NRC Written Exam Results 2011											
Q#	Correct										
1	B										
2	B										
3	A										
4	A										
5	A										
6	D					A					B
7	A	B	B							B	
8	D				A				A		
9	B		A				A				
10	D										
11	B								A	A	
12	B										
13	D										
14	C							A	A	D	
15	C										
16	C	B			B				B		
17	C							B		B	B
18	C			A		A					
19	A										
20	C		B	A	B	B		B			B
21	D										
22	D			A	A		A				A
23	A										B
24	D		C								
25	D										
26	C										
27	C										
28	A										
29	B						C				
30	A			D							
31	C		A	A			D				
32	C		D						D		
33	B		A								
34	B										
35	C						B				B
36	C		D	D	D	D		D		D	
37	D			A			A		A		
38	B										
39	A	B	C			B					
40	B			A	A	A	A				A
41	D										
42	B		C								
43	C			A							
44	C										
45	C							D			
46	C										
47	C	A		A	B	B					A
48	D						B				
49	A								B		
50	C			D		D					A
51	B	D	D	A		D	D	D			A
52	C										
53	D										B
54	D	C		C	C		C	C			C
55	D						C				
56	A										
57	D										
58	D		C		C					C	C
59	D										
60	A					D					D

61	C		B			B		B	B		
62	D								A		
63	D				C						
64	D										
65	B										
66	A										
67	C						D				D
68	D				C	C					
69	C										
70	A		B				B				
71	B			A	C					A	
72	B										
73	D										
74	B										
75	C										
76	A	C				C	C	C	C		
77	B	D						C	D		
78	A										
79	A			D				D	D		
80	A										
81	B		A		C						
82	C										
83	B										
84	A										
86	A										
87	A										
88	D										
89	D	B		A							
90	C										
91	B										
92	C							D			
93	C										
94	A										
95	D										
96	A										
97	B										
98	B										
99	C						A				
100	B										
Total Missed		9	15	16	13	13	15	12	12	7	15
Percent	**Overall**	90%	84%	83%	86%	86%	84%	87%	87%	90%	80%
RO		6	14	14	12	12	13	8	9	7	15
Percent	**RO**	92%	81%	81%	84%	84%	82%	89%	88%	90%	80%
SRO		3	1	2	1	1	2	4	3		
Percent	**SRO**	87%	95%	91%	95%	95%	91%	83%	87%		

	Avg	**High**	**Low**
Total	85.7%	90.0%	80.0%
RO	85.1%	92.0%	80.0%
SRO	90.50%	95.00%	83.00%

2011 NRC Written Exam Review/ Post-Exam Comments

This review starts with the high-miss questions first and then covers all questions missed. There were nine high-miss questions: 20, 36, 37, 40, 47, 51, 54, 76, and 85. All of these questions were reviewed for validity and K/A match. Of the nine high-miss questions, there are two recommended changes to the exam grading. For Question 37, Answer D should be accepted as the only correct answer based on newly discovered technical information. This question should be repaired as well to clarify the actual requirements being tested. It is recommended that Question 85 be deleted because it has no correct answer. Selecting a proper reactive load will repair the question by providing a correct answer. The other seven questions were found to be valid, although a reference improvement was noted on Question 40, a minor wording change on Question 51, a minor wording change on Question 76, and a construction improvement was noted on Question 88.

At Wolf Creek, a Training Needs Analysis (TNA) request is the starting point of our Systematic Approach to Training. TNAs 2011-1238-1 and 2011-1238-2 were written for SSPS training associated with Question 20. TNA 2011-1239-1 was written for Containment Purge System power supply knowledge associated with Question 36. TNAs 2011-1240-1 and 2011-1240-2 were written for operator alarm response issues to high radiation areas associated with Question 47. TNAs 2011-1241-1 and 2011-1241-2 were written for main and auxiliary feedwater power supplies associated with Question 51. TNA 2011-1242-1 was written for Containment pressure and leakrate differences associated with Question 54. TNA 2011-1243-1 was written for hot leg recirculation lineup without SI pumps associated with Question 76. All TNAs generated during exam reviews will be entered into a single corrective action document once reviews from all parts of the exam are complete to ensure tracking of these items.

There were 51 total questions that at least one applicant picked an incorrect answer. The large number indicates a good spread of plausible distracters. Including these with post-exam debrief comments revealed 64 questions for further review. All of these questions were reviewed for training weakness. All questions missed or commented on have been reviewed with the applicants during a formal written exam debrief on 7 Sept 11.

A total of twelve validators took all or portions of the exam during the 14 revisions of the exam. However, only those taking tests with questions close to the final exam are considered for this review. In the majority of cases, validation improved the quality of the questions.

HIGH MISS

Question 20:

Question 20 is an NRC bank question from Comanche Peak 2009 exam. This question was missed by 6 of 10, with five choosing answer B and one choosing answer A. No questions or comments were provided during the exam administration. Validation results had 3 of 7 people miss with all three selecting the B distracter. All validators commented item was an important knowledge bit that they had missed. No question changes were proposed during validation.

The knowledge required answering this question:

- Train B SSPS has a General Warning in 'test' (Ref ALR 75A/76A).
- Train A experiences a 48V power supply failure, which leaves the train functional but degraded. A loss of any single power supply (48vdc or 15vdc (two each per train)) also produces a General Warning (Ref: ALR 00-075A/76A) for the affected train.

Two trains General Warning alarms directly produce a reactor trip (Ref: EMG E-0 Entry Conditions) without any direct first out indicators. First outs will continue to be received from Train A but not Train B, so the red first out would be from Nuclear Instruments negative rate trip.

Answer B states the reactor remains at power, which is incorrect since the reactor will trip on General Warnings for both SSPS trains. The reactor automatically trips due to the actual/potential loss of reactor trip protection. Answer B concludes only the General Warning from Train B is received, which is incorrect because a General Warning on Train A occurs from the power supply failure. Applicants that chose this answer likely did not realize that loss of either SSPS power supply to a train produces a General Warning.

Answer A states the Reactor Trip occurs from to two General Warnings, but all first out indicators illuminate. The one applicant that chose this distracter failed to understand that B Train Inputs are Blocked, and A Train continues to function normally with one redundant power supply out.

Answer C is still the only correct answer, with the reactor tripping and a single first out from the first trip signal from the input bays, which will be negative rate from the NIS.

No changes to this question are proposed. Training Needs Analyses 2011-1238-1 & 2 were written for initial and requal programs.

HIGH MISS

Question 36:

Question 36 is a new question. This question was missed by 6 out of 10, with all picking distracter D. No questions or comments were made during the exam's administration. Validation results showed it missed by 2 out of 6. Those that missed stated they were guessing at fan status.

This is a power supply question. Half of the dampers in the containment purge pathway are powered from NK01/04. Loss of NK01 will close all red/A train dampers, but the yellow/B train dampers are unaffected. The fans are powered by non-safety PG power, which based on the stem is still available. Loss of NK01 does not produce a containment purge isolation signal. Consequently, the fans remain running without this signal. This was validated by both use of the prints and the simulator. The net result is: purge is still isolated and the fans remain running.

Distracter D stated the A Train dampers go closed (true) and the fans stop (false).

Answer C remains the only correct answer.

No changes to the question are proposed. The status of the fans may be immaterial to the fact that the containment purge pathway isolates. Training Needs Analysis 2011-1239-1 was written for the ILO program.

HIGH MISS

Question 37:

Question 37 is a new question. This question was missed by 7 out of 10, with all choosing distracter D. An applicant submitted a question during the exam's administration asking if level was exactly 23 feet above the fuel. In assessing a response to the question, it was discussed that although TRM requirement is ≥ 23 feet, there are procedural requirements that exceed the TRM values. It was further discussed whether a value should be provided that met all requirements. It was decided that no additional information would be provided during the exam. Validation results showed that the question was missed by 2 out of 6. Validators provided no comments on the question.

TRM 3.9.7 requires water level ≥ 23 feet above the fuel during unlatching to meet accident analysis for fuel handling accidents. This level is specifically marked on BB LI-53A/B as 23 feet above fuel at ~ 240 inches. Control rod latching requirements are different from fuel movement, since all of the fuel assemblies are seated in the vessel. For fuel movement, TS 3.9.7 requires ≥ 23 feet above the vessel flange instead of the top of fuel. Both requirements are reflected in Operator surveillance during refueling STS CR-002, SHIFT LOG FOR MODES 4, 5, AND 6, which requires 241" above the fuel assemblies. The original goal of this part of the question was to differentiate between the TRM and Technical Specification requirements. The second part of the question was to test TS 3.9.6 requiring two RHR loops to be operable with one loop in operation.

From a procedural standpoint in addition to the TRM, Answer D is correct. In order to assure adequate level the procedural requirements in GEN 00-009, REFUELING, and FHP 02-012, CONTROL ROD UNLATCHING/LATCHING TOOL OPERATING INSTRUCTIONS, are set higher than TRM requirement to provide diverse visual indication of pool level with water at or above control rod drive shaft button height. GEN 00-009 step 6.1.15 contains a note stating: "when above button height (267" ~25 feet above fuel), unlatching may proceed," and is tied to a reference in FHP 02-012. FHP 02-012 step 5.13 states: "Refueling Pool level must be at or above button height for latching, unlatching and weight verification activities. Button height (2035 ft 6.5 inches, 267" on BB LI-462) is 27.2 inches higher than the TR 3.9.7, Refueling Pool Water Level requirement for core alterations of 23 ft above the top of irradiated fuel assemblies seated in the Reactor Vessel (2033 ft 3.25 inches, 239.8" on BB LI-53A). The purpose of the additional water is to shield the workers from radiation exposure from the upper internals structure and the Control Rod drive shafts."

Answer A meets the strict TRM requirement, however it fails to meet the procedural requirement. Question 37 asks: "Which ONE of the following describes whether or not unlatching can begin and why or why not?" Although the TRM answer was originally selected as the correct choice upon further review it was found to be incorrect per the operating procedures. Answer A would have been correct had the question been "Can unlatching begin based solely on the

stated conditions meeting TRM and Technical Specifications requirements and why?" As asked, the question is too broad and therefore includes <u>all</u> requirements, procedural, TS and TRM.

Based on the question as written the correct Answer is D because answer A did not consider the additional level requirements in the procedures. Per NUREG 1021 ES-403 this is considered newly discovered technical information supporting a change in the proposed answer key. The question stem should be reworded to specify that the GEN 00-009 and FHP 02-012 procedural requirements are to be considered in the determination.

HIGH MISS

Question 40:

Question 40 is a new question. This question was missed by 5 of 10 all chose distracter A. Three applicants commented during exam de-brief that the entire page from the Tank Data Book and was not presented and therefore they did not know what the zero reference point on the graph was. This was not a question asked during exam administration. The tank book page shows a diagram of the tank and its connections with notes. During validation 3 of 6 missed the question trying to deduce actual and usable volumes for the tank. As a result of the validation comments the question was modified to “usable” volume since the percentage column is the “usable” volume and the bottom portion of the tank document page with notes and diagram were removed. The difference between tank volume and “usable” volume stems from the suction line coming out of the side of the tank vice the bottom so usable volume starts where the tank provides suction.

The objective was to have the applicants calculate the available volume utilizing the list of percentages or graph using pump flow rates and time. Using the chart and subtracting 30,000 gallons used this volume from 90% yields the correct answer of 377, 317 gallons. The distracters were derived from improper selection of volumes from the chart. From the graph the volume versus percent does not intersect the origin, which indicates that the volume goes to zero prior to level in percent reaching zero. However, in the portion of the page that was removed was a note “Percentage is identified as usable volume starting from lower L.T.”. Without this note present it is not clear both the graph and chart represent usable volume.

Distracter A is incorrect because it represents an incorrect usable volume remaining. Three applicants chose this answer likely not knowing that the figure represented actual volume. Post-exam comments revealed they calculated 377,317 gallons but selected the next lowest value in the belief they were discerning actual versus usable volume.

Answer B is still the correct answer based on calculation and the chart.

Including the full reference page would clarify this question. However, the information that the page reflects usable volume is still present by looking at the intercept location on the graph. Also, we should add a statement to the stem that demineralized water makeup from the AN tank is isolated. There does not appear to be any knowledge weakness for this question. It was covered in detail during the exam review.

HIGH MISS

Question 47:

Question 47 is a new question. This question was missed by 5 of 10 with three choosing distracter A and two choosing distracter B. No questions or comments were provided during exam administration. Validation showed 2 of 6 missed with one A and one B. Both validators commented they were not familiar with the details of the alarm response procedure tested.

The question tests in the Reactor Operator's responsibility to an area radiation alarm found in ALR 00-062A, AREA RAD HIHI. First the Operator must determine the affected area monitor and its reading. The Operator then contacts Health Physics (HP) to determine if the alarm is expected due to HP activities in the RCA, (higher than normal surveys, moving sources/filters, etc.). Normally these activities would be communicated in advance to the control room so that the alarm will be expected. If HP is not the source of the alarm the requirement is to evacuate the affected area until HP can perform a survey.

Distracter A states to have HP survey the affected area, but then goes on to state that the entire RCA must be evacuated. This is incorrect since only the affected area in the RCA requires evacuation. Applicants choosing this answer knew HP must survey but did not know evacuation of the entire RCA was not required.

Distracter B states to dispatch an auxiliary Operator to investigate the alarm. The Operator does not carry radiological survey equipment, nor do they perform radiological surveys. Dispatching an operator into a potentially abnormally high radiation area without HP coverage or support is a non-conservative decision that could result in excessive radiation exposure. Those choosing this answer relied on a large percentage of alarm response procedures dispatch a local Operator to investigate.

Answer C is one of the options in the ALR. The stem of the question states that the alarm was unexpected and that the readings are valid. In the interests of worker safety, the correct response is to evacuate the hot machine shop until the source of radiation can be discovered and mitigated.

No changes to the question are proposed. Answer A is plausible enough not to raise any concerns with the three applicants that selected it. Two applicants and one validator chose answer B raising a concern of watchstander safety. Therefore as a safety issue and conservative decision, this issue was placed in Training Needs Analyses 2011-1240-1 & 2 for initial and requal.

HIGH MISS

Question 51:

Question 51 is bank question #22283. This question was missed by 7 of 10 with five choosing distracter D and two chose distracter A. No questions or comments were made during exam administration. Validation 4 of 6 missed with all four choosing C. Validation comments were: this was an important knowledge bit that they had missed. No question changes were proposed during validation.

The question tests applicants understanding of available controls during a loss of NK04. A loss of NK04 results in a reactor trip when main steam and feed isolation valves go closed.

Distracter A states both motor driven auxiliary feed pumps start with no indication for B train, and all MFRV and bypass valves fail open. Although the reactor trip from 100% power will cause a start signal, NK04 provides control power for the B aux feed pump breaker to close. The second part of the answer is also incorrect since the main feed regulating and bypass valves fail closed on loss of one P-14 solenoid.

Distracter D states the Turbine Driven Auxiliary Feedwater pump starts and AFW flow can be throttled to all steam generators. The TDAFP will start, however the loss of NK04/NN04 affects control/instrument power to the discharge flow control valves: A & D motor driven smart valves and B & C turbine driven discharge valves. A local Operator is dispatched to isolate flow to B&C steam generators so aux feed can be controlled from the A motor driven pump to these generators.

Answer B is correct. NK04 is the power feed to one of the P-14 solenoids on each of the main feed regulating and bypass feed regulating valves. This failure causes the valves to go closed.

Based on final exam review feedback, it is recommended to change the wording from “P-14” solenoids to FWIS solenoids. P-14 is a subset of feedwater isolation, so the question is still valid as it stands. Training Needs Analyses 2011-1241-1 & 2 were written for initial and requal programs.

HIGH MISS

Question 54:

Question 54 is a new question. This question was missed by 6 of 10 with all choosing distracter C. There was a question submitted during exam administration as to what kind of leakage we were concerned with: radiological or liquid. The clarification provided stated the mass release of water or steam from containment. There was a comment during exam debrief. Validation results were 1 of 6 and that person chose C. Their comment was hey talked themselves out of the correct answer.

The question tests an applicant's understanding of safety analysis containment challenges between a RCS LOCA and the steamline break. All applicants knew the highest pressure analyzed in Chapter 6 safety analysis was the Steam line break, however the second part of the question required knowledge of postulated total leakage. Since steam line break inventory is limited when aux feedwater has been isolated the generator dries out and no longer providing mass and energy to containment. Conversely for a DBA LOCA Emergency Core Cooling is not terminated for a long period and the break continues to release mass and energy to containment. Therefore containment pressure response for LOCA is taken out to 1E6 seconds whereas the MSLB cases are resolved to 2E3 seconds. Furthermore, Chapter 15 dose analysis conservatively assumes containment leakage stays at maximum rates for the first 24 hours to maximize the release calculation. This added leakage results in 5-10 times the dose compared to pressure response alone. The Safety Analysis results are also repeated in multiple Technical Specification Bases. From TS 3.6.4 for Containment Pressure: "The worst case LOCA generates larger mass and energy release than the worst case steam line break. However, the SLB bounds the LOCA event from a containment peak pressure standpoint." TS 3.6.1 for containment discusses that the total leakage is bounded from the LOCA analysis.

Distracter C states MSLB results in the highest pressure and the most leakage. The first part is true, but the second part is not. Peak containment pressure may be higher, but it lowers much faster than a DBA LOCA.

Answer D is still the correct answer by the safety analysis results.

The question should remain as it stands. The design basis for containment Technical Specifications are bounded for pressure by the analyzed MSLB event and the leakage requirements are bounded by the LOCA. Training Needs Analysis 2011-1242-1 was written for the initial license program. Requal does not appear to be affected.

HIGH MISS

Question 76:

Question 76 is bank question #12602. This question was missed by 5 of 8 with all choosing answer C. One comment was received from an applicant that they had trouble between answers A & C as to whether they would have to keep trying to establish SI hot leg flow. Validation had 2 of 5 with both selecting D. No question changes were proposed during validation.

The question concerns hot leg recirculation ECCS realignment with failures of both safety injection pumps. Both RHR and SI pumps have the capability to inject into the hot legs to sweep boron from the core. RHR can inject into loops 2 & 3 hot legs, each SI pump injects into 2 loops. Since they are separate injection flowpaths EMG ES-13, TRANSFER TO HOT LEG RECIRCULATION, aligns them separately starting with RHR. There are no hold points if one or the other does not function. Follow-up steps check to ensure core cooling and vessel level are maintained. If core cooling is challenged RHR is realigned to cold leg recirculation.

Distracter C states that one SI pump must be restored to service prior to realignment per EMG ES-13. Although the SRO may continue to work long term to restore SI pumps, there are no procedural requirements to do so. The procedure will allow realignment to hot legs from either SI or RHR. If SI hot leg flow is not achieved the RNO steps start available pumps. This is not a continuous action. If the pumps do not work the reader goes on. The distracter may need some enhancement to clarify which specific realignment is being described.

Answer A is the correct answer. Both trains of RHR will be realigned to the hot legs when directed. If core cooling cannot be maintained they will be realigned to four loop cold leg recirculation. Loss of safety injection pumps has no long term effect since hot leg recirculation is only entered 10 hours post-LOCA after RCS depressurization either by break flow or EMG ES-11, POST LOCA COOLDOWN AND DEPRESSURIZATION, which is performed when the break is not large enough to depressurize to RHR conditions. RHR cold leg recirculation is the only ECCS component required for decay heat removal at the 10-hour point in LOCA scenarios.

Some validators chose distracter D, which is credible since it will be a procedure that is performed prior to EMG ES-13, however in EMG E-1, LOSS OF REACTOR OR SECONDARY COOLANT, EMG ES-11, TRANSFER TO COLD LEG RECIRCULATION, comes well before hot leg recirculation is considered.

A minor change should be made before placing the question in the exam bank. Distracter C can be confusing due to the word “realignment”. This realignment could be solely for the SI portion. The recommended change is to replace it with

"exiting the procedure." Training Needs Analysis 2011-1243-1 was written for the initial license program.

HIGH MISS

Question 85:

Question 85 is a new question. This question was missed by 7 of 8, with all choosing answer B. One post-exam comment received from an applicant asked why initial conditions existed in the stem when all answers had their own conditions. Another post-exam comment stated the answer was still higher than the line, but that they chose the one that was closest to the graph line. There were no misses during validation but the question was changed in the final revision. The original draft answers were based on pressure and power factor. The NRC requested a change to MVAR loading since power factor is not a measured quantity on the control board indications. The question was redrafted, technically reviewed and revalidated by two licenses. They both missed it. The question was changed again based on their feedback and an error occurred in the final revision.

The question is two parts, the first part assesses main generator limitations and the second the required course of action to place the unit in a safe configuration. The applicant must find four points on the main generator spider curve and assess whether they are inside or outside of an acceptable pressure curve. This was first done with pressure versus power factor then later revised to pressure versus reactive load. The second part tests the applicant's knowledge of the required remedial actions contained in ALR vice OFN procedures.

Review of the associated points indicate there is no correct answer to this question since all points are outside their respective power curves on the figure. The question prior to the final version did have a correct answer with reactive load in Answer D at 400 MVAR. This was changed to 500 MVAR in the final version by a validator comment. This change was made in error without sufficient final review.

Answer B is closest to the curve but still outside. The procedural flowpath is incorrect since the OFN does not isolate the leak. The leak is isolated by the local ALR, which then sends the performer to a system operating procedure to emergency depressurize the generator.

The question requires repair. The original question may not have been discriminatory enough, but performed well in validation. If MVAR is to be used in the answer then the current MVAR loading statement needs to be removed from the stem. A correct answer must be provided.

This question is recommended for deletion from this exam because no correct answer is provided. For this question, an error occurred when changes were incorporated from validation without sufficient technical review.

LOW MISS AND/OR COMMENTS

Question 2:

No misses. There was a single post-exam comment that there are two ways to compare levels, and the applicant answered based on >15" and tygon tube level. This appears to be a knowledge gap since the narrow ranges only go to 55" and the stem was at 65-80", so the only remaining method is the tygon tube. This does not appear to be a generic weakness and was covered during the exam review with the applicants.

Question 6:

Two applicants missed the question, picking A & B. Two post-exam comments were received. One was "No idea of trends following event, based on loss of steam dumps concurrent with loss of NN01." The other was "Struggled with what was being asked – when does event start, post NN01 or post trip, assumed post trip." Answer A is still incorrect, as pressurizer level will decrease on the cooldown. Steam dumps still function on a loss of NN01. AC PT-505 / Tref is not used by the trip controller. Answer B is incorrect due to the selected channels, letdown isolation, and charging going to maximum. A minor clarification should be provided that the reactor trip occurred immediately after the bus trip. These appear to be isolated knowledge gaps and was be covered by exam review.

Question 7:

Three applicants picked answer B, for the pump tripping on overcurrent or differential. Two comments were received, with both indicating that they did not know if the trip was differential or overcurrent. The RHR pump breakers do not have differential protection. Differential protection is typically only used on very large motors or electrical buses. All breakers have overcurrent function. This does not appear to be a knowledge issue of concern. It was discussed during the exam review.

Question 8:

Two applicants picked answer A, that emergency boration was required. Three comments were received. One was that 551 degrees was too close to emergency boration. One was that no distracter meets the basis, more of a followup. One was if temperature is considered to continue downward. Answer A is incorrect based on the stem information. Emergency boration is not required based on the stem information. However, the questions reveal that the stem requires some repair for clarity. Emergency boration is never performed as part of immediate actions. The stem should be reworded that these are the conditions present when starting EMG ES-02. ES-02 will immediately throttle AFW, taking care of the temperature concern. This will leave the question meeting the original K/A of emergency boration requirements for stuck control

rods. There is no need for training, since the applicants could lead to their answers through reasonable assumptions since you are already at 552 degrees in the immediate actions. This was discussed during the exam review.

Question 9:

Two applicants picked answer A for NG01B. No comments were given. Although incorrect, this distracter is very plausible due to the abnormal train/numbering convention of the RHR suction valves. These valves do not follow normal even/odd A/B conventions. Both 8702A & B are NG02B, with the 8701A & B fed from NG01B. Unfortunately, due to overlap these were the only RCS pressure boundary MOV valves left to meet the K/A requirement, since the PORV block valves had been used on another exam. No knowledge weakness is noted since they knew the major MCC location, just not the specific train. This was covered during exam review.

Question 11:

Two applicants picked answer A that nitrogen is used to protect the PRT lining due to oxygen entrainment from the RCS. No comments were provided. The reactor coolant system uses hydrogen to suppress peroxide formation during radiolysis. As a result, free oxygen in the RCS extremely low. The major concern with RCS coolant is that the excess hydrogen will come out of solution at lower pressures and form an explosive mixture, which is the correct answer. This does not appear to be a generic weakness, and was covered in exam review.

Question 12:

There were no misses on this question. There was one comment that per the ALR, no vent would be required. While this is true, the RCDT system is only capable of handling 50 psig, and pressure will continue to rise since mass is being added and some non-condensable gases will come out of solution. This question was originally constructed with a higher pressure. However, validations revealed that not all were confident of being able to reduce pressure enough to reach RCDT operation. No concerns or knowledge weaknesses were revealed. This was covered during the exam review.

Question 13:

There were no misses on this question. There were two comments. One was that it took awhile to recognize the point of the question. The other was that it was not positive what was being asked. The only issue appears to be that reactor trips were asked in a different manner than traditionally, i.e. give me the coincidence for this trip. The specific K/A was for the trip status panel, so this question was written from the indications on the status panel to meet the K/A.

LOW MISS AND/OR COMMENTS

There are no concerns or knowledge weaknesses. This was covered during the exam review.

Question 14:

Three applicants missed this question with two picking answer A and one picking D. There was one comment that they focused on the “initial response” and did not like initial response question. Answer D is incorrect due to the failure’s affect on the instrument. The reference leg is the high side of the transmitter, which will make dP go low and indicated level go high. This is similar to the GFES questions. Answer A would describe the long term behavior for the pressurizer since level will go high once either the RCS reaches saturation or ECCS flow exceeds break flow. The level tap for the pressurizer is ¾”, which exceeds the capacity of a charging pump. A vapor space break is still a loss of coolant accident. Pressurizer level will decrease until either the RCS saturates or ECCS recovers level. That is why the “initial response is critical for the stem”. This does not appear to be a generic weakness, but was discussed during the exam review.

Question 16:

Three applicants missed this question, all picking answer B. Two comments were received and one clarification was requested. No additional information was provided. One comment was that it was difficult to choose between answers B & C. The other was that they did not like the “ALL” construction. The K/A deals with reflux cooling and small break LOCA. The original question was changed from the traditional S/G reflux, ECCS flow, break flow, and radiative due to the NRC desire for a 2-part answer, which necessitated the use of ALL/almost ALL. Answer B is incorrect since break flow does not remove ALL heat from the primary due to SG pressures < RCS pressure and reflux cooling occurring due to RVLIS indicating not full. Therefore, the steam generators are still removing heat. This does not appear to be a generic weakness. This was covered during the exam review.

Question 17:

Three applicants missed this question, all picking answer B. No comments were received on this question. Answer B is incorrect based on use of the steam tables. PORV throttling is isenthalpic. At psig (20 psia), you should be in the superheated range, not the saturation as the enthalpy is outside of the steam dome. This is not significantly different than standard GFES question. No additional concerns were raised. This was covered during the exam review.

Question 18:

LOW MISS AND/OR COMMENTS

Two applicants picked answer A. There were no comments. Answer A is incorrect because a failed safety valve would not result in the conditions in the steam. A failed safety valve will result in the RCS depressurizing to saturation and then refilling the pressurizer, both from ECCS and RCS boiling. The steam provided indicates the RCS is superheated and the pressurizer level is offscale high. This was covered during the exam review.

Question 22:

This question was missed by four applicants, with all picking A. There was one comment and one clarifying question. The comment was that they would have expected it to move for eight steps. The question asked during the exam concerned the DRPI accuracy of +/- 4 steps and whether DRPI could be used for diverse indication. No additional information was provided. Answer A is incorrect since DRPI should have showed rod motion for eight steps, considering a one-sided accuracy, i.e. all coils shifted plus normal tip detection. The question originally had rods moving fewer steps but was expanded to include any operational uncertainties in DRPI. While it is true that DRPI has a accuracy of +/- 4 steps, it cannot be both at the same time due to the physical nature of the coil stack and the fact that 5 rods are affected. Half-train accuracy of DRPI is +/- 10/4 steps. A similar argument would reveal that DRPI would be incapable of meeting its TS requirements for single train, which is not true. DRPI indicates every six steps and operators typically look for rods to move after moving five steps. There is the occasional rod off by one or two steps, but never an entire bank. It is believed that the applicants chose their answers based on an unreasonable assumption. This was not high miss and not considered a knowledge gap. This was covered during the exam review.

Question 23:

One applicant picked B for this question. No comments were provided. Answer B is that rods will step outward at maximum rate. With the auctioneered high nuclear instrument power failing high, the anticipatory circuit will see reactor power rising faster than turbine load and step rods inward, not outward. This is not a generic weakness and was covered in the exam review.

Question 24:

One applicant picked answer C. No comments were received. With power < 48% power (P-8), reactor trip on loss of a single reactor coolant pump is not required. A controlled shutdown will be required to enter Mode 3 to repair and restart the affected pump motor. This is not a generic weakness and was covered during the exam review.

Question 25:

LOW MISS AND/OR COMMENTS

There were no misses and only one comment. The comment was that they did not remember because there was only a small amount of discussion in reactor protection system. This was covered during the exam review.

Question 26:

There were no misses and only one comment. The comment is that the stem states “Containment conditions”, not all conditions in the stem, which would make answer D also correct. The word containment was used due to the generic desire to reword the specific K/A in the question. This is not a requirement, so the question will be repaired to remove all doubt. This was discussed during the exam review.

Question 28:

There were no misses and only one comment. The comment was that “INITIAL” was not specified, i.e. what will happen over time. The pressurizer level controller will eventually increase total flow back to the same point to maintain level. However, the controller is very slow for these types of changes and this is well out in the future > 30 minutes. It was not believed that this needed to be clearly stated due to the long integral time of the controller. We will add the word initial to remove all doubt. This was covered during the exam review.

Question 29:

One applicant picked answer C. There was one comment that they didn’t know how to get there without more information and had to make too many assumptions. Answer C is incorrect since our plant does not have an auto-isolation function for RHR. Although part of the original design, it was eliminated due to loss of RHR events in the industry. The second part of the answer is also incorrect, since with two RCPs in operation, spray flow will always be available, regardless of the combination of RCPs. This is not a generic weakness and was covered during the exam review.

Question 30:

One applicant picked answer D. There were two comments. One comment was that there was no 100% correct answer. The other comment was that the trip is at 15%, and their answer was based on setpoint exceeded. Answer D is incorrect based on that there is no AUTOMATIC ESW makeup. This makeup source has to be manually opened. Answer A is 100% correct. The stem has enough information to indicate that the leak is in CCW to containment, which means that CCW to containment will require isolation. The level is below 15% (14%), so the CCW train must be secured. Without CCW to reactor coolant pumps, the pumps must be secured within 5 minutes, which will require the reactor to be tripped. This was not considered a generic weakness for the

written exam question results; however, a similar issue does exist on the JPMs and a TNA will be written. (The JPM dealt with stopping the pumps, which is specifically why that part was left out of these answers.) No changes to this question are proposed and it was covered in the exam review.

Question 31:

Three applicants missed the question, with two picking answer A and one picking answer D. There were no comments. Per EMG C-13 only the A sump is below the required 1999'7". Additionally the A pump amps are oscillating, which is one of the signs of cavitiation. EMG C-13 must secure this pump. Answer A is incorrect since B sump has enough level. An earlier revision had levels much closer, but it was decided to spread them out to give more physical meaning, i.e. basemat is at 2000' plus curb. Answer D is incorrect since you already have a sign of cavitation in the stem and the pump needs to be secured. There does not appear to be a generic weakness and this question was covered during the exam review.

Question 32:

Two applicants picked answer D. There was one comment that they guessed at the answer because they could not remember procedure directives. This is simply a 10CFR50.54(y) discussion that deviations to licensed conditions must be approved by an SRO or higher. Answer D is not true because it contains the word "ONLY" the SM. This approval can be obtained from any licensed SRO or higher, which the NRC has recently clarified to include non-licensed upper management (Emergency Manager during E-Plan would be one example). This question should be repaired as we have been reorganizing procedures. The reference should be AP 26C-004 in the stem and the answer should be clarified to be "On-duty" SRO in keeping with the latest procedural requirements. This is not a generic weakness based on results, but it was discussed during the exam review.

Question 33:

One applicant picked answer A. There were no comments. Answer A is incorrect since these fans are not powered by a safety-related bus, nor is there a load shed feature for these fans. The K/A is knowledge of power supplies to containment iodine removal system (system 27). The question stands, no generic weakness, and was covered during the exam review.

Question 34:

There were no misses, but one comment. The comment was that the numbers for B & C were way too close and could get to either by interpolation. The two

surrounding answers A & C were chosen with no interpolation. Only B lies in between. This was covered during the exam review.

Question 35:

This question was missed by two picking answer B. There were three comments. One was that they did not like the use of INITIAL and can't really answer the question. Another commented that they assumed that INITIAL meant before rods go in. One was concerned with INITIAL and a fast runback versus a slow runback. Wolf Creek has two standard runbacks, 10%/min NSSS and 25%/min Turbine. Both are relatively fast. Running back the turbine at any rate will cause the primary temperature to increase and the pressurizer to swell. Answer B is incorrect under all circumstances, slow or fast. Answer C is correct due to the instrument failure. There is no generic weakness identified and this was covered during the exam review.

Question 39:

Three applicants missed the question, with two picking B and one picking C. There were no comments. The question asks what is required to open the sample valves following a radiation monitor isolation signal. Answer B is credible, since it has the correct signal. However, as with most sample valves, these valves have the ability to be reopened with the signal still locked in. This can be demonstrated by a review of the E-13 drawings. Answer C is incorrect since the radiation monitors do not generate an AFAS-M signal. This does not appear to be a generic weakness and was covered during the exam review.

Question 42:

One applicant missed the question by picking answer C. The conditions in the stem describe having all steam generators in a hot and dry condition. Answer C is incorrect since only one steam generator will be fed initially to limit any potential tube rupture to one generator. This does not appear to be a generic weakness and was covered during the exam review.

Question 43:

One applicant missed the question by picking answer A. There was one comment that answer "A" is an unfair distracter since it would be true by itself. The main turbine trip is at 7.5 inches HgA. The feed pump trip is at 15.1 inches HgA. Therefore, answer A is not true by itself. This is not a generic weakness and was covered during the exam review.

Question 45:

LOW MISS AND/OR COMMENTS

One applicant missed the question by picking Answer D. There were no comments. Answer D is true for being able to monitor wide range RCS temperatures. However, the stem is asking for core temperatures and the best indication of core temperature is from the incore thermocouples. Due to the loss of power, these would have to be read at the TCCM cabinet, which still has vital AC power for at least one more hour. This is not a generic weakness and was covered during the exam review.

Question 48:

One applicant missed this question by picking answer B. There were no comments. Answer B is incorrect since oil pressure is used to close the TDAFP governor valve. A loss of hydraulic pressure to the governor valve would result in an overspeed condition. This is not a generic weakness and was covered in the exam review.

Question 49:

One applicant missed this question by picking answer B. There were no comments. This is a frazil ice question by the conditions given in the stem. The recirculation line to the pump bay is used for pump venting during startup, not ice protection. The correct answer is the warming lines. This is not a generic weakness and was covered in the exam review.

Question 50:

Three applicants missed this question, with two picking D and one picking A. There were three comments. One was that the SOLA designation was not correct. One comment was that both C & D appear to be correct. The third was that based on the color of the selector switches, assumed this meant no swapping out the affected channels. The first comment is correct; the wrong SOLA power supply is listed. This was missed when the question was changed to avoid overlap with the simulator scenarios. This part of the question needs to be repaired to list XNN06. Answer D is incorrect, as the NCP flow control valve does not fail open on loss of NN04 since yellow train is not a selectable channel for pressurizer level control. The same is true for answer A, since yellow is not a selectable channel for steam generator level control. Answer C is still the only correct answer, as VCT swapover cannot be prevented without de-energizing the affected MOVs with a red or yellow train NN bus failure. This does not appear to be a generic weakness and was covered during the exam review.

Question 53:

One applicant missed this question by picking answer B. There was one question during the exam and was clarified by stating “Time of discovery is the time provided in the stem.” Answer B is incorrect since tank level is still greater

than 80%. The same person that asked for the clarification missed the question. Therefore it is not recommended to add the same clarification to the stem. This does not appear to be a generic weakness and was covered during the exam review.

Question 55:

One applicant missed the question by picking answer C. There was one comment that they did not know the setpoint that would put the monitor into accident isolate. It was not the desire of the question to know the actual setpoint of the monitor, only to realize that the reading provided exceeded both the low and mid range detectors. The low range is 1E-7 to 1 E-1 micro Ci/cm3. Mid range is 1E-4 to 1E+2. High range is 1E-1 to 1E+5. A value to 2E+5 is the maximum value for the high range monitor. This concentration is multiplied by flowrate, a large value, to arrive at micro CI/s. Typical alert values are in the range of 3.15 E+3 micro Ci/s. Answer C is incorrect since the WRGM detectors isolate the particulate and iodine channels on high activity and must be restored locally before they resume sampling the flowstream. This does not appear to be a generic weakness and was covered during the exam review.

Question 56:

There were no misses, but one comment was received. The comment was that gas bubbles equal FBIS. Bubbles coming from a fuel assembly are an indication of clad breach, which is likely to trigger a fuel building isolation signal if enough activity is present. This is a correct comment. There is no need for further discussion. This was covered during the exam review.

Question 58:

Four applicants missed the question by picking answer C. There was one comment that they were no sure if the degraded condition goes away, but that they assumed that it did. This question is essentially the basis for why OFN NB-042 was created and why we keep a dedicated operator during diesel runs with the engine paralleled. The issue is that an upstream transient may be isolated prior to the bus feeder breaker. If the bus feeder breaker remains closed, the diesel will not shift to emergency mode. Without an SI present, 55 seconds is not long enough for the degraded voltage condition to open the bus feeder breaker. The transformer feeder breaker opens, but there is no transformer lockout. The diesel is tested by surveillance to withstand up to full load reject. The EDG will restore voltage once divorced from the degraded offsite source. The voltage will likely go high, but not excessively due to the power factor limitations in the STS procedure. Answer C is incorrect since there is no signal to open the bus feeder breaker. The operators will perform the actions of OFN NB-042 to place the EDG in emergency mode. This does not appear to be a generic weakness, but was covered during the exam review.

LOW MISS AND/OR COMMENTS

Question 59:

This question had no misses, but had one comment and clarification. The comment and clarification was that air pressure at 14:24 was the same as the last reported value of 14:22. This should be incorporated into the question by asking the question at 14:22. This was covered during the exam review.

Question 60:

Two applicants missed the question by picking answer D. There was one comment that the applicant did not understand which came first and didn't understand the valve referred to in the stem. This question tests the knowledge that there is a high flow isolation signal generated on the ESW side of these compressors. The surveillances that test this function secure the air compressors and open the same drain valve to simulate a line break condition. The major cooling load for ESW is the interstage heat exchangers, which remove the heat of compression. Without cooling water temperatures rapidly rise and the protective trips on high temperature come in prior to compressor damage. If these trips do not occur, then answer D becomes plausible in that a motor overload is likely for compressor damage. This does not appear to be a generic weakness, but was covered during the exam review.

Question 61:

Four applicants missed this question, all picking answer B. The difference between answers B & C is in the sound of the tone, pulsing versus wailing. The Site Evacuation alarm is a pulsing tone, whereas the Containment Evacuation alarm is a wailing tone. Due to the frequency of testing in the plant, all operators have an opportunity to hear these in the plant. This question was originally written for the flux doubling alarm in containment versus the containment evacuation alarm, but the specific sound of the flux doubling alarm in containment was replaced since many operators have not actually heard it and it is only tested during outages. Sound descriptions are often difficult to communicate in words, but in this case the alarms are very distinct from one another. We tried a variety of descriptions, but ended up going back to the standard descriptions in the training material for consistency. This does not appear to be a generic weakness, but was covered during the exam review.

Question 62:

One applicant missed this question by picking answer A. There were two comments/questions. One comment stated that for distracter B, we do not initial in autolog. The question asked during the exam was whether the question was written knowing that we use autolog. No clarification was provided. Answer A is incorrect since we typically do not alter a log entry after several days, we append

with a corrected late entry. As to the comments about initials, it does not matter whether paper logs or autolog are used. Autolog automatically puts it the users name. If using paper, the entries are placed in Autolog when it becomes available. If transferring from paper to the computer, then the initials or name are placed with the entry, not the line number from the paper forms. This does not appear to be a generic weakness, but was covered during the exam review.

Question 63:

One applicant missed this question by picking answer C. There were no comments. Answer C is incorrect since communications are verified every 12 hours during fuel movement per STS CR-002 A.27. It is a plausible distracter since the surveillance procedure is typically performed every eight hours. This does not appear to be a generic weakness, but was covered during the exam review.

Question 66:

There were no misses, but one comment. The comment was that they answered based on “valid alarm” and is repeating frequently. This is a sound assumption. No further review is required. This was covered during the exam review.

Question 67:

Two applicants missed this question, with both picking answer D. There was one comment that the applicant had to recall someone else’s job. Answer D is incorrect because the Shift Manager has to approve entry into a Very High Radiation Area. Because grave danger is associated with these areas and the dose rates are usually due to some type of plant alignment such as incore thimbles withdrawn, Operations is involved in these entries. Even though it is only the shift manager, the requirement is covered in generic radworker training. This does not appear to be a generic weakness, but was covered during the exam review.

Question 68:

Two applicants missed this question, with both picking answer C. There were no comments. Answer C is incorrect since this area is not greater than 500 Rad/h at 1 meter, which is the definition of a Very High Radiation area. The postings and requirements are all covered in generic radworker training. This does not appear to be a generic weakness, but was covered during the exam review.

Question 70:

Two applicants missed this question, with both picking answer B. There were no comments. Answer B is incorrect, since the cooldown is not stopped due to

RVLIS level. EMG ES-06 is a natural circulation cooldown of the RCS with RVLIS in service. It is expected for a bubble to form in the reactor vessel head due to limited coolant flow in this region. Steps 7-10 form a continuous action loop to slow the depressurization rate or repressurize the RCS if the RVLIS level drops below 76%. Cooldown is not stopped during this process as the cooldown increases the margin to saturation and will recollapse voids outside of the head region. Stopping a cooldown will not improve the conditions listed in the stem. This does not appear to be a generic weakness, but was covered during the exam review.

Question 71:

Three applicants missed this question with two picking answer A and one picking C. Answer A is incorrect since pressure is already significantly below the relief and LTOP setpoints. Answer C is incorrect due to the high pressure and temperature present which is >225°F. To realign the train the pump will have to be stopped, the suction line voiding is a concern, and the pressure will be higher than the injection pressure of the pump. Answer B is on the foldout page and is always true when in this procedure. This does not appear to be a generic weakness, but was covered during the exam review.

Question 77:

Three applicants missed this question, with two picking D and one picking C. There were no comments. Answer D is credible because instrument air is used in the stem; however, this is not a global loss of instrument air. If the OFN procedure is used for guidance, it will not divert flow to the RHUT. Answer C has the incorrect system response. BG TCV-130 fails open, allowing maximum cooling on loss of air. This is an SRO question due to the need to recognize that the condition will eventually result in removing boron from the reactor coolant leading to a power excursion. There is no direct procedural guidance for this condition. This reactivity excursion must be compensated for by stopping flow though the demineralizer beds. Selecting a different letdown flowpath is one option. However, prolonged letdown to the RHUT is undesirable as well as you will be drawing down boration supplies. This does not appear to be a generic weakness, but was covered during the exam review.

Question 79:

Three applicants missed this question by picking answer D. There was one question during the exam. The question was whether the actions in EMG FR-S1 mitigate the situation in reducing core exit temperatures. No additional information was provided. There was also a comment as to really needing the entire sequence of events. This is an SRO question that dealing with an ATWS combined with a LOCA. ATWS scenarios represent a potential severe challenge to both the core and reactor coolant system pressure boundary. ECCS is unable

to remove the additional heat generated from nuclear power production, resulting in the highest priority status for EMG FR-S1. Based on the conditions in the stem, transition to the SACRG's is required. Temperatures are greater than 1200 degrees and rising, limiting the ability of ECCS to quench the zirc water reaction. If the actions of the procedure are truly successful at reducing reactor power prior to significant fuel damage, then transition to FR-C1 would also unlikely, as ECCS flow will be able to quench the core, rapidly restoring level and temperature. No changes to the question are proposed. Applicants need to be aware that a transition from FR-S1 to the SAMG procedures is a distinct flowpath. This does not appear to be a generic weakness, but was covered during the exam review.

Question 81:

Two applicants missed this question, with one picking A and one picking C. Answer A is incorrect since a trip condition will not be reached at this power level. There is sufficient cross-around flow to handle the redirection of steam. No conditions in the stem warrant a reactor trip. Overspeed protection should be reviewed prior to tripping the turbine. Answer C is incorrect since the conditions in the stem indicate that the control/intercept valve remains closed (modulating is still driven to zero and fast acting valve remains open). Additionally, due to the issues with EHC in the stem, it would be unwise to try and move turbine load at this time. This does not appear to be a generic weakness, but was covered during the exam review.

Question 86:

There were no misses, but one question. The question was why did maintenance want the EDG secured. A reason was specifically not stated to not enter any relative urgency into the question. That is why it was presented as a "request". The SRO should challenge maintenance with the concern prior to taking actions outside of the procedure. This question was originally written as a post-sequencer question, but due to existing connected loads, it was too unlikely for the diesel to be this lightly loaded. This does not appear to be a generic weakness, but was covered during the exam review.

Question 89:

Two applicants missed this question, with one picking answer A and one picking answer C. Both answers have the incorrect procedure due to RVLIS < 45% and CETCs > 712°F. EMG FR-C1 is the correct procedure. Answer A has the correct subcooling, answer C is incorrect on both counts. This does not appear to be a generic weakness, but was covered during the exam review.

Question 92:

LOW MISS AND/OR COMMENTS

One applicant missed the question by picking answer D. Answer D is incorrect since the full crew compliment is still required in Mode 4. Reduced manning requirements do not apply when above Mode 5. The requirement comes from 10CFR50.54m, which is referenced by Technical Specifications and reflected in AP 21-003. This does not appear to be a generic weakness, but was covered during the exam review.

Question 97:

There were no misses, but one comment. The comment is that for answer D, the crew could be split, but they went with answer B. Splitting the crew would mean that the CRS would have to stick with the higher order procedure, which would divert attention from mitigating the actual condition. With thermal barriers in service, a loss of seal injection does not represent a challenge to the RCP seals. The condition will be better mitigated by restoring seal injection from the ALR. This does not appear to be a generic weakness, but was covered during the exam review.

Question 99:

One applicant missed the question by picking answer A. Answer A is incorrect since an overfill condition has previously occurred and there may be water in the steamlines that are not part of the direct flowpath through the safety. Re-admission of steam through these lines would likely result in severe water hammer. EMG FR-H2 will kick the reader to EMG FR-H3 for this reason if level is 93 [79] %. Note that containment conditions are adverse. This does not appear to be a generic weakness, but was covered during the exam review.