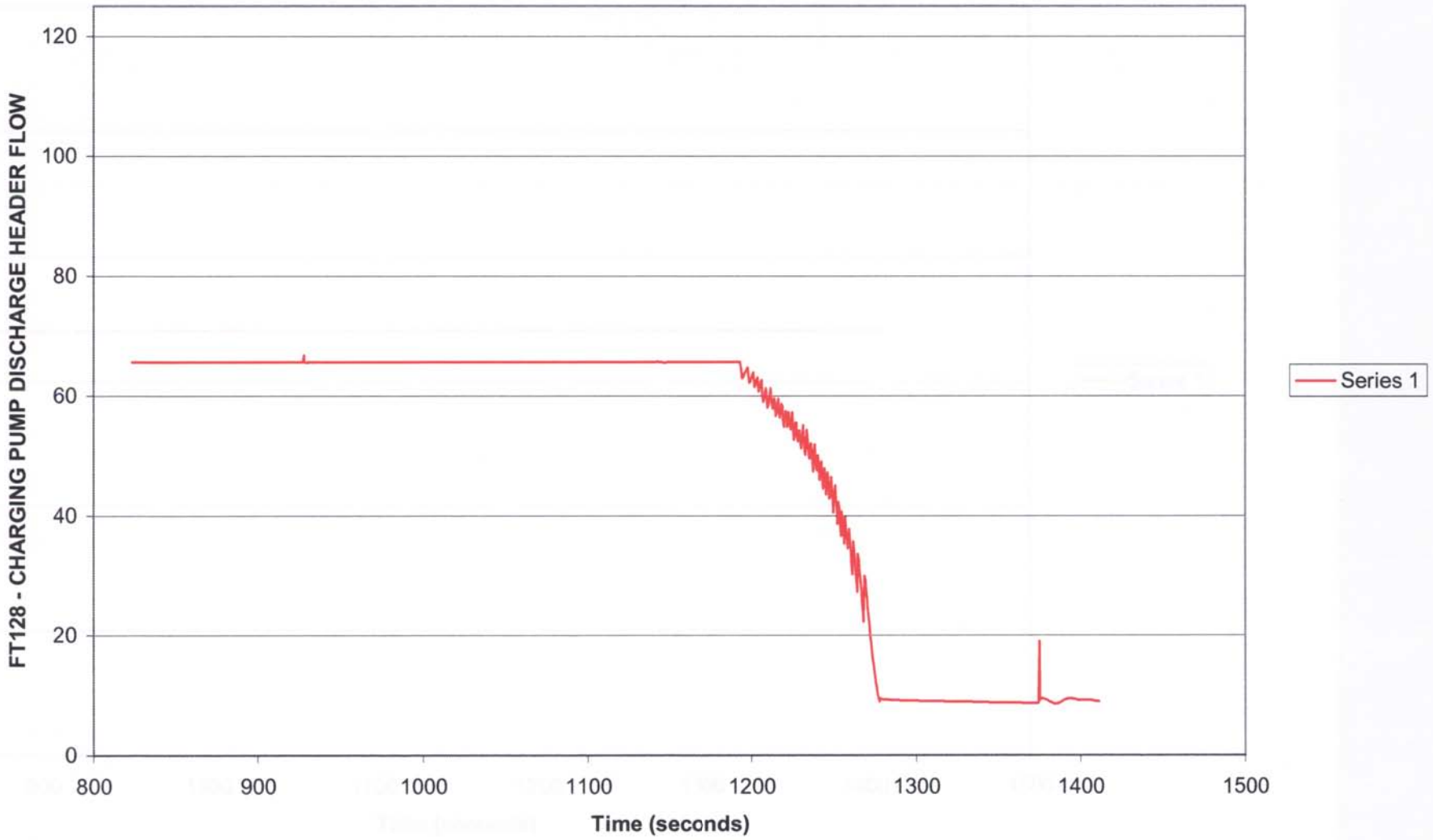
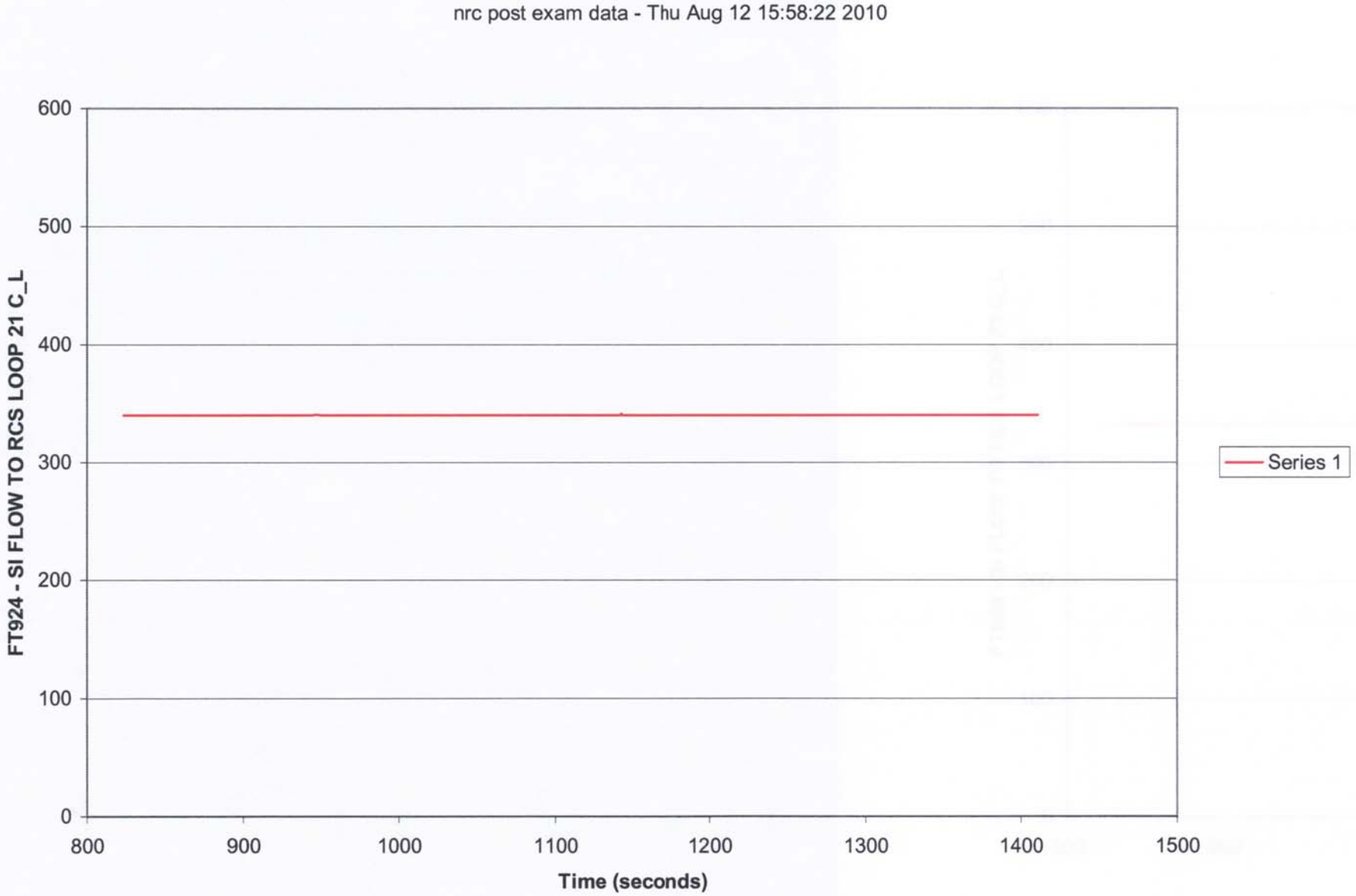
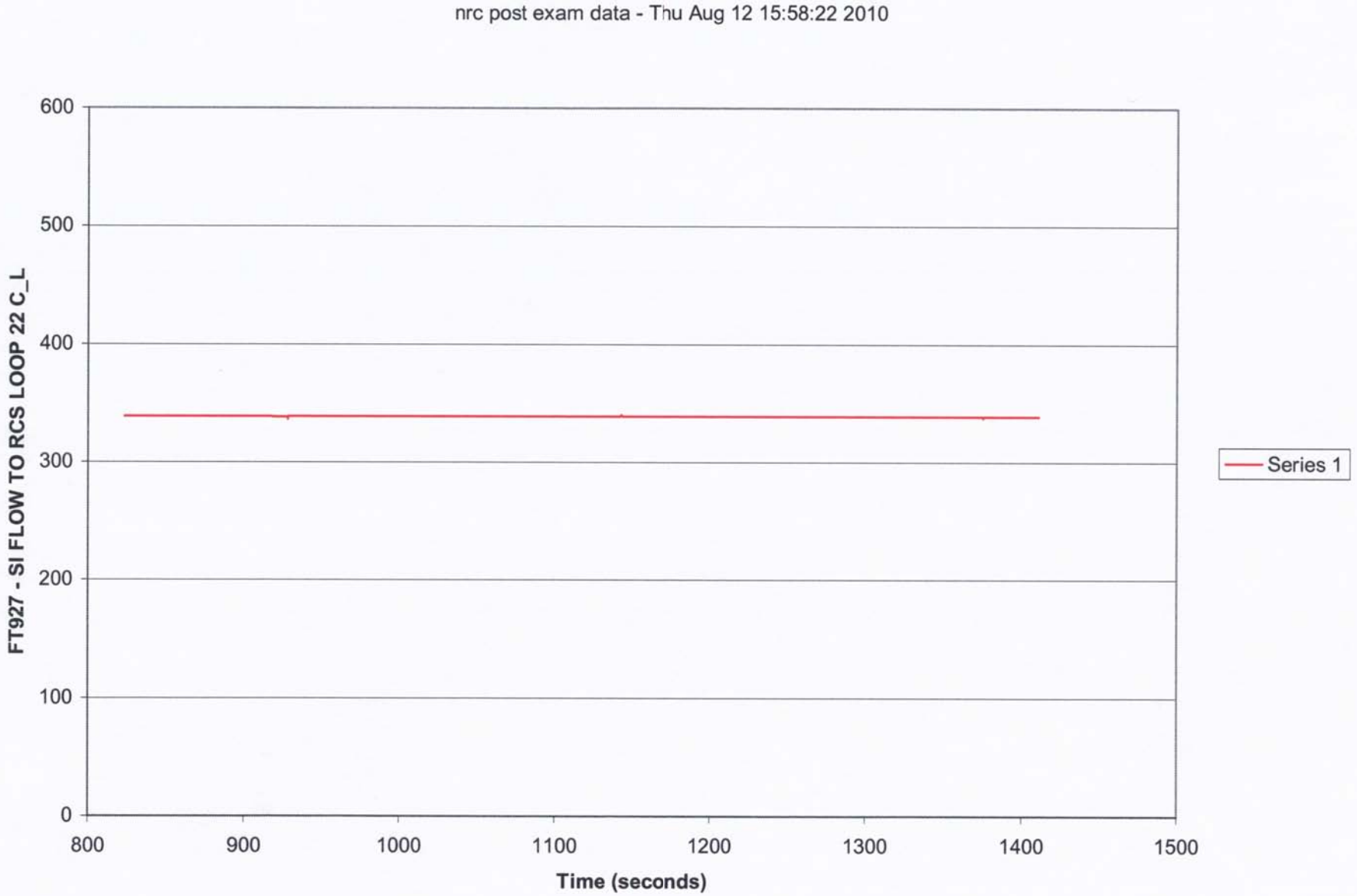



nrc post exam data - Thu Aug 12 15:58:22 2010
FT924 - SI FLOW TO RCS LOOP 21 C_L
600
500
400
300
200
100
0
800
900
1000
1100
1200
1300
1400
1500
Time (seconds)
Series 1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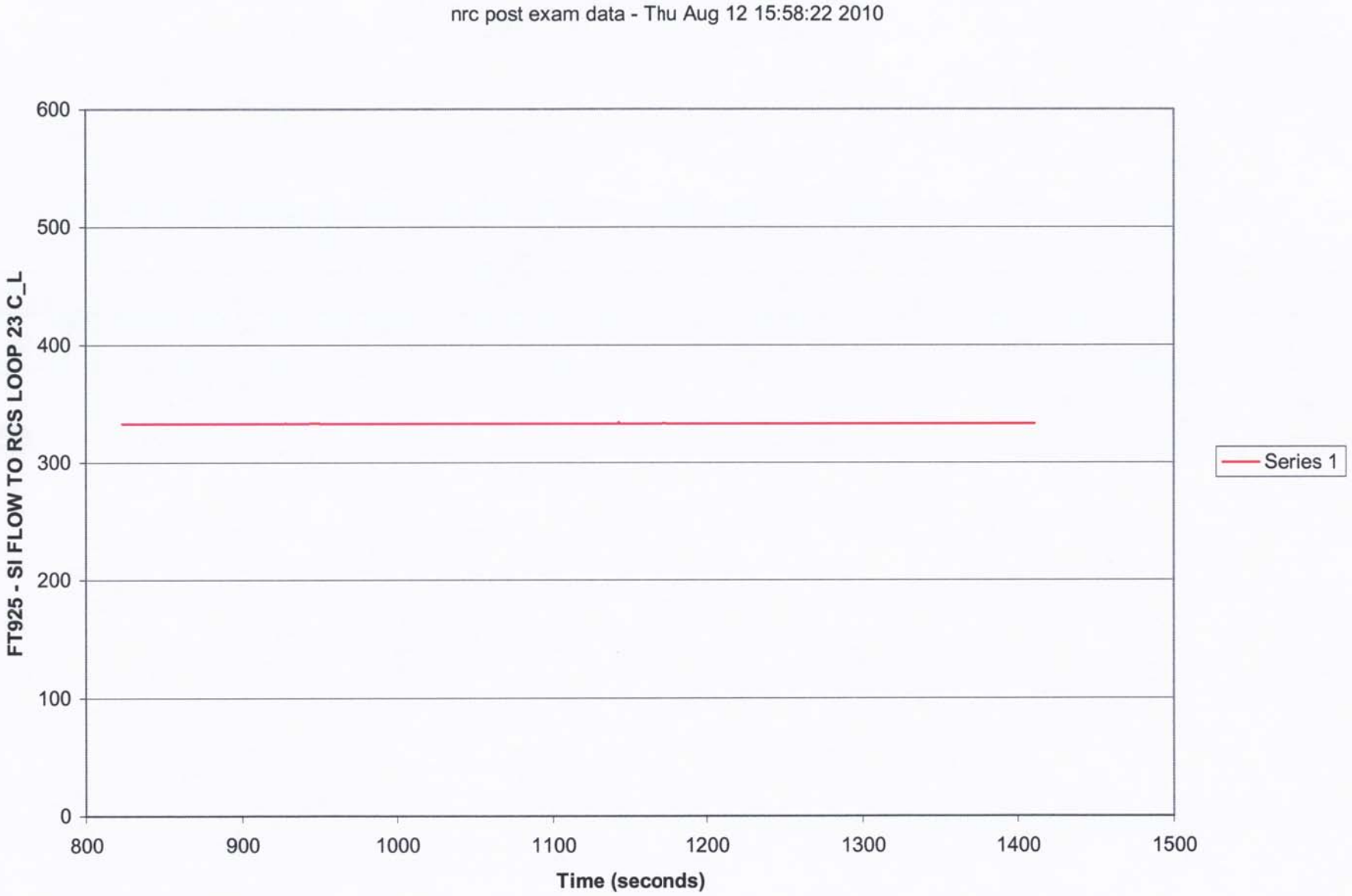
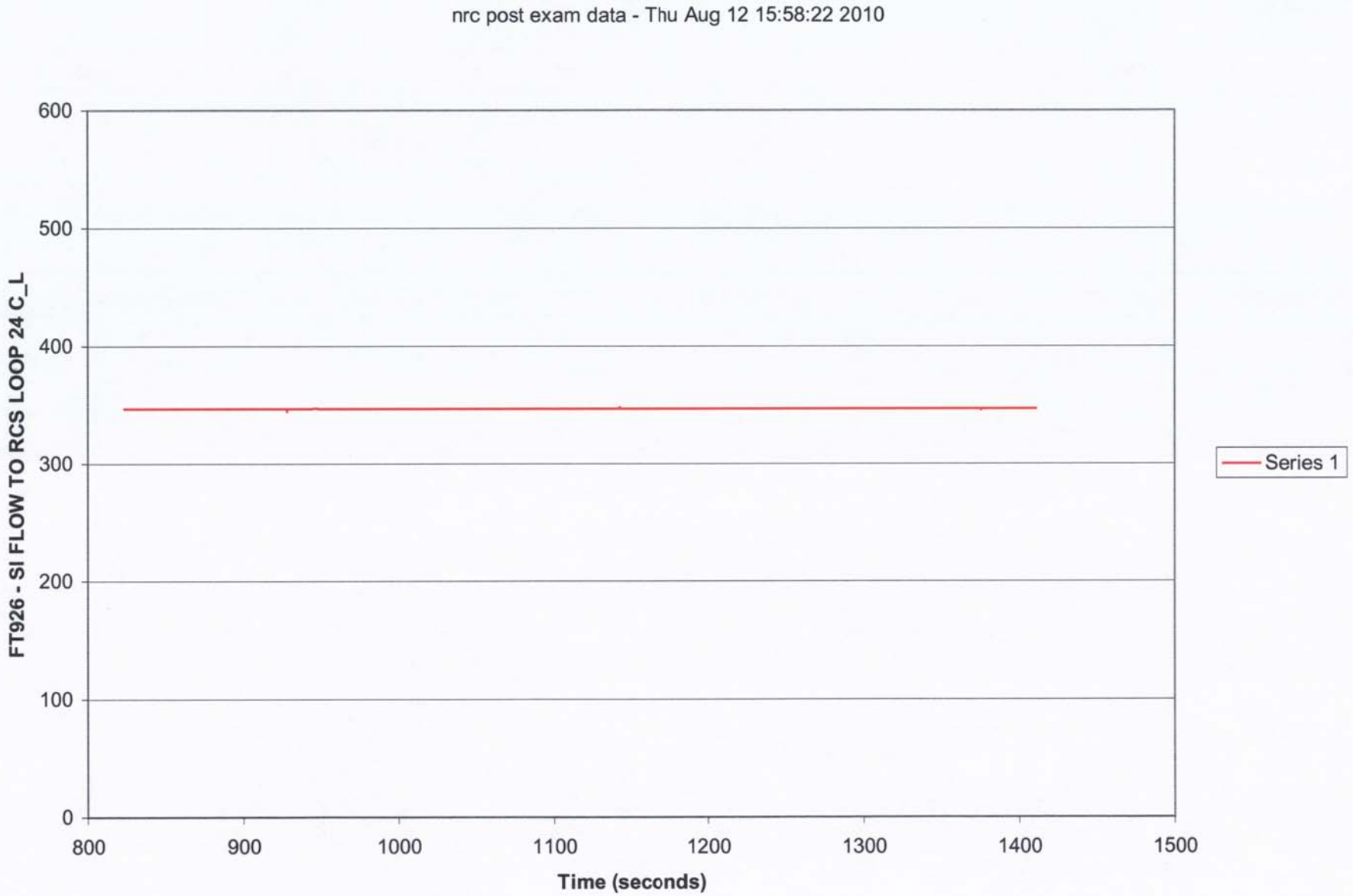
600
500
400
300
200
100
0
FT927 - SI FLOW TO RCS LOOP 22 C_L
800
900
1000
1100
1200
1300
1400
1500
Time (seconds)
Series 1


nrc post exam data - Thu Aug 12 15:58:22 2010
600
500
400
300
200
100
0
FT925 - SI FLOW TO RCS LOOP 23 C_L
800
900
1000
1100
1200
1300
1400
1500
Time (seconds)
Series 1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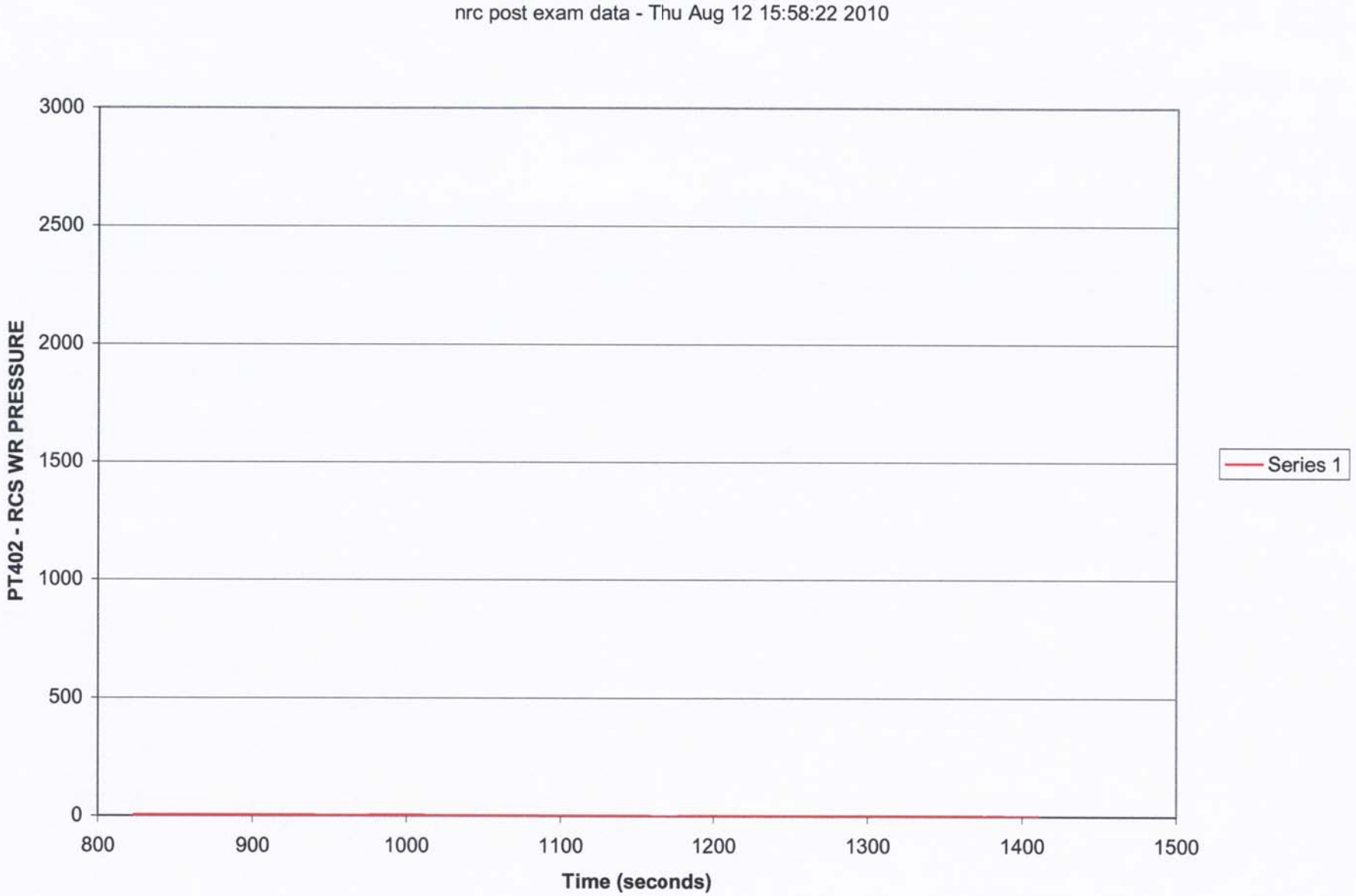
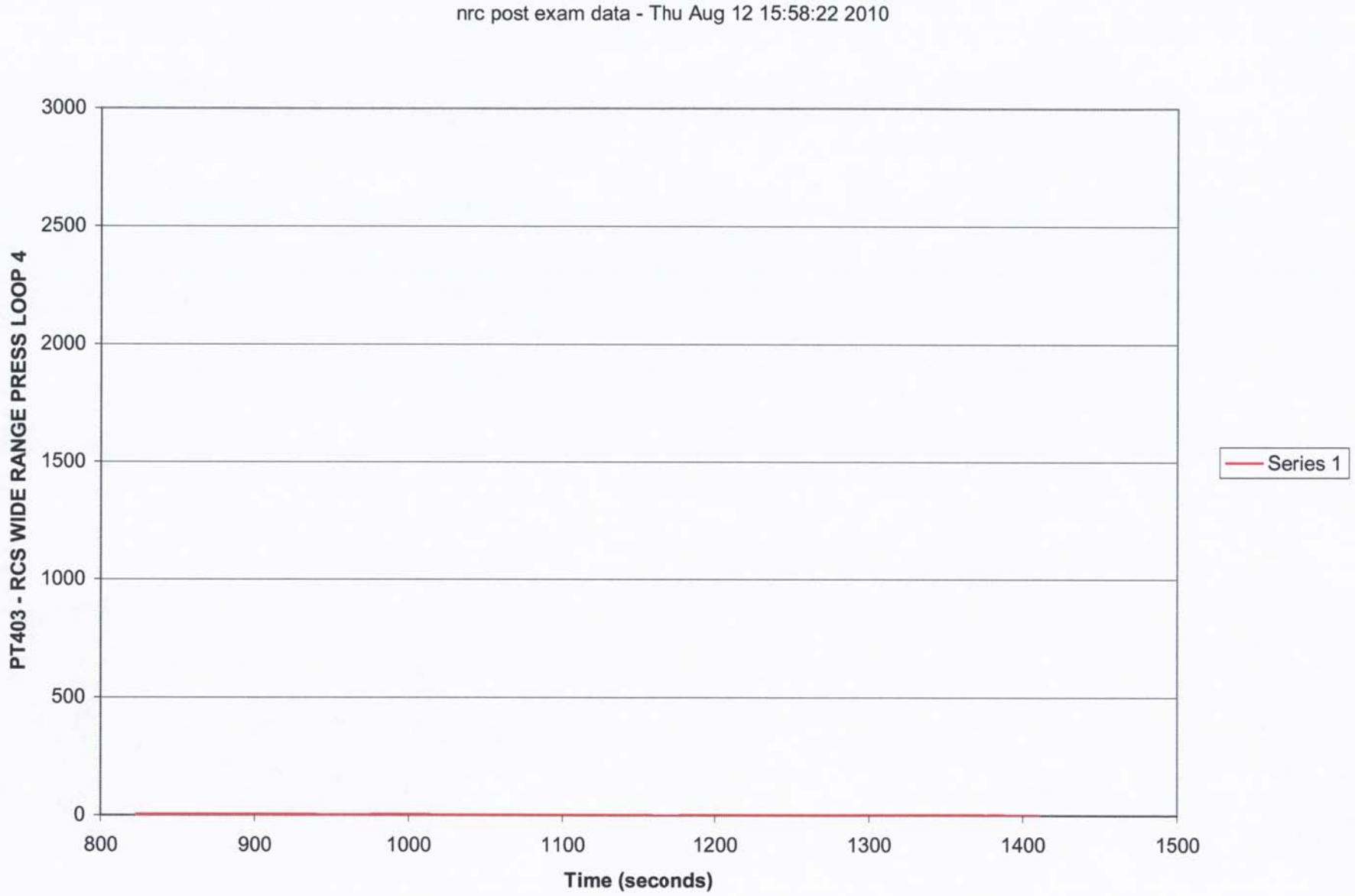
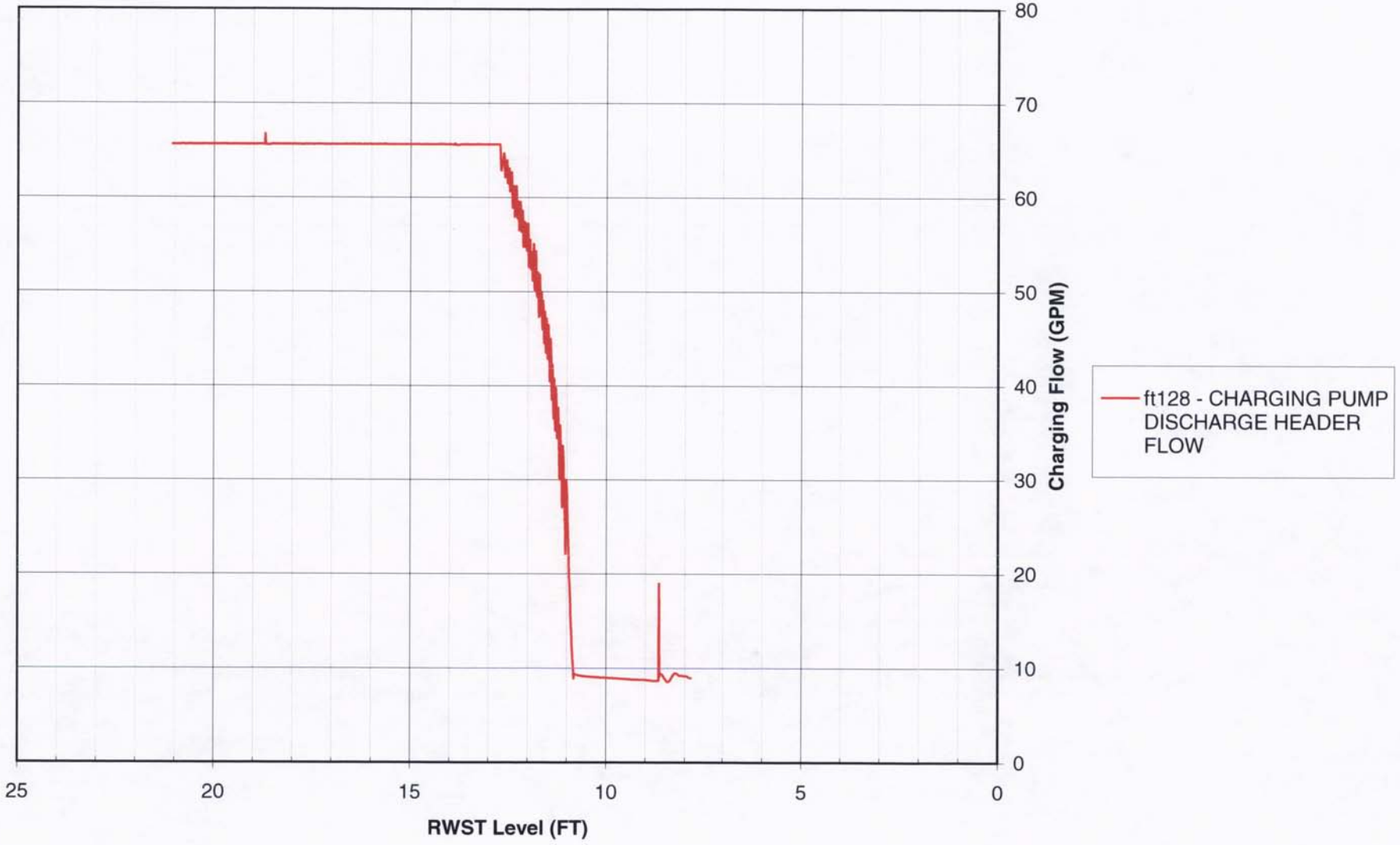
600
500
400
300
200
100
0
FT926 - SI FLOW TO RCS LOOP 24 C_L
800
900
1000
1100
1200
1300
1400
1500
Time (seconds)
Series 1


nrc post exam data - Thu Aug 12 15:58:22 2010
PT402 - RCS WR PRESSURE
3000
2500
2000
1500
1000
500
0
800
900
1000
1100
1200
1300
1400
1500
Time (seconds)
Series 1


nrc post exam data - Thu Aug 12 15:58:22 2010
PT403 - RCS WIDE RANGE PRESS LOOP 4
3000
2500
2000
1500
1000
500
0
800
900
1000
1100
1200
1300
1400
1500
Time (seconds)
Series 1

ft128 - CHARGING PUMP DISCHARGE HEADER FLOW



Caruso, John

From: Caruso, John
Sent: Friday, August 20, 2010 12:46 PM
To: 'Davis, Stephen V'
Cc: Ferrick, John
Subject: RE: Exam Comments

Steve,

Please call me I have some follow-up questions for you on Q86:

1) Did Ops management endorse your position on Q86?
2) How about the caution in ES-1.3 between steps 2& 3 that talks about securing the charging pump when RWST level gets to 3 ft? This appears to conflict with securing the pumps at 10-12' in E-1?
3) Why haven't the EOPs been revised to indicate the pumps should be secured at 10'- 12' based on the caution in E-1?
4) The caution does not say to secure the pumps just to monitor the pumps and in fact the caution in ES1.3 would appear to contradict the way you are training your operators.
5) How confident are you that the sim modeling is correct for a LBLOCA?

Thanks
John C.

Memo leans towards saying No Correct answer Based on licensee arguments. Tim KoLB is leaning in the direction of accepting 2 correct answer ah + have written it up.

From: Davis, Stephen V [mailto:SDavi14@entergy.com]
Sent: Monday, August 16, 2010 6:56 PM
To: Caruso, John
Subject: Exam Comments

Attached is a copy of our exam comments. We did revise the last question a little more. We provided some simulator graphs, both from the simulator data and the simulator PICS graphs. I have attached the word document. I have attached a PDF version with the graphics. The PICS graphs that were scanned are hard to read, the hard copies you get with exam package are much better. There is a new reference (EN-OP-115) for allowed two handed operation.

As far as the charging pump operation question you brought up, the EOP basis document for the 2-E-1 caution provides the information about the height of the suction piping in relationship to the RWST. I also attached the Caution's EOP basis (single page).

The exam package should get there before 1030.

I will not be in on Tuesday. I can be reached by my cell phone 845-282-6164.

Steve Davis
Supt., Operations Training - ILO
Indian Point Energy Center
(914) 788-2904