

MANTG Conference Project Management

By: John Caruso - NRC

Brian Haagensen - NRC

Archie Faulkner - PSEG

Presentation Topics

- Introduction
- Exam Project Management at Hope Creek
 - Archie Faulkner
- NRC Schedule and Project Management Topics
 - John Caruso and Brian Haagensen
- Case Studies - Resolution of Post Exam Comments
- Breakout Session Wrap
 - Top 3 important issues
 - Collect Questions and Potential Answers

Exam Project Management at Hope Creek

By: Archie Faulkner
PSEG

NRC Schedule and Project Management

By John Caruso - NRC Chief Examiner
and
Brian Haagensen - NRC Examiner

Marking of Sensitive Exam Information

“ . . . All reference materials provided by the licensee . . .
Should be marked; any personal, proprietary, sensitive,
or safeguards should be marked and submitted in a
separate enclosure . . . ”

NUREG 1021, errata change May 2005.
ES-201, Attachment 1, Other Considerations

The NRC's public website provides some guidance on classification of information and withholding sensitive information from public disclosure (See SECY-04-0191, “Withholding Sensitive Unclassified Information Concerning Nuclear Power Reactors from Public Disclosure”, ES-501,E.4.c).

Facility Prepared Exams

Project Loading and Budget

Weeks -6 to -4	Weeks -3 to -1	Week 0	Weeks +1 to +4	Totals (9 cal-wks)
Exam Prep review (120) validation 70)	Resolve any issues 10 hours	Administer Exam 120 hours	Post Exam Grade (60) Document (26)	Issue Licenses
1 Chief (80) 2 support (80) 1 trip (30)	1 Chief (10)	1 Chief (30) 2 support (60) 1 trip(30)	1 Chief (46) 2 support (40)	Travel 60 hrs
190 hrs	10 hrs	120 hrs	86 hrs	406 hrs +

NRC Prepared Exams

Project Loading and Budget

Weeks -14 to -7	Weeks -6 to -4	Weeks -3 to -1	Week 0	Weeks +1 to +4	Totals (9 cal- wks)
Develop Written 300 OP Test 130	Exam Prep review 150 validation 90	Resolve any issues 20 hours	Administer Exam 120 hours	Post exam Grade 60 Document 30	Issue Licenses
Chief 60 Written 270 OP test 100	1 Chief 60 support 130 2 trips 50	1 Chief 10 W-support 5 Op-support 5	1 Chief 30 support 60 1 trip 30	1 Chief 40 support 50	Travel 80 hrs
430 hrs	240 hrs	20 hrs	120 hrs	90 hrs	900 hrs +

Miscellaneous Planning Assumptions

- 10% of all exam projects in a year result in retakes.
- 200 hours per facility developed retake.
- Split exam – 600 hours per project and add 15 hours per applicant above 10 applicants for all exams.

GFES Exam Scheduling

- 4 GFES per year (NRC licensing exam generally administered 18 months later)
 - Has not leveled out exam demand.
 - Underlying causes?
 - What can industry do further?

Experience with Post-Exam Comments

- Only one facility in the last year has submitted a post-exam comment on an exam in which everyone passed.
- *Find the Points to Pass* mentality.
- Not following the rules of logic.
- Incomplete technical story prompting additional response – sometimes three submittals.
- Many facilities are confirming through analysis that the majority of exam questions submitted are satisfactory but may need some enhancement.
- There was an average of ~2 post-exam comments per exam over the 6 quarters October 2003 through March 2005 (53 comments over 29 exams).

Basic Guidance (ES-403 D.1.b)

- Criteria for deleting a question
 - 3 or more correct answers, or
 - no correct answer
- Criteria for accepting 2 correct answers
 - 2 answer selections are correct,
 - 2 are incorrect, and
 - In practice, the 2 correct answers can't be opposite or mutually exclusive of one another
 - e.g. One proposed correct answer is to shutdown and the other is to stay at power.
- Your explanations need to follow simple rules of logic.

Unwarranted Assumptions

- NUREG 1021, Appendix E, Part B, Written Exam Guidelines states in part, “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.”
- Post exam comments have been submitted a number of times in the last few years in which “arguments” centered around assumptions made that were unsupported by stem conditions.

Submittal of Post Exam Comments

- Prior to submitting formal post exam comments, the facility licensee may also request an informal meeting with the NRC's chief examiner to discuss the exam questions and resolve facility concerns (ES-402.C.1.h).
 - Helpful practice to understand concerns
- The facility licensee may expedite the grading process by giving draft comments to the NRC chief examiner before he or she leaves the site (ES-402, E.4).
 - Avoid unnecessary delays in resolution of comments
- Formal comments should be signed by an authorized facility representative and addressed to the responsible regional office (ES-402, E.4).

Submittal of Post Exam Comments (Cont)

- Inform the NRC of any substantive post exam comments that are stated by the applicants even if you do not support the comment.
 - Good practice in ES-401 E.4 and ES-501 C.1
 - Allows better understanding of applicant concerns
 - May prevent an unnecessary appeals
 - Some Appellants in the last year have claimed that technical comments have been withheld from the NRC.

Question Bank Integrity

- Before depositing questions in any exam bank, revise the questions to incorporate all changes, comments, and enhancements, as appropriate.
- Flawed questions that can't be fixed should not be incorporated into your exam banks.
- We don't want to deal with a potentially weak or flawed question again in the future.
 - (ES-403, D1.c & d)

Extension of 5 day time limit

- If you need more than five business days after the written exam is administered to complete your post exam submittal...

request a time extension!

- It truly is a pay now or later scenario.
- We want and expect your very best submittal.
- A first time quality submittal saves time and money in the long run.

Post exam changes:

Trigger levels

- Criteria for post changes – ES-501
 - 4 RO or 2 SRO question changes – explain why
 - 7 RO or 2 SRO question deletions – evaluate exam
 - Post exam comments that result in written exam changes or deletions will be counted in determining whether target quality exam submittal criteria was met
 - If >20% of the RO or SRO written exam questions submitted required replacement or significant modifications then the exam is considered outside the “acceptable quality range” expected by the NRC for either RO or SRO exams
- > 20% will be noted in exam report with some exceptions as permitted by Rev. 9

Post Exam Comments

Success Criteria – SME Review

- Use your best SMEs to review and provide comments prior to submittal.
- The NRC will review your comments very carefully after all there is a lot at stake.

References are required

- Support all assertions with technical references
- Quote procedure numbers and applicable sections
- Include the entire procedure in your submittal
- Do not selectively “pick and choose” references that support your contention while ignoring others that contradict the contention
- Be objective – do not simply advocate for passing
- Remember to mark and segregate security sensitive information

Document the bases for your contention

- Write your comment at a level that can be easily understood
 1. It will make the review process easier
 2. You are asking us to effectively revise an exam item that you had previously written or approved
 3. A licensing decision depends on it and it will be defensible.

Why did we have to make this change to an exam that had been approved?

- Take the time to explain why your previous justifications are now incorrect.
- You are now asking us to change the correct answer to the question.
- Explain why your original thinking was flawed.
- We need to correct the record on why our original thoughts and logic were wrong.

- ***Potential Consequences of Improper Resolution of Post Exam Comments:***
 1. Improperly Licensed Personnel.
 2. Potentially Material False Statements are investigated by the NRC.

Case Studies

Actual resolution of post exam
comments from a “plant in your
region”

Case Study

Ques #1 Generic Question

Plant conditions are as follows:

- Mode 5
- Core Shuffle Part 1 has just begun
- RBCCW is backing up TBCCW
- The CRD system is in service
- The RWCU system is in service in a normal lineup dumping 60 GPM to the Main Condenser
- A fire header break in the RBCCW system room has caused both RBCCW pumps to trip

WHICH ONE of the following describes the operational implications of this condition?

- A. Higher than normal plant dose rates.
- B. Loss of Instrument Air to the Refueling Bridge
- C. Reactor Cavity and fuel pool visibility will degrade
- D. **Reactor Cavity and Fuel Pool water level will begin to lower**

Q-1 Generic Question

Initial Licensee Response

- Original answer “d” is not correct.
 - Original Answer assumed both RBCCW pumps trip
 - CRD pumps trip after a loss of RBCCW
 - Reactor cavity/spent fuel pool level would lower.
 - However, there is no direct trip of the CRD pump due to a loss of RBCCW flow
 - CRD pump may remain running with a loss of TBCCW and RBCCW
 - CRD may or may not trip on low suction pressure
- Reactor cavity and spent fuel pool level may or may not lower

Q-1 Generic Question

Initial Licensee Response (cont)

- Distracter “C” is correct
 - RBCCW cools RWCU pump motor coolers
 - Loss of RBCCW trips the RWCU pump on high temperature in the RWCU pump motor windings
 - Applicants assumed SFPCU was not operating – not stated as running in stem of question
 - Crud dislodged from the fuel elements will cloud the water during fuel shuffle
 - Cavity water communicates with SFP via “natural circulation” flow
- Change correct answer from “D” to “C”

Generic Q-1

Initial NRC Response

- You supported your contention that “D” is not correct with references – we accept this change
- But it is not clear how spent fuel pool visibility will degrade with the spent fuel pool cooling / cleanup system (SFPC/U) in operation
 - SFPC/U will remove most particulate in the pool
 - There is little communication of water between the reactor cavity and the spent fuel pool
 - Reactor cavity water may degrade in visibility but spent fuel pool water will not have a noticeable difference
- Is there any correct answer?
 - Did not provide sufficient references to document your contention that “C” is correct

Q-1 Generic Question

Licensee Contention (cont)

- Spent fuel bundles are covered with a loose coating of corrosion products which will easily detach when bundles are moved through the water.
- The forced flow of water upward through the reactor tends to push corrosion products up, where RWCU has difficulty removing it.
- Effect is worsened if RWCU trips since no removal of corrosion products will occur down in the reactor core area.
- If filtration is lost, less corrosion particles will be removed, and visibility will degrade

Q-1 Generic Question

Licensee Contention (cont)

- Loss of RWCU during Shuffle Part 1 causes degradation of reactor cavity water and spent fuel pool water visibility would degrade.
- This makes answer “c” the correct answer.
 - Same situation had actually occurred during the last refueling outage
- Accept C as the only correct answer

Generic Q-1

NRC Response

- Accepted the licensee's recommendation
 - Original answer "D" not correct
 - Change correct answer to "C"
- Licensee provided excellent logic and documentation for changes
- Well done for post exam comment
- Should have caught the problem BEFORE the exam was administered

Case Studies

Ques #1 Westinghouse PWR

Given the following conditions:

- The Unit is operating at 100% power, with all systems in a normal system alignment.
- The RO recognizes that Control Bank “D,” Group 2, and Control Bank “B,” Group 2 control rods drop just prior to a reactor trip.

Which ONE of the following is the cause of the failure?

- A. Logic Cabinet Oscillator failure
- B. Logic Cabinet Master Cyclor failure
- C. Power Cabinet Thyristor failure (original correct answer)**
- D. Power Cabinet Logic error

PWR Q-1 Licensee Contention

- Accept C (original answer) and D as correct.
 - C - requires 2 failed thyristors to cause 2 groups of rods to insert
 - D – a “power cabinet logic” failure causes an “urgent failure” alarm – but no such alarm was stated in the stem of the question
 - By design however, the Power Cabinet “Urgent Failure” should actuate, and issue a hold current to the affected rods to prevent the rods from dropping
 - Applicants assumed Urgent Failure alarm “had not activated” (additional failure?)
- Concluded that 2 groups of rods would drop

NUREG 1021 Appendix E says

“ 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 stated in the question. For example, you should not assume an alarm has activated unless the question so states or the alarm is expected to activate as a result of the conditions that are stated in the question.”

Q-1 NRC RESOLUTION

- Answer C is not correct
 - The stem does not state or imply 2 separate thyristor failures
- Answer D is not correct
 - The Urgent Failure alarm is an expected condition that is a consequence of the logic error
 - The applicant should have recognized that the a hold current would have been applied as a consequence of a logic error
- No correct answer
 - Deleted the question from the exam

Case Study

Ques #2 Westinghouse PWR

Given the following conditions:

- The Unit has been at 100% power for 3 weeks. All systems are in normal alignment.
- RCS boron concentration is 1000 ppm.
- A controlled power reduction to 50% is to be performed.

Using the references provided and maintaining control rods at their current position, assuming no change in xenon concentration, which ONE of the following describes the approximate amount of boric acid required to initially maneuver the plant to 50% power?

- A. 700 - 800 gallons
- B. 850 - 950 gallons
- C. 1000 - 1100 gallons (original correct answer)**
- D. 1150 - 1250 gallons

PWR Q-2 Licensee Contention

B and C (original answer) should be considered correct based on the tolerances and inaccuracies introduced to determine this answer.

- tolerances between the proposed correct answers (“B” or “C”) fall within the tolerances and margin of error obtained when calculating the correct answer to this problem.
- the required amount of boric acid that needs to be added is between 900 and 1100 gallons.
- the small size of the scale ($\sim 3/8$ of an inch represents a difference of approximately 200 gallons, which is still on a log scale), the readability of this scale should be considered to fall within an acceptable margin of error to accept answers “B” or “C.”

PWR Q-2 Contention (cont)

- Degree of difficulty was high:
 - “The candidate needs to use three different graphs to obtain the desired boron concentration change (135 ppm) to plot on the far right column of the nomograph.
 - Assuming a small error on reading each curve, the starting point on the nomograph of 135 ppm will have some numerical tolerance in addition to the interpolation tolerance.

PWR Q-2 Licensee Conclusion

- The intent of the question was to evaluate the candidates' ability to calculate the amount of boric acid addition for a given power change.
- By choosing either answer “B” or “C” this knowledge and ability is demonstrated to be within an acceptable margin of error as explained above.

PWR Q-2 NRC Resolution

The Background...

- Original question asked for the “minimum” amount of boric acid to “initially” maneuver to 50% power
- NRC challenged the question based on the potential confusion that might be caused by asking a candidate to decide a “minimum” amount for a downpower
- NRC suggested asking the applicant to determine the amount of boric acid to accomplish the 50% decrease.
- NRC suggested the answers and distracters be ranges of boric acid quantities, only one of which should include the correct answer.

PWR Q-2 NRC Resolution

The Decision

- Original submittal – as administered
 - Licensee answer was 900 gals
 - NRC review indicated closer to 950 gals
- Post-exam review showed a problem
 - Licensee corrected answer was 966 gals
 - NRC review indicated 970 gals
- Resolution – deleted the question
 - Answer did not lie in either “B” (850-950) or “C” (1000-1100) error bands

PWR Q-2 Bases for Resolution

- Precise answer was not captured by any of the ranges of boric acid quantity provided by the four answers/distracters.
 - “B” + “C” covered a range of 850-1100 gallons
 - 250 gallons would challenge the discriminatory value of the question.
 - None of the right answers were within the range of B or C
- No correct answer for the question was provided

Case Study

Ques #1 General Electric BWR

A LOCA has occurred , RPV level has slowly trended down. The following conditions exist in the plant:

- Reactor pressure 50psig;
- Wide Range Level -146 inches;
- Fuel Zone level -93 inches;
- Upset Range level 0 inches;
- Shutdown Range Level 0 inches;
- Narrow Range level 0 inches;
- Drywell pressure +5.2psig;
- Drywell Temperature 200 degrees F.

As the Unit Supervisor using ON-145-004, which of the following Reactor Level Instruments would you instruct the operators to use as water level lowers”?

- A. Shutdown Range
- B. Fuel Zone
- C. Upset Range
- D. Wide Range (Original correct answer)**

BWR Q-1 Licensee Contention #1

- Can the range for Wide Range Level REALLY be extended to -147"?
 - This would leave only one inch of useable level indication as water level continues to drop.
- With reactor pressure at 50 psig, use the 100 psig column for a conservative level indication
- Fuel Zone would therefore be on scale at -93" to -307 inches.
- We consider "B. Fuel Zone" as the only correct answer (i.e. "D" is not correct)

BWR Q-1 NRC Response #1

- Using the 100 psig was not conservative
 - 0 psig column yields a lower and more limiting level condition
 - Interpolating for 50 psig yields -101.5 inches
 - -93" is > useable scale of the Fuel Zone instrument.
 - Procedure is silent on whether to interpolate
- Having Wide Range Level at -146 inches and Fuel Zone level at -93 inches did not make sense
 - These levels should be nearly the same value
- Question was flawed - stem conditions not realistic
- Also values given for Wide Range Level (-146 inches) and Fuel Zone level (-93 inches) do not indicate whether these values are actual readings or corrected

BWR Q-1 Licensee Response and NRC Resolution

- After further review and consideration...the licensee
 - Retracted request to modify the answer key
 - Stem of question poses conditions that are not realistic and
 - Distracters are not plausible
 - Agreed that the question should be deleted
- NRC deleted the question from the exam

Case Study

Ques #2 General Electric BWR

The plant has experienced a loss of offsite power and the following conditions exist:

- Buses 1C and 1D are being supplied by their respective EDGs
- RPV pressure is being maintained at 935 psig with Isolation Condensers
- Oyster Creek has been informed that offsite power will be restored no sooner than 72 hours

If a plant cooldown is commenced at the **MAXIMUM** allowable cooldown rate, what will be the **MINIMUM** time it takes to clear the shutdown cooling interlocks, assuming a constant cooldown rate?

- A. 1.9 hours
- B. 2.2 hours
- C. 19 hours
- D. 22 hours

BWR Q-2 Licensee Contention

- Max cooldown is 10 °F/hr unless:
 - HPI available and make to iso-condenser
 - Original question assumed not true
- But – CRD provided HPI source and fire diesels provided makeup to iso-condenser on a loss of offsite power
- So – maximum cooldown limit is 90 °F/hr (admin limit)
- Recommend change correct answer to “B”

BWR Q-2 NRC Response

- But – let's look again CAREFULLY at the cooldown calculation:
 - Maximum allowable cooldown rate is 90°F/hr.
 - Starting temperature @ 935 psig is 538 °F
 - SDC interlocks clear @ 350 °F
 - Required cooldown of 188 °F to clear SDC interlocks
- $188^{\circ}\text{F} / 90^{\circ}\text{F/hr} = 2.088 \text{ hrs} \neq 2.2 \text{ hrs ("B")}$ - even with rounding up
- Are any of the answers really correct?

BWR Q-2 Final Resolution

- Deleted the question from the exam
 - “best” or “closest” answer is not the “right” answer
 - When asking for calculated values, provide acceptable error bands in the answer key
- Additionally – what is the “plausible” error for distracter “D”
 - What “math error” would be plausible?
- Quality of technical review is important