

Draft Outlines submitted by SONGS received at 1200 CST on 2/12/2007 for June 2007 Exam.

NRC Outline review comments IAW ES-201-1:

**1. Written:**

T1G1-

Contractor sampled twice from same line item for two systems in Tier 1, Group 1. This contractor did this on the last outline for the October 2006 exam. When called then he believed that the line item for system 007 (BW/E02&E10;CE/E02) Reactor Trip-Stabilization-Recovery/1 allowed a selection of both a K/A from system 007 in the catalog and a second selection from E02, in this case because SONGS is CE and this is CE specific. A duplicate problem also occurred for the system:

0040 (BW/E05;CE/E05;W/E12) Steam Line Rupture-Excessive Heat Transfer/4 in that a K/A selection was made for system 040 and also for CE E05.

In a call to NRR last year during outline reviews, I spoke with Fred Guenther on this issue and he stated that this is oversampling on a topic. Because the contractor had not sampled items such as 0029 ATWS, 055 for Station Blackout, and 065 for Loss of instrument Air, these would be appropriate replacements for the two oversampling examples listed above. Also on the call, Fred was asked the question about an automated program that the contractor had developed that was proprietary and singularly used and how to get it certified by the NRC for use. Fred stated that we do not have a process in place for this type of review but the outlines must be scrutable IAW NUREG-1021. In the October 2005 exam at SONGS, the contractor's program did not include on each of the forms for the written outlines the items not selected. The forms were only populated with items the program selected. The question came up as to how the NRC would know if the program had the opportunity to select these items or if the program omitted them from the random selection process. The contractor provided a list of systems omitted from the ES-401-2 forms submitted and indicated that they were in fact in the system but not selected. As the chief examiner I performed a cursory review of the program while onsite for the validation week and it appeared that the program did include these items in the random selection process.

T1G2-

The program sampled system 037 for Steam Generator Tube leak/3 twice, indicating a flaw in the program because in this tier and group, there are 22 items to select from and 9 are required to be selected. Rule 4 on ES-401-2 states that (paraphrased) every system must be sampled once before selecting a second topic K/A for any system or evolution.

T2G2-

it may be difficult to write a SRO-only question on condensate system 056.

**ES-401-4 form review:**

Rejected 022 AK1.01 with statement of no relation to facility-need a better clarification on these items than this. I called Bill Arbour and discussed. SO-23-13-6, used on previous written and operating exams, either justify in detail or write a question on it.

Bill Arbour/Rob Hampton agreed to send an updated ES-401-4 with better justification for review.

## **2. Simulator:**

Generally speaking there has been a lack of originality in the scenarios from 2005 to present. Specifically, Use of same or very similar instrument/component failures has occurred during this Timeframe. I reviewed previous year's exams and have not seen the following:

1. No digital FW/dig turbine faults such as fw suc press/flow xmtr failures,
2. no MFW lube oil issues-loss of MFW,
3. few (one in 2005) NI instrument faults...hi log power trip,
4. no SG low press trips,
5. no dropped rod events,
6. no failure of CSAS during LOCAs,
7. no rad monitor failures with actions??,
8. failure of bypass or stm dump valves to open post trip,
9. inter-system LOCA's (CCW-RCS),
10. feedwater valves fail to close on ESDE,
11. no letdown flow instrument or back-pressure control valve failures,
12. no SG level failures,
13. instrument air failures,
14. SG safety stuck open...,
15. inadvertent actuation of various ESF equipment such as Aux FW,
16. Transformer failures,

Also, because of industry events and new systems you have installed such as Digital FW/turbine, Failures of items related to these new systems should be included in the scenarios.

Suggest a large modification of the scenario outlines including new component and instrument items. I like the low power IC for Scenario 4 so please keep that content for it. Major events are fine as long as they work with the modifications made for instrument and component failures.

Specific comments on the submittal:

Scenario 1: Event 6 is a component failure, not a major event as exemplified in the NUREG.

Scenario 1: Event 9, with LOOP and loss of both diesels this would be a SBO, wouldn't it? If you agree, then this would be a second major event under event type for this event.

Scenario 2: Event 6 loss of vacuum is a not a major event by itself, and should be classified as a component failure for type.

Scenario 2: Event 7, the overspeed trip of P-140 during the major might be able to be counted as a component failure dependent on how this failure was setup and subsequent operator actions.

Scenario 3: Event 4 has been used too much on exams. See general notes above for suggestions.

Scenario 4: Event 8, should be rolled into event 7 (the major) and would be a component failure, not an instrument failure unless there is more details not provided in the brief overview about this event.

## **3. W/T:**

Admin topics:

Q: Which Admin jpm is "significantly modified" since a new jpm was not written and one of these is required?

Note: I will need to have a copy of the old admin jpm and the corresponding modified admin jpm during the draft exam review to verify that at least one RO admin jpm meets this criteria.

Sim / In-Plant JPMS

Q: How is P-1 a Safety function 6? I need some clarification since control room evacuation and electrical systems (SF-6) must be tied for this new jpm.

Also, P-1 will be SUNSI and will require strict controls if we (NRC, utility, contractor) decide to use it.

**Don't send it (P-1) with the draft exam submittal if we decide to use it. I will communicate on how to send it separately.**

**4. General:**

No additional comments.

To Mr. Kelly Clayton, Chief Examiner SONGS June 2007 Exam  
From: Bill Arbour, Initial Training Supervisor

**1. Written:**

On the last outline for the October 2006 exam the contractor was notified of the NRC's concern related to over sampling of selected topics for T1G1. After discussion with the NRC the contractor notified their designer of their automated program and requested changes to the program to correct the deficiencies. The designer agreed and adjusted the program to meet the requirements of NUREG 1021. Unknown to the contractor the designer had not yet addressed the problem with the CE portion of the program and had only adjusted the program for Westinghouse development of exam outlines. When the outline for the 2007 SONGS NRC exam was developed the deficiency had not yet been corrected and was again identified by the NRC Chief examiner and brought to the attention to the Utility for correction. The Contractor has been notified and has had the automated program corrected. A corrected outline is included in this package.

**ES-401-4 form review:**

The record of rejected K/As as delivered, although correct, was void of necessary detailed description necessary for adequate analysis by the NRC. This form is being resubmitted with expanded explanation as to defend rejection from the outline.

Of particular concern to the NRC during review of the rejected K/As is the utilities rejection of K/A 022 AK1.01 for the current outline for 2007 and the acceptance of K/A 022 AA2.02 during the development of the 2006 NRC exam. This concern is valid and deserves analysis;

4.2 Generic APE Abnormal Plant Evolutions 022 is labeled "Loss of Reactor Coolant Makeup" note; the word "Pump" does not appear after the word "Coolant".

AK1, AK2, AK3, AA1, and AA2 all use the phrase "...Loss of Reactor Coolant **Pump** Makeup..." note; the word "Pump" appears after the word "Coolant".

When 022 AA2.02 was accepted during the 2006 development this entire K/A's wording needs to be viewed;

"022 Loss of Reactor Coolant Makeup" AA2.02 Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Pump Makeup: Charging pump problems.

The Utilities desire and responsibility to accept randomly selected K/As led the Utility to accept this K/A because the Utility does have "Reactor Coolant Makeup" as well as Charging Pumps. The word "Pump" in the description of the K/A was not identified as a significant problem for accepting the K/A because the rest of the description applied. The K/A and the question used on the 2006 SONGS license exam follows;

"022 Loss of Reactor Coolant Makeup" AA2.02; Ability to determine and interpret the following as they apply to the Loss of Reactor Coolant Pump Makeup: Charging pump problems.

#44

Given the following conditions:

Unit 2 is at 100% power.

The following alarms are received:

50A23, PZR LEVEL ERROR LO

58A01, REGEN HX TSH 9267 LETDOWN TEMP HI

The RO determines that all PZR level instrumentation is trending down.

Letdown flow is 35 GPM and trending down.

The crew enters AOI SO23-13-27, Pressurizer Pressure and Level Malfunction.

The trends continue as before.

Of the choices below, which ONE (1) is the probable cause?

- A. Letdown Flow Controller failure.
- B. Loss of Charging flow.**
- C. Pressurizer level controller setpoint failure.
- D. Letdown backpressure control valve input failure.

022 AK1.01 was rejected during the 2007 development due to the details in the wording of the K/A. The wording in this K/A needs to be scrutinized as well:

“022 Loss of Reactor Coolant Makeup” AK1.01 Knowledge of the operational implications of the following concepts as they apply to Loss of Reactor Coolant Pump Makeup:  
Consequences of thermal shock to RCP seals.

The first point that was noticed by the Utility is the consequences of thermal shock to RCP seals at SONGS are minimal. Experience of several of the developers related this K/A to seal injection utilized at other utilities. Some utilities use part of their charging injection to cool the RCP seals. SONGS uses the RCS bleed flow to stage the seals and provide cooling for the surfaces of the seals. The cooling at SONGS has nothing to do with charging injection. In addition the cooling from CCW can be lost for several minutes without damage to the seals. The subsequent reapplication of CCW to the seal heat exchanger has minimal consequences of thermal shock to the seals themselves. The consequences of this event are minimal and no Abnormal Operating Procedure exists for this situation.

The Utility’s original rejection of this K/A (No relation to facility) is accurate as it relates to the “Consequences of thermal shock to RCP seals” because of the lack of relevance to the RCP seals at SONGS. The Utility’s acceptance of the 2006 K/A is justified due to the existence of “Reactor Coolant Makeup” as well as Charging Pumps. The Utilities understanding is that the K/A catalog has been improved significantly from the last version but problems still exist. It is the intention of this Utility to use the K/A catalog as accurately as possible and viewing the inconsistencies with an appropriate amount of tolerance and flexibility.

## 2. Simulator:

The NRC has expressed a concern over the simulator portion of the exam. The concern is centered on repeated types of failures between exams since 2005. The concern is compounded by the apparent lack of new types of failures for this exam compared to previous exams. A list of suggestions was presented to the Utility for consideration to be inserted into the exam.

The exam, as outlined, has been evaluated and determined by the Utility to meet the requirements of NUREG 1021 Rev 9. Limits on the frequency and types of failures from the current exam compared to previous exams have not been violated. The Utility does realize that meeting the letter of the law is a minimum and it is prudent to improve when possible. To this end the Utility agrees that expanding the exams to include a wider variety of failures would be appropriate and desirable to enhance the quality of the NRC exams as a validation tool to identify safe operators. Exams, as well as exam outlines, being labor intensive and challenging to provide a quality product to meet exam dates, does not lend itself to a large modification of the exam outlines at this time. Efforts will be incorporated to expand the content of the exams compared to previous exams in the future.

The list of suggestions provided by the NRC Chief Examiner deserves addressing. It is understood that the list provided is not finite or required but given as examples. A short discussion is given for the items on the list.

1. No digital FW/dig turbine faults such as fw suc press/flow xmtr failures,  
Master Controller Setpoint failure, a slow leak that leads to lowering of steam flow and manual binding of feed water regulating valves are the only plausible failures. Although the students are exposed to these types of failures in their training the lack of value as an evaluation tool requires the Utility to not use these types of failures on an exam.
  - a. Flow transmitter failures on the new digital feedwater system require minimal action on the part of the BOP due to system redundancy; however, they do require action on the part of the operator to place the malfunctioning transmitter in bypass. The only failure that requires "immediate" attention on the part of the BOP is a Master Controller Setpoint failure.
    - i. The following failures were used on the Oct 2006 NRC exam:
      1. NRC Scenario #5 - E-088 Master Controller Setpoint failure.
    - ii. The following failures will be used on the June 2007 NRC exam:
      1. NRC Scenario #1 - E-089 Feed Flow Transmitter failure.
  - b. Turbine Digital Control System failures are generally self-correcting.

2. no MFW lube oil issues-loss of MFW,
 

A loss of MFW lube oil would only affect one of the main feed pumps and would not render the entire main feed system unavailable. Failures have been created to be used in an escalation to a total loss of feed water which leads the crew to SO23-12-6 Loss of Feed Water.

  - a. A loss of a Main Feedwater Pump (MFWP) is generally considered to be a "Unit trip" likely event, therefore, use of same is limited to those situations where a subsequent trip has minimal impact on the continuation of the scenario (e.g., loss of feedwater). At SONGS, a trip of a MFW Pump at 100% requires an immediate rapid power reduction, initiation of Emergency Feedwater and a lowering of power to < 70% where the remaining MFWP can hopefully restore level. Anything less than 70% power and the impact is minimal. In building scenarios to support a LOFW event we have tried to use many different approaches:
    - i. Oct 2005 NRC Scenario #2 utilized a seismic event with a MFWP trip as event initiators for a LOCA and LOFW Functional Recovery event.
    - ii. Oct 2006 NRC Scenario #1 utilized a Condensate Pump trip and a loss of Condenser vacuum to initiate a LOFW event.
    - iii. June 2007 NRC Scenario #2 will utilize an overcurrent trip and lockout of Bus 2A06 and a loss of Offsite power to support a LOCA and LOFW Functional Recovery event.
  
3. few (one in 2005) NI instrument faults...hi log power trip,
  - a. Generally speaking, the NI detector failure does not meet the NUREG 1021 ES-301 standard of "verifiable actions that provide insight to the applicant's competence." We have limited the use of this event to the Audit examinations where the standard is easier to defend. While it would certainly be "nice" to use these type of malfunctions (i.e., RWST level instrument failures, SG level and pressure failures, Core Protection Calculator failures, etc.) or any other Technical Specification required instrumentation for that matter, if there is not the "verifiable action" plus an associated Tech Spec call, that failure will get "overlooked" because it just does not work into the 60 to 90 minute time frame that we are trying to maintain and still get the required "bean" count.
  
4. no SG low press trips,
  - a. See #3 above. I'm assuming that you are referring to an individual instrument failure as opposed to an ESDE.
  
5. no dropped rod events,
  - a. We have used Rod Control events in both the scenario and JPM arenas.
    - i. Oct 2005 NRC Scenario #1, LOCA had a dropped rod.
    - ii. Oct 2006 NRC Scenario #5, LOCA (which was re-labeled as #3 after the NRC validation) had a dropped rod.
    - iii. Oct 2005 NRC JPM S-6.
    - iv. June 2007 NRC JPM S-3.

6. no failure of CSAS during LOCAs,
  - a. Initially we did not think that this was correct, however, in reviewing the last four (4) exams the only thing that comes close was a new JPM S-8 on the Oct 2005 NRC exam that addressed the Containment Cooling System. This of course prompted the question, "When did we do a LOCA of adequate size with a Train of Containment Spray out-of-service here the impact would be significant?" The reason being that post-major events are usually selected to meet Critical Task criteria and a Train needs to be out of service for this failure plus the break size must be sufficient that a CSAS failure has some operational impact. That said, here is what I discovered:
    - i. April 2005 NRC Scenario #2, LOCA and ESDE the RCS leak size (~500 gpm) was insufficient to impact Containment Spray.
    - ii. Oct 2005 NRC Scenario #2, LOCA and LOFW the RCS leak size (~500 gpm) was insufficient to impact Containment Spray.
    - iii. Oct 2005 NRC Scenario #4, ESDE and LOCA the RCS leak size (~400 gpm) was insufficient to impact Containment Spray.
    - iv. Oct 2006 NRC Scenario #5, LOCA (which was re-labeled as #3 after the NRC validation) the RCS leak size (double-ended shear) was more than sufficient to impact Containment Spray, however, the NRC scenarios had the Train A Charging Pump, Saltwater Cooling Pump, and LPSI Pumps OOS. The Audit scenarios used for the Oct 2006 exam had the Train A Containment Spray Pump and HPSI Pumps OOS.
      1. The double-ended shear was used, ad nauseum, during the 80's but history and the PRA would show that the small break LOCA has a greater chance of occurring and poses the greater risk for core damage.
    - v. June 2007 NRC Scenario #2, LOCA and LOFW the RCS leak size (~1200 gpm) is insufficient to impact Containment Spray (as submitted).
    - vi. June 2007 NRC Scenario #4, ESDE and LOCA the RCS leak size (~250 gpm) is insufficient to impact Containment Spray (as submitted).
7. no rad monitor failures with actions??,
  - a. This was tested on the Oct 2006 NRC exam as JPM S-2.
8. failure of bypass or stm dump valves to open post trip,
 

Steam dump valves (ADV's) are not designed to open without operator action following a trip. If the valve were to fail to operate post trip when required by the operator then local operation would be required and no further operation, after identification of failure, by the license operator would be required, other than "open" and "close" verbal direction to the local operator.

  - a. During a loss of vacuum event where the BOP must place the Atmospheric Dump Valves (which are normally left in Manual) in service as part of his post-trip actions.
    - i. Oct 2006 NRC Scenario #1 tested this event.
    - ii. Oct 2006 NRC Scenario #3 tested this event.
9. inter-system LOCA's (CCW-RCS),
 

Including this event in future NRC exams will be evaluated. I seem to recall minimal NUREG 1021 impact.
10. feedwater valves fail to close on ESDE,
 

Feed water valves failing to close on ESDE are trained but have not been a failure of focus on NRC exams. Including this event in future NRC exams will be evaluated.

11. no letdown flow instrument or back-pressure control valve failures,
  - a. The following failures were used on the Oct 2006 NRC exams:
    - i. NRC Scenario #6 - Letdown pressure transmitter failed high
  - b. Letdown flow instrument failures are generally contained within a Pressurizer Level instrument failure where we can take credit for the instrument failure and a Tech Spec call for the CRS.
  
12. no SG level failures,

SG levels to digital feed water control system are now 1E inputs. Any single or even dual failure has no real effect on DFWCS. This does force operators to exercise SO23-13-18 and bypass level inputs to DFWCS as well as RPS/ESFAS trips.

  - a. The following failures were used on the Oct 2006 NRC exams:
    - i. NRC Scenario #6 - E-089 Level instrument fails low
  
13. instrument air failures,

The major concern for licensed operators in the instrument air system is the containment isolation valve operation during major events and this aspect has been evaluated during NRC exams each time we have a CIAS. Failure of the entire system is problematic. Although the instrument air system for both units is located in the Unit 2 turbine building the backup for the instrument air system at SONGS is the respiratory air system. This system is located and operated in the Unit 3 turbine building. Although some failures can be simulated, modeling failures for the respiratory air system is challenging. Even If both instrument air and respiratory air system fail then the nitrogen system, which for the most part is passive, will back up instrument air. Given system redundancy this event is typically not considered as plausible.
  
14. SG safety stuck open...,

SG safety stuck open is the same as just about every other excess steam demand event. The one difference that may be of interest is the reset capability of the safety in the middle of the event.

  - a. In general, ESDEs inside Containment yield the necessary Critical Tasks as opposed to those outside Containment.
  - b. The following failures were used on the Oct 2005 NRC exam:
    - i. NRC Scenario #4 - 2 SG safeties fail open.
  
15. inadvertent actuation of various ESF equipment such as Aux FW,
  - a. The following ESF failures were used:
    - i. April 2005 NRC exam Scenario #1 - SIAS relay failure.
    - ii. Oct 2005 NRC exam Scenario #4 - EFAS Partial Actuation.
    - iii. Oct 2006 NRC exam Scenario #6 - Train B SIAS relay failure.
    - iv. June 2007 NRC exam Scenario #4 - MSIS relay failure
    - v. June 2007 NRC exam Scenario #4 - AFW Valve fails close

16. Transformer failures,

Assuming reference is to Main, Unit Aux, and Reserve Aux transformer failures. Emphasis on electrical failures of this magnitude is similar to loss of 4kv and 6.9kv busses or loss of off site power.

- a. Transformer failures do not have an "identifiable" impact on the Units due to redundancy of design. If we fail the Reserve Auxiliary Transformer (RAT) supplying a 1E 4 kV Bus the alternate Unit's RAT will supply power. If we fail a Main Transformer we get a Unit trip and a potential for a loss of Offsite Power but nothing that specifically says "Take action for a loss of the Main Transformer." The "operational impact" comes from an overcurrent/undervoltage trip that ultimately isolates the 1E Bus.
- b. The following failures were used on the Oct 2006 NRC and Audit exams:
  - i. NRC Scenario #4 - Overcurrent trip & lockout of 1E Bus 2A04
  - ii. Audit Scenario #2 - Overcurrent lockout of 1E Bus 2A06 upon SIAS
- c. The following failures will be used on the June 2007 NRC and Audit exams:
  - i. NRC Scenario #2 - Overcurrent trip & lockout of 1E Bus 2A06

In general, the malfunctions and events suggested result in the same symptoms and actions that are being performed by most of the malfunctions and events already being used by SONGS. As a whole the current process meets the NUREG and is found acceptable by the utility. Currently, every effort is made to incorporate new operating experiences, plant changes and new concerns identified by INPO and the NRC. SONGS will continue to grow in these areas as well as look for new ideas for incorporation into the exam process.

Specific comments on the submittal:

Scenario 1: Event 6 is a component failure, not a major event as exemplified in the NUREG.

This was labeled as an M (ALL) because all crew members should recognize that a Reactor trip should have occurred.

Scenario 1: Event 9, with LOOP and loss of both diesels this would be a SBO, wouldn't it? If you agree, then this would be a second major event under event type for this event.

This is not an SBO event; however, it would become one if the BOP fails to perform actions required per the SPTAs. The BOP is required to ensure that the EDG breaker will not close. When they recognize that voltage is too low, they must raise output voltage and the breaker will shut.

Scenario 2: Event 6 loss of vacuum is a not a major event by itself, and should be classified as a component failure for type.

Re-labeled as BOP bean.

Scenario 2: Event 7, the overspeed trip of P-140 during the major might be able to be counted as a component failure dependent on how this failure was setup and subsequent operator actions.

Re-labeled as a BOP bean.

Scenario 3: Event 4 has been used too much on exams. See general notes above for suggestions.

Meets the requirements and this is a desirable event to gauge the ROs mastery of board components.

Scenario 4: Event 8, should be rolled into event 7 (the major) and would be a component failure, not an instrument failure unless there is more details not provided in the brief overview about this event.

This is a separate BOP event and should remain as is. The scenario summary is self explanatory.

Admin topics:

Q: Which Admin jpm is “significantly modified” since a new jpm was not written and one of these is required?

The conditions and outcome for JPM A.1.a can be modified to use factors not incorporated into the bank JPM (SONGS needs to ensure that this occurs).

The conditions and outcome for JPM A.1.b can be modified to use factors not incorporated into the bank JPM (SONGS needs to ensure that this occurs).

The conditions and outcome for JPM A.3 can be modified to use factors not incorporated into the bank JPM (SONGS needs to ensure that this occurs).

Sim / In-Plant JPMS

Q: How is P-1 a Safety function 6? I need some clarification since control room evacuation and electrical systems (SF-6) must be tied for this new jpm.

Requires actions that are electrical in nature, although it spans a couple of Safety Functions.