

# PROJECT TO UPDATE SECTION 2, "GENERIC KNOWLEDGES AND ABILITIES," OF NUREG-1122

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Prepared by:  
Valerie E. Barnes  
Performance, Safety, and Health Associates, Inc.  
Post Office Box 30  
Boalsburg, PA 16827

Prepared for:  
Westinghouse Owners Group  
Training Working Group

## ABSTRACT

The Westinghouse Owners' Group (WOG) Training Working Group (TWG) initiated a project to survey licensed operators in the commercial nuclear power industry to reassess the job relevance and "importance to safety" of the 129 knowledges and abilities (K/As) in Section 2, "Generic Knowledges and Abilities," of NUREG-1122 (*Knowledges and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors, Rev. 2*). The K/As in Section 2 were selected for review because industry examiner personnel have described them as the greatest source of confusion in NUREG-1122 (the Catalog) and the most significant mismatch between the member utilities' expectations and the NRC's testing requirements. The results of the survey indicated that it would be worthwhile to update Section 2. Therefore, the WOG TWG held a workshop to review the information collected from the survey and develop recommendations for adding, deleting, and revising the K/As to increase their relevance to today's operating environment. This report summarizes the methods and findings of the survey and presents proposed revisions to the K/As in Section 2.

## EXECUTIVE SUMMARY

The Westinghouse Owners' Group (WOG) Training Working Group (TWG) initiated a project (PA-OSC-139) to survey licensed operators in the commercial nuclear power industry to reassess the job relevance and "importance to safety" of the 129 knowledges and abilities (K/As) listed in Section 2, "Generic Knowledges and Abilities," of NUREG-1122 (*Knowledges and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors, Rev. 2*). The K/As in Section 2 were selected for review because industry training and examiner personnel have described them as the greatest source of confusion in NUREG-1122 and the most significant mismatch between the member utilities' expectations and the NRC's testing requirements. The purpose of the survey was to answer the following questions: (1) do the "importance to safety" ratings for each generic K/A continue to be accurate in today's operating environment; (2) are there other generic K/As that should be added to the K/A Catalog; and (3) should the existing generic K/As continue to be used as they are currently written, clarified, or revised based on industry operating and licensing exam experience.

The survey was administered over the World Wide Web between October, 2004 and April, 2005. One hundred and twenty-nine participants completed some portion of the survey, and 118 completed the entire survey. Twenty-two of the 42 sites with operating PWRs (52%) provided respondents for the survey. The participating sites represented 15 of the 26 utilities (58%) that are currently licensed by the NRC to operate PWRs. The utility volunteers who participated in the survey (1) held a PWR license as a Reactor Operator (RO) or Senior Reactor Operator (SRO) at the time of the survey or previously held a PWR license, (2) had access to the internet, and (3) had available approximately 4 hours of time to complete the survey. Eleven NRC examiners also participated.

Only one systematic difference was found in the importance ratings provided by different groups of participants. A small, positive correlation ( $r = .21$ ,  $p < .05$ ) was found between the amount of time a respondent had spent standing watching over the past 5 years and the respondents' importance ratings. However, no systematic differences were found between the ratings provided by NRC examiners and utility respondents; licensed RO and SRO respondents; or training personnel, Operations management personnel, and RO or SRO job incumbents. Because the one group difference identified had a negligible impact on the ratings, group membership was not considered in the remainder of the analyses.

The average importance ratings obtained from the survey and those in the Catalog had a strong, positive relationship ( $r = .91$ ,  $p < .001$ ). That is, K/As that were rated as highly important in the Catalog were also rated as highly important by the survey participants, while K/As rated as low in importance in the Catalog were also rated as of low importance by the survey participants.

However, the importance ratings from the survey were on average about one-half of a rating level higher on the 1-5 rating scale used than those in the Catalog. The reasons for the higher average importance ratings in the survey could not be determined.

Additional analyses of the survey data led to the following conclusions:

- The importance ratings for 22% of the current K/As in Section 2 showed substantial variability among the raters, indicating that these K/As may require updating or clarification;
- There are many more K/As in Section 2 that are appropriate for testing in an SRO-level exam than in an RO-level exam, indicating that exam developers may have difficulties in selecting the required number of K/As from Section 2 to be tested in initial licensing exams;
- The knowledge or ability required is different for the RO and SRO jobs in 45% of the K/As, indicating that revisions to the K/As may be warranted to clarify their unique applicability to the two job levels; and
- The K/As in Subsection 2.3, Radiation Protection, appear to be particularly difficult to interpret and use as the basis for exam questions that are applicable to licensed operators' job requirements.

Based on these findings, the WOG TWG concluded that revising Section 2 would be appropriate and held a 3-day workshop to develop proposed revisions to the K/As. Workshop attendees were comprised of WOG TWG members.

The WOG TWG's recommended the following changes to Section 2 of the K/A Catalog:

- Deleting the 11 K/As that currently comprise subsection 2.3, Radiation Protection, and replacing them with 10 new K/As derived from 10 CFR 41;
- Deleting 4 additional K/As because they were determined to be adequately addressed in other K/As either in Section 2 or in other sections of the Catalog and retaining them could result in over-sampling of the topic areas;
- Revising 37 K/As to clarify their intended meaning and applicability to the RO or SRO job by making editorial changes to the wording and/or adding examples of the knowledges or abilities to which the K/As refer;
- Moving 7 K/As related to fuel handling from subsection 2.2, Equipment Control, to subsection 2.1, Conduct of Operations, for consistency with how these knowledges and abilities are discussed in NUREG-1021;
- Moving 6 K/As currently in subsection 2.1 to subsection 2.2, based on the greater relevance of their content to Equipment Control rather than Conduct of Operations;
- Moving 2 K/As from subsection 2.4, Emergency Plan/Procedures, to subsection 2.2, Equipment Control, because the knowledges or abilities apply during normal as well as abnormal and emergency operations;

- Adding one new K/A to subsection 2.1, Conduct of Operations, related to reactivity management; and
- Revising other K/As in Section 2 to correct grammatical or typographical errors, add articles of speech for clarity, and provide complete citations to the relevant paragraphs of 10 CFR 55.

If NRC approval of the proposed changes is obtained, the previous survey participants will be asked to provide importance ratings for the new and revised K/As. A revised Section 2 will then be submitted to the NRC for consideration as a replacement for the current Section 2 in the K/A Catalog.

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# 1 INTRODUCTION

## 1.1 Purpose and Scope

The Westinghouse Owners' Group (WOG) Training Working Group (TWG) initiated a project (PA-OSC-139) to survey licensed operators in the commercial nuclear power industry to reassess the job relevance and "importance to safety" of the 129 knowledges and abilities (K/As) listed in Section 2, "Generic Knowledges and Abilities," of NUREG-1122 (*Knowledges and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors, Rev. 2*). The K/As in Section 2 were selected for review because industry training and examiner personnel have described them as the greatest source of confusion in NUREG-1122 and the most significant mismatch between the member utilities' expectations and the NRC's testing requirements. This report presents the results of the project to-date, a list of recommended changes to the K/As in Section 2, and the bases for the recommendations.

## 1.2 Background

NUREG-1122 (the Catalog) was initially developed in 1985 by a working group comprised of licensed Reactor Operators (ROs), Senior Reactor Operators (SROs), and NRC-certified operator licensing examiners. The original Catalog was developed using the Institute of Nuclear Power Operations' (INPO) generic Job and Task Analysis (JTA). INPO developed the generic JTA in an effort to provide a common starting point for member utilities to develop their site-specific JTAs. The NRC impaneled industry job incumbents (ROs and SROs), augmented by NRC-certified licensing examiners, to develop the current set of K/As using a consensus process and to rate the "importance to safety" of each K/A.

In 1996, the NRC updated the Catalog and made extensive changes to Section 2. These changes included: (1) moving many of the previous system generic K/As into Section 2 and revising them for plant-wide applicability; (2) reorganizing Section 2 into four subsections and establishing sampling requirements for the four subsections; (3) linking the K/As to the applicable 10 CFR 55 requirements; and (4) adding new plant-wide generic K/As. The NRC obtained new "importance to safety" ratings for the new and revised K/As, but retained the importance ratings from Rev. 0 of the Catalog for the K/As that were previously included in Section 2.

The industry has continued to accumulate operating experience and "lessons learned" over the past 20 years, as well as during the past 10 years since Rev. 2 to NUREG-1122 was published. Therefore, one purpose of this project is to update the "importance to safety" ratings in the current Catalog, as well as determine whether there are new K/As that should be added.

In addition, since the Catalog was last revised, the NRC has changed its regulations and now permits its licensees to develop operator licensing examinations, rather than restricting exam development to NRC-certified licensing examiners. In order to ensure consistency in the exam development process when implemented by the utilities, the NRC also revised NUREG-1021, *Operator Licensing Examiner Standards for Power Reactors*. The revised examiner standards decrease the latitude given to exam developers in choosing the K/As to be tested in an exam and require test items to be more closely aligned with the content of the K/As. However, it has been the experience of the WOG TWG members that some of the K/As in Section 2 are difficult to interpret, some are outdated, and some are inappropriate for licensing examinations. Therefore, it is difficult to develop written exam questions based on these K/As that are acceptable to NRC reviewers. As a result, both utility and NRC resources are wasted in the rework required to develop acceptable exams.

The WOG TWG undertook this project to answer the following questions:

1. Do the “importance to safety” ratings for each generic K/A continue to be accurate in today’s operating environment?
2. Are there other generic K/As that should be added to the K/A Catalog?
3. Should the existing generic K/As be used as they are currently written, clarified, or revised based on industry operating experience?

## 2 METHODS

### 2.1 Respondents

The WOG TWG sought the largest possible participation in the survey among the utilities that are licensed to operate a PWR and sent a request for participation to each of its members, as well as to members of the Babcock and Wilcox Owners Group. The request asked for volunteers to participate in the survey who (1) currently hold or previously held a PWR license, (2) had access to the internet to complete the survey, and (3) had available approximately 4 hours of time to complete the survey. In addition, participation from NRC licensing examiners in each NRC Region was also sought.

### 2.2 Survey Administration

The survey was administered electronically via the World Wide Web in order to (1) permit respondents to complete the survey at their own pace, (2) reduce administration time and data input costs, and (3) maintain control over access to the survey and results.

The point-of-contact from each site that agreed to participate emailed a list of volunteer participants to the survey administrators. The administrators then contacted each volunteer and provided him or her with a unique user name and



password for accessing the survey website. Only the survey administrators were able to link responses to the individual participants. Responses were collected between October, 2004, and April, 2005.

## 2.3 Survey Instrument

The instructions for completing the survey that were provided to the participants when they logged into the survey website can be seen in Attachment 1.

The initial survey questions requested information about each respondent, including:

- The NSSS vendor type of the PWR unit(s) for which they are licensed (or, in the case of those who are not currently licensed, the NSSS vendor types with which they are most familiar);
- Whether they were licensed at the time of completing the survey and, if so, the type of license held (i.e., RO or SRO);
- The number of years they held an RO and/or SRO license;
- Their job duties at the time of completing the survey;
- The amount of time they had spent standing watch, on shift, in the past 5 years; and
- Whether they had ever developed or reviewed an operator licensing exam.

The respondents were then asked to answer a series of questions about each of the 129 K/As in Section 2. For each K/A, respondents were asked the following questions:

- In your opinion, how important is it for ROs and SROs to master this K/A in ensuring safe plant operations? (Response options were the 1-5 rating scale used for previous importance ratings with 1 = insignificant importance; 2 = of limited importance; 3 = fairly important; 4 = very important; and 5 = essential);
- In your opinion, which of the following exams should include questions that test for mastery of this K/A? (Response options were the site-specific RO licensing exam; site-specific SRO licensing exam; General Fundamentals Exam; Other exams such as GET or Radworker training; and don't know); and
- Is the knowledge or ability required by this K/A the same for ROs and SROs? (Response options were yes, no, and don't know).

Text fields were also provided for respondents to offer explanatory comments for their responses or additional information. The respondents also were asked for any suggestions they had for revising each K/A. At the end of the survey, the respondents were asked to list any K/As that they believed should be added to the current K/A Catalog in Section 2 and the job position (RO, SRO, or both) to which the K/A would apply.

## 3 ANALYSIS AND RESULTS

### 3.1 Respondent Characteristics

One hundred and twenty-nine respondents answered some portion of the survey questions, and 118 completed the entire survey. Except for the data analyses that required complete data from each participant (i.e., comparisons between respondent groups), all of the responses from each participant were included in the analyses.

Twenty-two of the 42 sites with operating PWRs (52%) provided respondents for the survey. The participating sites represented 15 of the 26 utilities (58%) that are currently licensed by the NRC to operate PWRs. Eleven NRC examiners also participated. Table 1 shows the number of respondents from each site and their distribution among utilities.

Figure 1 shows the license status of the participants at the time they responded to the survey. The majority of respondents (44%) held an active SRO license. Thirty percent of the respondents were not licensed at the time of the survey, and 25% held an RO license.

Figure 2 shows that, among the respondents who were not licensed at the time of the survey, the majority previously held an SRO license. The 10 respondents who had never held a license were NRC examiners.

In general, the respondents had many years of experience in Operations. Figure 3 shows that, among the respondents who held an RO license, the majority (59%) had been licensed for more than 5 years.

Among both the “upgrade” and “instant” SROs who were licensed at the time of the survey, the majority of had also been licensed for more than 5 years.

The majority of the respondents also indicated that they had some familiarity or experience with the exam development process. Seventy-four of the 129 respondents (57%) indicated that they had developed or reviewed a licensing exam.

Figure 5 shows the respondents' primary job duties at the time of the survey. The largest single group of respondents (30%) was involved in developing, delivering, or managing Operations training. However, when the number of control room operators, shift supervisors, unit supervisors, field operators, and the single STA was combined, the majority of the participants (58%) were currently engaged in actually performing Operations duties on shift.

Figure 6 confirms these results by showing that 57% of the respondents had spent more than half of their time actually standing watch in the past 5 years.

Overall, the sample of respondents appeared to represent a reasonable cross section of

- 
- Utilities and sites;
- Individuals who had current knowledge of PWR operations at the time of the survey; and
- Individuals who were knowledgeable of the licensing exam process.

### **3.2 Comparisons Between Respondent Groups**

A number of analyses were conducted to determine whether there were systematic differences in the importance ratings provided by different groups of respondents.

For example, the importance ratings provided by ROs were compared to those given by SROs across the set of K/As. The importance ratings provided by NRC examiners were compared to those given by industry representatives, and ratings from Operations trainers and Operations management personnel were compared to those from respondents who were currently working on-shift. In each case, no statistically significant pattern of differences in the ratings provided by the different groups was found. Figure 7 illustrates the similarity of the importance ratings provided by NRC examiners and those provided by industry personnel. The correlation of the importance ratings given by these two groups was 0.93 ( $p < .001$ ).

Only one respondent characteristic was systematically related to the importance ratings. Overall, there was a small, positive correlation ( $r = .21, p < .05$ ) between the amount of time the respondent had spent standing watch over the past 5 years and his or her importance ratings. As can be seen in Figure 8, the more time a respondent had spent on shift in the past 5 years, the higher the importance ratings

that he or she assigned to the K/As. This pattern was stronger in the importance ratings for the SRO job ( $r = .26$ ) than for the RO job ( $r = .17$ ). However, the relationship accounted for only about four percent of the variance in the importance ratings and so had little practical impact.

### **3.3 Importance to Safety Ratings**

Consistent with the methods used to calculate the importance to safety ratings for Rev. 0 and Rev. 2 of NUREG-1122, the average importance rating for the RO and SRO jobs was calculated for each of the 129 K/As. The average ratings from the survey were then compared to the importance ratings documented in Rev. 2 of the Catalog.

#### **3.3.1 Comparison of Survey to Catalog Importance Ratings**

Figure 9 shows that the pattern of importance ratings obtained from the survey was very similar to the pattern of ratings in Rev. 2 of the Catalog. This figure



shows the average importance rating for each of the K/As in Section 2 for the RO and SRO jobs obtained from the survey and those for each K/A for the RO and SRO jobs in the Catalog. The correlation between the importance ratings across all of the 129 K/A was  $r = .91$  ( $p < .001$ ). This strong, positive correlation means that any K/As that were previously rated as being of lesser importance in the Catalog were also rated as being of lesser importance by the survey respondents. Similarly, K/As previously rated as of higher importance in the Catalog were also rated as more important by the survey participants.

However, the survey participants gave higher importance ratings for the K/As overall than those in the current Catalog (two-tailed  $t = .23$ ,  $df = 127$ ,  $p < .001$  for RO job; two-tailed  $t = 18.86$ ,  $df = 127$ ,  $p < .001$  for SRO job). Figure 10 illustrates this difference by showing the importance ratings for the SRO job from the survey to the importance ratings in the Catalog for the SRO job for the 34 K/As in subsection 2.1, Conduct of Operations. Across all of the 129 K/As in Section 2, the average difference between the survey and Catalog ratings was .48. Therefore, for example, if a K/A for the RO job had an average rating of 3 (fairly important) in the Catalog, it was rated as about 3.5 by the survey participants. Analysis of the impact of this increase in the importance ratings showed that, if the ratings in the Catalog were replaced with the ratings from the survey, the ratings for 25 out of 39 K/As for the RO job that are less than 2.5 in the Catalog would exceed the current 2.5 importance rating cutoff that is used to exclude K/As from testing in an initial operator licensing examination and would be eligible for sampling. None of the importance ratings for the SRO job for any K/A that is rated as less than 2.5 in the Catalog was above 2.5 in the importance ratings from the survey.

The reasons for the higher survey importance ratings are unclear. There are several possible explanations.

One possible explanation is that the survey ratings accurately reflect the operating experience the industry has gained over the years since the K/As were last rated. Lessons learned through additional decades of operating experience may have confirmed that mastery of these K/As is more important to safe operations than was apparent to earlier raters.

Another plausible explanation is that the higher survey importance ratings are an artifact of the methods used to administer the survey. For example, the set of instructions given to the survey participants (see Attachment D) may have differed from those given to the raters when the importance ratings in Rev. 0 and Rev. 2 of the Catalog were obtained and inadvertently influenced the survey participants' responses. A record of the instructions previously given to raters is no longer available. Alternatively, obtaining the importance ratings through a web-based survey, rather than with paper-and-pencil rating forms, may have influenced the ratings. Or, having participants rate the K/As individually rather than in a group setting may have somehow affected their ratings. However, the mechanisms by which these differences in survey methods would have led to higher ratings are unclear.

A third plausible explanation for the higher importance ratings obtained in this survey may be the characteristics of the survey participants. For example, when importance ratings were obtained for Rev. 0 and Rev. 2 of the Catalog, the groups of raters included fewer job incumbents (i.e., currently licensed ROs and SROs) than the sample of raters who participated in this survey. In particular,

this survey sample included a much smaller proportion of NRC-certified licensing examiners than the sample of raters for Rev. 2 of the Catalog. Although the ratings from the NRC-certified licensing examiners who participated in this survey did not differ from the job incumbents' ratings, the number of examiners who participated was very small ( $n = 10$ ) and, therefore, may not have been reliable. Differences in the ratings given by examiners and job incumbents may have been found in the survey data, if the sample composition was more similar to the Rev. 2 group.

A smaller number of NRC examiners in the sample could lead to overall lower importance ratings because they are more familiar with the licensing exam process than job incumbents are likely to be. Specifically, examiners are aware of the practice that K/As that have an importance rating of less than 2.5 (which is half-way between "of limited importance" and "fairly important" on the 5-point rating scale) are generally not acceptable for testing in an exam. Most ROs and SROs on-shift would not be aware of this threshold and so might assume that a rating lower than 3 should be interpreted as indicating that the K/A is not sufficiently important to be tested on an exam. This explanation cannot be evaluated, however, because information about the actual proportions of examiners versus job incumbents in the previous groups of raters and any systematic differences in their ratings is not available.

Some slight support for this explanation was provided by the small, positive correlation between the amount of time the rater had spent on shift in the past 5 years and his or her survey importance ratings, as well as a negative correlation ( $r = -.37$ ,  $p < .05$ ) between the amount of time a rater had spent on shift in the past 5 years and whether the rater had ever developed or reviewed a licensing exam. That is, raters who spent more time on shift (i.e., most RO and SRO job incumbents) gave slightly higher importance ratings and were less likely to be familiar with the exam process than other groups of raters in this sample.

The effect of prior knowledge that an importance rating of less than 2.5 would result in the exclusion of a K/A from being tested in a licensing exam could be evaluated in another survey by providing half of the survey participants with this information, withholding it from the other half of the participants, and then comparing their ratings. Or, at the end of the survey, the respondents could be asked whether they were aware of the 2.5 threshold when they gave their importance ratings. The ratings of those who indicated they had prior knowledge of the threshold could be compared to the ratings of those who indicated they were not aware of the 2.5 threshold to identify any systematic differences in the ratings they provided.

### **3.3.2 Variability in the Importance Ratings**

The degree of consensus among the survey participants in their importance ratings was also assessed by calculating the standard deviation (SD) of each average importance rating for the RO and SRO jobs for each K/A. A larger SD reflects greater disagreement among the raters on the importance to safety of the K/A. An SD of 1.0 indicates that about one-third of the participants rated the

K/A at least 1 rating level higher or lower than the average rating for that K/A. That is, if the average rating for a K/A was 3 (fairly important), but the ratings had an SD of 1.0, then about 15% of the participants rated it as 4 (very important) or higher in importance and about 15% rated it as 2 (of limited importance) or lower.

Figure 11 shows the distribution of the importance ratings given by the survey respondents for the K/As that had the smallest (SRO rating for K/A 2.4.1, SD = .38) and largest (SRO rating for K/A 2.1.16, SD = 1.27) SDs among all of the average importance ratings. As a general statistical rule, it would be better if the distributions of ratings for all of the K/As were similar to the distribution for K/A 2.4.1 (Knowledge of EOP entry conditions and immediate action steps), rather than to the distribution of importance ratings for K/A 2.1.16 (Ability to operate plant phone, paging system, and two-way radio). The distribution of ratings for K/A 2.1.16 would be expected from simply tossing a coin, whereas the greater agreement among the raters for K/A 2.4.1 suggests that the average importance rating better reflects its “true” importance to safety for the RO and SRO jobs.

Thirty-eight of the 258 average importance ratings from the survey (129 each for the RO and SRO jobs) had SDs greater than 1.0. The importance ratings that had higher rater disagreement were related to 28 of the K/As in Section 2 (22%). Some of the importance ratings for these K/As in the Catalog also had SDs greater than 1.0. However, the importance ratings with larger SDs were not marked in the Catalog when the new and revised K/As in Section 2 were added for Rev. 2. Therefore, it was not possible to determine whether the

importance ratings for these K/As were also problematic in the earlier surveys or problematic only for the participants in this survey.

Table 2 lists the 10 K/As for which the importance ratings had SDs greater than 1.0 for both the RO and SRO jobs. The complete list of 38 K/As for which the importance ratings showed an unacceptable degree of variability can be seen in Attachment 2. A review of the comments provided by the survey participants on the 38 K/As (also available in Attachment 2) suggested that the lack of consensus in the importance ratings resulted from three different factors.

First, variability in some of the importance ratings reflected differences in the raters' operating experience at their sites. For example, many of the participants indicated that they work at single unit sites and were either guessing at the importance to safety of K/A 2.2.4 (Ability to explain the variations in control board layouts, systems, instrumentation and procedural actions between units at a facility) at a multi-license site or declined to rate it. When the importance ratings from participants at single-license sites were excluded from the averages for the K/As related to multi-license sites, the SDs of the average importance ratings decreased to less than 1.0. Similarly, the SDs of the importance ratings for some K/As related to flowchart-format emergency operating procedures (EOPs) (e.g., K/A 2.4.13, 2.4.14) were also greater than 1.0, because the large majority of PWR sites do not use flowchart-format EOPs.

Second, variability in some importance ratings reflected changes in operators' roles and responsibilities over the past two decades. For example, several of the K/As involve activities related to initial construction and operational testing of

new plants, such as K/A 2.2.16 (Knowledge of the process for making of field changes) and K/A 2.2.31 (Knowledge of procedures and limitations involved in initial core loading). Because no new plants have been constructed in the past decade, the relevance of these K/As to current operators' duties has been diminished and many of the respondents were unfamiliar with the relative importance of these activities.

Third, the respondents had difficulty in interpreting some of the K/As. For example, the respondents' comments indicated that they did not understand K/A 2.1.15 (Ability to manage short-term information such as night and standing orders). Several commented that they did not understand what was intended by the word "manage" in the K/A. Some focused on the phrase, "short-term information," and questioned the specific type of short-term information that was being referenced. When a rater interpreted "short-term information" as referring to information about temporary modifications, the commenters stated that obtaining and maintaining cognizance of such knowledge is important to safety for both ROs and SROs and gave high importance ratings. Others commented that this K/A is outdated, because reliance on night and standing "orders" has waned and the type of information that standing orders previously contained is now formalized in policies and procedures. These commenters indicated that this K/A is irrelevant now at their sites, so they rated it as "of limited importance" or "insignificant" importance.

In addition, a review of the INPO exam database showed that there appear to be fewer exam questions included in the database that test the 38 K/As that had average importance ratings with SDs greater than 1.0 in the survey than for other K/As that had average importance ratings with SDs less than 1.0. The number of questions in the exam database for each of the 38 K/As is listed in Attachment 2. For example, the exam database contains no questions that test 9 out of the 38 K/As that have importance ratings with SDs greater than 1.0. NUREG-1021 requires that the process for selecting K/As to be tested in a licensing exam must be random, but permits exam developers, with NRC approval, to eliminate some K/As that are randomly selected with an adequate justification. The small number of exam questions for these 38 K/As suggests that exam developers and NRC reviewers agree that the K/As are problematic. This result, considered together with the variability in the importance ratings and the respondents' comments, suggested that these K/As were good candidates for revision.

### **3.4 Testing the K/As on RO and SRO Licensing Examinations**

Participants were also asked to provide their judgments of the appropriateness of testing each of the 129 K/As in Section 2 on licensing examinations. As previously discussed, the average importance ratings generally serve as the decision criterion for whether a K/A will be tested in a written exam, with a 2.5 importance rating or above as the threshold for inclusion. In addition, the average importance ratings are also used to distinguish between K/As that apply to the RO or SRO jobs. For example, if a K/A's average importance rating for the RO job is less than 2.5, but greater than 2.5 for the SRO job, the exam

developer would not include a question to test that K/A on an initial operator licensing exam. A test question for that K/A could be included in the portion of an exam intended for SRO license candidates.

However, the methods used to elicit importance ratings for Rev. 0 and Rev. 2 of the Catalog, as well this survey, did not directly ask raters to judge whether each K/A was appropriate for testing on a licensing exam for ROs, SROs, both, or neither job level. Therefore, the WOG TWG added a survey question to validate these uses of the average importance ratings by soliciting the participants' judgments of which of several types of exams, to which operators are normally subject, should include questions to test each K/A. The response options for this question were:

- \_ RO site-specific exam
- \_ SRO site-specific exam
- \_ General Fundamental Exam
- \_ Other (GET, Radworker)
- \_ Don't know

Participants were permitted to select multiple response options. The number of participants who selected each option for each K/A was then counted and compared to the total number of participants who responded to the question. If a simple majority of the respondents "voted" to include questions for a K/A on an exam, the K/A was determined to be appropriate for testing on that type of exam.

The participants' responses for about two-thirds of the K/As in Section 2 were similar to those for K/A 2.4.49 (Ability to perform without reference to procedures those actions that require immediate operation of system components and controls), as shown in Figure 12. As can be seen in Figure 12, the large majority of participants who responded to this question for K/A 2.4.49 (119/121 and 113/121) "voted" to test this K/A on both the RO and SRO site-specific exams.

However, for 42 K/As in Section 2 (about 33%), the majority of participants endorsed including questions to test the K/A on the SRO site-specific licensing exam, but not on the RO site-specific exam. For example, Figure 13 shows that, for K/A 2.2.8 (Knowledge of the process for determining if the proposed change, test, or experiment involves an unreviewed safety question), 90/121 participants “voted” to include a question to test this K/A on the SRO portion of a licensing exam, whereas only 27/121 participants endorsed including a question to test this K/A on an initial licensing exam.

By contrast, there were only 7 K/As in Section 2 for which the majority of participants endorsed including a question to test the K/A on the RO site-specific licensing exam, but not on the SRO site-specific exam.



Taken together with the average importance ratings for these K/As from both Rev. 2 of the Catalog and this survey, these results suggest that Section 2 contains a more limited set of K/As to sample for the initial licensing exam than for SRO exams. A smaller number of K/As to sample for the initial exam is problematic because most current site-specific written licensing exams are comprised of 75 questions for the RO job level and only 25 questions for SRO license candidates. To support this typical exam structure, there should be a larger number of K/As that are appropriate for testing at the RO level.

Further, the K/As that the participants did not “vote” to test on an RO site-specific exam were not evenly distributed among the subsections of Section 2. If an exam developer actually excluded these K/As when creating a sample plan for an initial licensing exam,

- 9 K/As out of the 34 in subsection 2.1, Conduct of Operations, would not be tested;
- more than half (19/34) of the K/As in subsection 2.2, Equipment Control, would be excluded;
- 7/11 K/As in subsection 2.3, Radiation Protection, would not be sampled for testing; and
- 7/50 K/As in subsection 2.4, Emergency Plan/Procedures, would not be tested on an initial licensing exam.

Therefore, identifying K/As for an RO-level exam in subsections 2.2, Equipment Control, and 2.3, Radiation Protection, may be particularly difficult for exam developers.

For 5 K/As, the majority of participants endorsed including questions to test the K/A on exams other than the RO and SRO site-specific licensing exams. These K/As, and the alternate exams endorsed by the participants, were as follows:

- \_ 2.1.13 - Knowledge of facility requirements for controlling vital/controlled access (GET)
- \_ 2.1.16 - Ability to operate plant phone, paging system, and two-way radio (GET)
- \_ 2.3.2 - Knowledge of facility ALARA program (Radworker)
- \_ 2.3.5 - Knowledge of use and function of personnel monitoring equipment (Radworker)
- \_ 2.3.7 - Knowledge of the process for preparing a radiation work permit (Radworker)

These 5 K/As appear to be good candidates for revision to increase their applicability to licensed operator duties.

Overall, there were strong, positive correlations between the number of respondents who endorsed including questions to test a K/A on the RO and SRO site-specific licensing exams and the average importance ratings for the K/A for the RO and SRO jobs. The correlation between the number of “votes” to include a K/A on an initial licensing exam and the average importance ratings for the RO job was  $r = .92$  ( $p < .001$ ). This correlation for the SRO job was  $r = .81$  ( $p < .001$ ). These correlations suggest that the average importance ratings are consistent with participants’ judgments of whether a K/A is appropriate for testing on an RO or SRO site-specific licensing exam.

### **3.5 Similarity of the Knowledge or Ability for the RO and SRO Jobs**

The WOG TWG was also interested in the participants’ judgments as to whether the knowledges or abilities required by the K/As in Section 2 are the same for the RO and SRO jobs. Ideally, if the knowledge or ability referenced in a K/A statement is different for the RO job from that required for the SRO job, there should be two different K/As to accurately capture the unique knowledges or abilities required. Currently, exam developers must rely on their personal expertise to write exam questions that are directed to the appropriate job level when a K/A is selected for testing that requires different knowledges or abilities for the RO versus SRO jobs. Revising K/As to better capture the appropriate level of knowledge could reduce the burden on exam developers as well as reduce potential confusion with respect to the link between a K/A and the questions that are developed to test it.

For each K/A, the survey respondents were asked whether the knowledge or ability described in the K/A is the same for ROs and SROs. The response options were:

- \_ No, the knowledge or ability is different for ROs and SROs
- \_ Yes, the knowledge or ability is the same for ROs and SROs

- \_ Don't know

Participants were permitted to select only one response option. In addition, a text field was provided for the participants to offer any comments on how the knowledge or ability differed for the two job levels.

Results for this question indicated that the participants judged the knowledge or ability required for 58 K/As (45%) in Section 2 to be different for the RO and SRO jobs. In general, the participants' comments indicated that the SRO requires more detailed knowledge than an RO or has greater responsibility for implementing the requirements referenced in the K/As than an RO.

The 58 K/As that participants indicated require different knowledges or abilities for the RO and SRO jobs were distributed among the subsections in Section 2, as follows:

- \_ 11/34 (32%) in subsection 2.1, Conduct of Operations
- \_ 24/34 (71%) in subsection 2.2, Equipment Control
- \_ 3/11 (27%) in subsection 2.3, Radiation Protection
- \_ 20/50 (40%) in subsection 2.4, Emergency Procedures/Plan

Among this set of 58 K/As, 38 of the K/As had average importance ratings with an SD > 1.0 for either the RO or SRO job and/or the majority of participants did not endorse including questions to test the K/A on the RO site-specific exam. The remaining 20 K/As are listed in Attachment 3 with the comments provided by the respondents. Because these K/As were identified in the survey as being important to safety but as requiring different knowledges or abilities for the RO and SRO jobs, they also represented good candidates for revisions to clarify their applicability to the two job levels.

### **3.6 Recommendations for New K/As**

The respondents provided a total of 47 recommendations for new K/As to be added to Section 2. Attachment 4 provides the complete list of recommendations. Among the 47 recommendations, the following 6 topics were mentioned by two or more respondents:

- \_ Maintenance Rule and risk assessment
- \_ Operations interface with the site Security Plan/Procedures
- \_ Making operability calls
- \_ Reportability requirements
- \_ Severe accident management/core damage
- \_ "Soft skills" (e.g., minimizing control room distractions, human error reduction techniques, team skills)

### **3.7 Summary of Survey Results and Conclusions**

In summary, the results of the survey led to the following conclusions:

- The importance ratings for 22% of the current K/As in Section 2 showed substantial variability among the raters, indicating that these K/As may require updating or clarification;
- There are many more K/As in Section 2 that are appropriate for testing in an SRO-level exam than in an RO-level exam, indicating that exam developers may have difficulties in selecting the required number of K/As to be tested in initial licensing exams;
- The knowledge or ability required is different for the RO and SRO jobs in 45% of the K/As, indicating that revisions to the K/As may be warranted to clarify their unique applicability to the two job levels; and
- The K/As in Subsection 2.3, Radiation Protection, appear to be particularly difficult to interpret and use as the basis for exam questions that are applicable to licensed operators' job requirements.

The survey results and these conclusions were presented to the WOG TWG at a working session held at the Westinghouse Energy Center in Monroeville, PA, May 16-18, 2005. After review and discussion, the WOG TWG determined it would be worthwhile to propose to the NRC that Section 2 be revised to address the problems identified.

## 4 WORKSHOP METHODS AND RESULTS

Proposed revisions to Section 2 were developed in several steps. First, a subgroup of WOG TWG members who have been assigned to monitor the progress of this project were divided at random into two approximately equal working groups and assigned specific K/As to review from Attachments 2 and 3 to this report.

Over the first 1.5 days of the workshop, the two groups reviewed the information provided and develop proposed revisions to the K/As. Additional reference materials used by the groups included Chapter 10 of the Code of Federal Regulations, Rev.s 0 and 2 of the Catalog, and Rev. 9 of NUREG-1021.

An NRC representative was also present and participated as a member of one of the working groups.

On the afternoon of the second day of the workshop, the results from the two working groups were presented to all WOG TWG members who attended the meeting for additional review, revision, and concurrence. The WOG TWG members present also reviewed the survey respondents' recommendations for new K/As. Finally, the WOG TWG reviewed all of the comments provided by the survey respondents on all of the K/As to determine whether other K/As that were not listed in Attachments 2 and 3 could be improved. Attachment 5 to this report lists the WOG TWG members who participated in the workshop and provides a brief description of each member's relevant experience.

The recommendations for revising Section 2 that were developed by the WOG TWG and the bases for the recommendations can be seen in Attachment 6. Overall, the workshop attendees recommended -

- Deleting the 11 K/As that currently comprise subsection 2.3, Radiation Protection, and replacing them with 10 new K/As derived from 10 CFR 41;
- Deleting 4 additional K/As because they were determined to be adequately addressed in other K/As either in Section 2 or in other sections of the Catalog and retaining them could result in over-sampling of the topic areas;
- Revising 37 K/As to clarify their intended meaning and applicability to the RO or SRO job by making editorial changes to the wording and/or adding examples of the knowledges or abilities to which the K/As refer;
- Moving 7 K/As related to fuel handling from subsection 2.2, Equipment Control, to subsection 2.1, Conduct of Operations, for consistency with how the knowledges and abilities are discussed in NUREG-1021;
- Moving 6 K/As currently in subsection 2.1 to subsection 2.2, based on the greater relevance of their content to Equipment Control rather than Conduct of Operations;
- Moving 2 K/As from subsection 2.4, Emergency Plan/Procedures, to subsection 2.2, Equipment Control, because the knowledges or abilities apply during normal as well as abnormal and emergency operations;
- Adding one new K/A to subsection 2.1, Conduct of Operations, related to reactivity management; and
- Revising other K/As in Section 2 to correct grammatical or typographical errors, add articles of speech for clarity, and provide complete citations to the relevant paragraphs of 10 CFR 55.

## 5 STEPS TO PROJECT COMPLETION

To complete the project, the WOG TWG will submit this report to the NRC for review and then meet with the NRC staff and any interested members of the public to discuss the results of the project to-date. If the NRC staff indicates that the proposed revisions to the Catalog appear to be acceptable, the WOG TWG will ask the same group of survey participants to provide importance to safety ratings for the proposed new and revised K/As. The results of this second survey will either lead to additional revisions to the proposed K/As or submittal of a revised Section 2 to the NRC for possible publication. At this time, the WOG TWG does not anticipate that the proposed revisions would require any conforming changes to NUREG-1021.

## ATTACHMENTS

## ATTACHMENT 1: Instructions to Survey Participants

### Top of Form

**Introduction** Welcome and thank you for agreeing to participate in this survey, sponsored by the Westinghouse Owners' Group Training Working Group (WOG TWG). Before starting the survey, please read through this background information and the instructions. If you have questions at any time, please feel free to call either Val Barnes at 814-466-6180 or Lynn Moyer at 717-691-0369. The WOG TWG greatly appreciates your willingness to participate. **Purpose of the Project** The purpose of this project is to determine whether Section 2: "Generic Knowledges and Abilities" of NUREG-1122 (Rev. 2), Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors (i.e., the K/A Catalog), should be updated.

**Background** The K/A Catalog lists the knowledge and abilities that licensed operators must have in order to operate a nuclear plant safely. It is used to develop the written portion of a site-specific operator licensing exam. Exam developers randomly sample K/As from the catalog and then write exam questions to test the candidates' understanding of the K/As that were randomly selected. In the context of a written exam, exam developers use the technical term, *mastery* (which you will see used in the survey), to mean that a candidate is able to correctly answer exam questions that test the candidate's understanding of a K/A. The original K/A Catalog was developed nearly 20 years ago and re-organized and revised about 10 years ago. Since the Catalog was last revised, the industry has undergone a number of changes. These changes may have impacted the knowledge and abilities that Reactor Operators (ROs) and Senior Reactor Operators (SROs) must have to operate safely. The importance to safety of some of the K/As in the Catalog may also have changed.

**Questions to be Answered** The survey you are being asked to complete will help the WOG TWG to answer the following questions: 1. How important *now* is mastery of each K/A for ROs and SROs to be able to operate safely? 2. Does each K/A statement, as it is currently written, accurately and clearly communicate the knowledge or ability that operators must have? 3. Are there additional K/As that should be included in the Catalog? The survey will ask you questions about each of the 129 K/As in Section 2 of the Catalog, so it will take you some time to work through them all.

**Organization of the Survey and Instructions** The survey starts out by asking questions about your site, the type of license you hold (if any), your operating experience, and your current job duties. You will then be asked to answer some questions about each of the K/As that are currently listed in Section 2 of the Catalog. In addition, there are text boxes provided for several of the questions in the survey, where you can type in any comments you have about the K/A or the question. The set of questions you will be asked to answer about each K/A may change, depending on some of your answers to earlier questions. So, don't be surprised if you run into different questions for different K/As. We expect that working through the survey will take about 4 hours of your time. If at all possible, try to avoid taking it on a dial-up internet connection. The survey file is large and takes some time to load, so it will be easier to take with a faster internet connection. The survey is designed so that you can work through it at your own pace and on your own schedule. When you need to take a break, you don't have to logout -- just close your browser window. When you login again to work on the survey, you will need to use the links provided to you in the initial e-mail. Please note at what question you last answered, this will determine which link you use to resume taking the survey. Please don't use the "back" or "refresh" buttons in your browser. The survey software is designed for you to use the buttons provided at the bottom of each page to navigate between questions.

**Confidentiality of Your Answers** No-one within your organization will have access to the answers you provide to this survey. In fact, the members of the WOG TWG won't have access to them either, except in the aggregate. The only people who will be able to link you with your answers will be Val Barnes and Lynn Moyer from PSHA, which is the company that has been hired by the WOG TWG to conduct the survey. They need to be able to link your e-mail address with your answers so that they can contact you, if more information is needed or there has been a problem with the survey software. **A Note about Your "Importance to Safety" Ratings** For some of you, it may be tempting to pull out the current K/A Catalog and look at the existing "importance to safety" ratings for these K/As (especially now that we've brought it up). Please don't! To the extent possible, we hope that this survey will provide a "fresh" assessment of the K/As. Please base your ratings on your understanding of the RO and SRO job positions, as they exist today -- not on the ratings from 10 years ago.

Ready to begin? Click on the "Go to Next Question" button below.

Bottom of Form



## ATTACHMENT 2: Comments from Participants and History of the K/As with Standard Deviations > 1.0

### 2.1.3 Knowledge of shift turnover practices.

Survey: RO Impt 3.5, SD .993      SRO Impt 3.6, SD 1.0

Catalog: RO Impt 3.0                  SRO Impt 3.4

History: This K/A was added for Rev. 2.

Number of questions in INPO exam database by plant type: W 7, 1 CE, 0 B&W

#### Comments:

- Shift Turnover may include the watchstander-to-watchstander turnover or could be a broader topic. I suggest that it is both broader and more important for SROs. SRO = pre-turnover to post-turnover.
- Writing a good question for this topic is difficult and the topic is better suited to simulator or JPM performance.
- Use of plant equipment ID - eliminate colloquialisms and tribal data - Correlate to Operator Workarounds and deficiency tracking systems.
- In my opinion, this K/A covers "short term relief" during shift coverage. However, it could be advantageous to identify this as a separate K/A.
- Shift turnovers have been changed to include a pre-shift brief as a crew, which has improved information exchange. I suspect that the original K/A does not cover this.

### 2.1.5 Ability to locate and use procedures and directives related to shift staffing and activities.

Survey: RO Impt 2.85, SD 1.04      SRO Impt 3.8, SD 1.0

Catalog: RO Impt 2.3                  SRO Impt 3.4

(FYI: 2.1.4 is Knowledge of shift staffing requirements)

History: 2.1.5 was A1.03 in Rev. 0, "Ability to locate and use procedures and station directives related to shift staffing and activities," with a dagger indicating the level of knowledge required by an SRO is different from the level of knowledge required by an RO.

2.1.4 was added in Rev. 2.

Number of question in INPO database: 0

#### Comments:

- ROs need to know this information wrt how it relates to them, while SROs need to understand it for all crew members.
- It usually falls on the shoulders of the SRO to ensure the shift is adequately staffed.
- ROs should know specific limits (OT, Medical Restrictions) from memory. SROs should be able to apply these limits.
- SROs are required to have a higher knowledge level for procedures. Especially abnormal and emergency procedures.

- \_ RO's should be aware of their requirements, and SROs should be aware of everyone's requirements.
- \_ "and activities" should be removed, or the "activities" should be specified. For example, if "and watchstanding practices" were used instead, then the importance level increases, and so does the RO knowledge requirement in this area.
- \_ K/A 2.1.4 and 2.1.5 are the same thing and should be combined. In order to obtain knowledge of staffing requirements, candidates will need the ability to locate and use the appropriate procedures.
- \_ This is redundant to 2.1.4 and is more defined. Keep this one, delete 2.1.4 - 2.1.4 is imbedded in this K/A.
- \_ I'm making an assumption here that activities includes all C/R activities during normal and abnormal/emergency situations (you can't tell by reading it)
- \_ Consider combining this K/A with the associated knowledge K/A number 2.1.4 into only one K/A.
- \_ Why have a K/A on locating procedures for this particular area? The importance of locating and using procedures is more important for such things as EOPs.
- \_ "and activities" is too subjective, or non-specific.
- \_ "Activities" needs to be clearly defined. Shift staffing shouldn't be in this K/A.
- \_ Should be combined with the previous k/a on staffing.
- \_ The K/A is too vague.
- \_ Similar in nature to 2.1.4.
- \_ Ability to locate and use procedures should be dropped.
- \_ Don't understand what "and activities" mean.
- \_ This should be removed from the K/A.
- \_ If "and activities" were to be removed, it would be fine.
- \_ Combine with K/A 2.1.4 since it's talking about the same thing.
- \_ Combine with K/A 2.1.4
- \_ Specifically "and Activities".
- \_ Ability to "locate" too simple for catalog; ability to use normal and AOPs/EOPs/alarm response should be separate
- \_ Should be combined with K/A 2.1.4.
- \_ It should be removed. You might as well have ability to tie your shoes. This K/A is fundamentally basic and inherently covered in many other tasks.

**2.1.6 Ability to supervise and assume a management role during transients.**

**Survey: RO Impt 2.4, SD 1.07 SRO Impt 4.7, SD .57**

**Catalog: RO Impt 2.1 SRO Impt 3.4**

**(FYI: 2.1.7 is Ability to evaluate plant performance and make operational judgments based on operating characteristics, reactor behavior, and instrument interpretation.**

**2.1.8 is Ability to coordinate personnel activities outside the control room.)**

**History: Added in Rev. 2 in response to requests for K/As applicable to the operating exam.**

**Number of questions in INPO exam database: W 1, CE & B&W 0**

**Comments:**

- \_ Command and control abilities are fundamental to the job

- ROs are not required to assume management roles, while the ability to supervise is an essential skill for both ROs and SROs.
- ROs operate the unit, SROs manage the event
- ROs could conceivably be required to fill this role during operational modes when an SRO is not required in the control room.
- RO knowledge would be of a less specific nature like the chain of command.
- ROs should be cognizant to not take on or appear to take command of the crew
- The scope of the potential roles is much larger for the SROs where the scope for ROs is limited to Procedure Director.
- The relative positions of ROs and SROs are established. The important facet of this k/a should be what tools or avenues would a TEAM member have to refocus the team if he believed the team were about to proceed in an incorrect direction.
- Good reference is NUREG 1021 for competencies
- This is typically not an RO responsibility except in certain situations.
- This could be a description of the [XX] program. Too generic and broad to be of any use.
- This K/A includes the ability to "assume a management role" during transients and this is not a required skill for ROs. This K/A could be split into 2 separate K/As, one of which includes the ability to supervise in transients (RO and SRO applicable) and one to assume a management role (applicable to SROs only).
- As alluded to earlier, I don't see this as an independent K/A - would probably reject it as the basis for a written test question. However, it is a cross-cutting or general consideration during the operational exams.
- Applicable to the practical exam only
- This quality of a supervisor would be better observed than tested
- The problem here is that the "Ability" can't really be tested by a written test question. There is a need to have an SRO demonstrate the "ability" but in a dynamic situation (simulator) rather than test question.
- We do not test SROs to the degree they should be tested, this is especially true for instant SROs. An SRO should face the same exam any RO would take then given an additional exam. This exam can be tempered if the SRO is a previously RO for the plant he is being tested at, but there should not be an allowance for former SROs from other stations or having a degree.
- Initial license candidates are made aware of their future responsibilities as license holders during their selection process short of an incapacitation event the responsibilities of each group is established by company policy.
- I noted that K/A 2.1.8 overlaps this one
- This is a KA that should be moved to a new section of the catalogue that specifically addresses the simulator exam. It would be impossible to write a question to show the ability to supervise a person.
- Focus on Roles and Responsibilities as described in plant conduct of operations and in emergency procedures.
- Ability to maintain command and control and correctly supervise and respond to plant transients and abnormal conditions
- Consider changing "upset conditions" to "emergency conditions".

- \_ Delete this K / A.
- \_ The verbiage of the K/A should differentiate roles and responsibilities of the RO and SRO.
- \_ This K/A should be split into two separate requirements; ROs are not required to assume management roles.
- \_ The role of RO does not assume any management activity and a very limited supervisory capacity.
- \_ This is a "perform" issue. No question that you can ask on a written exam can test the "ability to supervise."
- \_ More integrated plant knowledge should be required
- \_ Of importance is the ROs ability to supervise field activities and the SROs ability to supervise critical (field and MCR) activities. To "assume a management role" does not add clarity and may detract from the key elements of this K/A. I would remove.
- \_ Too wordy; "ability to supervise" and assume a mgmt role" are too close to keep both; same for "plant transients" and "upset conditions"
- \_ delete or define "upset condition"
- \_ Probably much less important to RO
- \_ This should be deleted.
- \_ Since SROs may fill multiple emergency action roles this K/A should be divided into separate responsibilities.
- \_ Needs to focus more in the area of overall control and command. (Keeping the big picture).
- \_ Recommend breaking down into supervise field activities and MCR activities
- \_ delete or define "upset condition"
- \_ This is inherently fundamental in other tasks and the training. You will never negotiate an event and proceed through the EOPs without taking and demonstrating command and control. This does not need to be identified separately.

### **2.1.9 Ability to direct personnel activities inside the control room.**

**Survey: RO Impt 2.9, SD 1.01            SRO Impt 4.5, SD .64**

**Catalog: RO Impt 2.5                    SRO Impt 4.0**

**History: Was A1.11 in Rev. 0 as "Ability to direct personnel activities inside the control room." RO impt was 2.8, SRO impt was 4.1 with an asterisk indicating variability in the ratings.**

**Rev. 0 also included A1.09, "Ability to coordinate personnel activities inside the control room." RO impt was 2.7, SRO impt was 3.9 with an asterisk.**

**(FYI: 2.1.8 is Ability to coordinate personnel activities outside the control room)**

**INPO exam database: W 2, CE 2, B&W 0**

#### **Comments:**

- \_ The people should be interchangeable
- \_ Pretty much an SRO only type K/A
- \_ SROs should be able to prioritize activities when they hit manpower limits.
- \_ ROs do not generally direct activities inside the C/R
- \_ ROs might direct specific tasks, SROs direct comprehensive plant operation

- Best tested on Operating Test
- In some cases, the RO's may be required to act as Procedure Director.
- ROs do not direct other ROs' actions
- K/A very similar to previous one
- very limited for ROs
- With changes in command and control lineup the RO now performs more reactivity evolutions
- Primarily SRO
- This should be included in the conduct of ops k/a
- Needs to be more job focused
- Delete this item.
- This K/A is more a performance-type ability, not a knowledge to be tested on a written exam
- Too broad and fundamental.

**2.1.14 Knowledge of system status criteria which require notification of plant personnel.**

**Survey: RO Impt 2.9, SD 1.02 SRO Impt 3.9, SD .93**

**Catalog: RO Impt 2.5 SRO Impt 3.3**

**History: This K/A was intended to address the knowledge of when it was necessary to make a general plant page announcement for emergencies. Many plants had separate communication procedures that listed all the times (or events) that had to be announced over the plant paging system. Today, if it is important to make an announcement, there will usually be a specific step in the procedure that tells the operator to make the page announcement. The phrase, "systems status criteria," was supposed to mean plant events - from starting large pumps to reactor scrams. In the very old days, many plants did not use the plant page to announce major events and workers got contaminated or injured because they did not know that a problem had occurred. This is a lesser issue today.**

**This was a System Generic K/A in Rev. 0, and the importance ratings varied by system, as follows (not a complete list):**

<b>CRDS</b>	<b>RO 3.2, SRO 3.9</b>
<b>CVCS</b>	<b>RO 2.9, SRO 3.6</b>
<b>RPIS</b>	<b>RO 2.5, SRO 3.3</b>
<b>Continuous Rod Withdrawal</b>	<b>RO 2.7, SRO 3.7</b>
<b>Inoperable/Stuck Control Rod</b>	<b>RO 2.8, SRO 3.4</b>
<b>Reactor Trip</b>	<b>RO 3.4, SRO 3.8</b>
<b>Emergency Boration:</b>	<b>RO 2.5, SRO 3.3</b>
<b>ATWS</b>	<b>RO 3.4*, SRO 4.2*</b>
<b>RCS</b>	<b>RO 3.2, SRO 3.8</b>
<b>PZR LCS</b>	<b>RO 3.0, SRO 3.6</b>
<b>ESFAS</b>	<b>RO 3.1, SRO 3.7</b>
<b>Loss of Reactor Coolant Makeup</b>	<b>RO 2.5, SRO 3.4</b>
<b>PZR Level Malfunction</b>	<b>RO 2.6, SRO 3.3</b>
<b>PZR PRS</b>	<b>RO 2.9, SRO 3.6</b>
<b>Pressurizer Vapor Space Accident (Relief Valve Stuck Open)</b>	<b>RO 3.2, SRO 3.6</b>

Small Break LOCA	RO 3.4*, SRO 4.0*
Large Break LOCA	RO 3.4*, SRO 3.9*
PZR PCS Malfunction	RO 2.7, SRO 3.4
SG Tube Leak	RO 3.1, SRO 3.9
SGTR	RO 3.3, SRO 4.1*

Therefore, this is not really a “plant-wide” generic, because the importance ratings changed for each system in Rev. 0.

INPO exam database: W 5, CE 1, B&W 0

**Comments:**

- Is this talking about the Emergency Plan and the Emergency Action Levels? That's what my answers are based on.
- Very different idea of what this K/A requires for ROs and SROs.
- I've have no idea what the focus of this item is..
- Need to clarify what this means because I don't know. I took it to mean notification of Operations Mgmt (off shift) by on-shift supervision
- “System status criteria” is vague and does not have meaning. If this is talking about the status at which we would notify the NRC or make EIP notifications then it should be in section 2.4
- Is this E-Plan?--What “personnel” are we notifying?--Plant page? , Personal notifications?. Written notifications?
- What status criteria are you talking about and notification of which plant personnel ie. plant management? or all personnel? or maintenance? or the fire brigade? etc.
- RO: when should equipment status changes be announced or communicated to NLOs. SROs: when should they report equipment issues to organizations outside of Operations or to site leadership.
- I'm not sure what this K/A is asking
- Notification of plant personal is done for almost every situation. Does not need a separate KA.
- needs work.
- SROs are more accountable for making notifications
- see previous comment
- The criticality is higher for SRO.
- SRO responsibility
- SROs have to know more of these types of criteria
- ROs - knowing when to report anomalous behavior. SROs - knowing when to mobilize support organizations.
- Mainly an SRO function.
- Notifying Supervisors is the same but notifying additional personnel is SRO responsibility.
- If this is talking about Emergency Action Levels (Alert, Unusual Event, Site Emergency, etc.) it should specify such. The way it is now, it could mean you need to know that Joe I&C tech wants to be notified whenever turbine bearing #8 vibration acts up.
- Delete this from the K/A catalog

- \_ Not a real big deal, but should be retained since it is something SROs and crew members are responsible to maintain.
- \_ This KA is so open to interpretation it becomes very difficult to write a question to that has meaning.
- \_ Is this K/A aimed at PRAs? Does it imply degradation, misalignment, or inoperability? Whom is being notified, Ops management or other operators?
- \_ Pretty straightforward, I read this as being "When do we need to tell plant personnel something has happened."
- \_ Find out what it's suppose to mean then add some detail.
- \_ Do not understand what the KA is looking for.
- \_ I took this to mean notification per administrative procedure(s) for equipment/system malfunction or abnormal evolution...not notifications required by E-Plan
- \_ Knowledge of plant status changes that...
- \_ If the term plant personnel means on site people, this is not as important as notification of the NRC. Site personnel could mean resident inspector, ops manager, ED, General manager and in some cases could mean VPs. Also this could mean to notify work control, dispatcher, maintenance, HP, chm, etc. This would then not be as important.
- \_ This K/A is too "wordy". Change to "notification of plant management for abnormal situations"
- \_ I am not real sure of what the required knowledge is for this.

**2.1.15 Ability to manage short-term information such as night and standing orders.**

**Survey:** RO Impt 2.7, SD 1.01SRO Impt 3.3, 1.01

**Catalog:** RO Impt 2.3 SRO Impt 3.0

**History:** Added in Rev 2, supposedly based on 10 CFR 45.12, and Rev. 7 of NUREG-1021, ES-301 (and it's still there in Rev. 9). However, 45.12 says, "Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility," so the link isn't obvious.

**INPO exam database:** 0

**Comments:**

- \_ Standing orders are NOT short term information at [my plant]
- \_ Operators must be able to manage all information short or long.
- \_ I recommend adding the word "orders" after the word "night," so that it reads, "Ability to manage short-term information such as night orders and standing orders."
- \_ what does "manage" mean in this situation
- \_ This information is covered in our conduct of operations manual the K/A for conduct of ops should cover this.
- \_ Do you want to be able to test what night orders have been written? Seems too broad to me.
- \_ Change the wording to include current industry verbiage on night and standing orders. I do not think these terms are all that common any more.
- \_ both groups should recognize temporary conditions and act appropriately.

- This is not a licensing/training issue. This is an administrative process that is plant dependant. If a person can handle the other things necessary to get a license and has problem with this objective it is probably a plant process issue that affects all operators.
- Although I don't agree with the use of these documents to operate the plant (they don't get the level of review our procedures do), their extensive use requires frequent review and memorization. Memorization is important because (typically) there is nothing to drive us to these documents (i.e., alarm response or other procedures don't direct you to these documents for guidance).
- Delete this from the K/A catalog
- Lots of information in these documents that crew members are required to know.
- This should not be part of the NRC licensing process. It is part of the Licensee's employment practice.
- No value for this KA.
- This is more a "watch-standing skill" than an item that can be tested on a written exam since by the K/A itself, it is short-term information, and would or could change by the time the exam is administered.
- Get rid of it.
- Delete this ka. It is not necessary
- What does it mean? What are night orders or standing orders?
- Having the knowledge of these items is important, but I'm not even sure what the ability to "manage" these items refers to.
- This K/A could test "Rules of Practice". These are general rules for how we operate.
- This KA has an ability which is hard to test on a written exam. So this should be a simulator ability. Night orders and standing orders are no different than any other procedure and are usually implemented with a TCN or other plant change process. This has a very low priority in today's world.
- This administrative issue may deal with safety or non-safety related instructions dealing with temporary issues in the plant. The issue involved should be examined for specific systems involved. The administrative handling of the night or standing order has no bearing on safe plant operation. Review and understanding of these documents would be a part of the watch turnover process.
- My problem is testing students on Night orders that are not important.

### **2.1.16 Ability to operate plant phone, paging system, and two-way radio.**

**Survey:** RO Impt 3.2, SD 1.31 SRO Impt 3.2, SD 1.27

**Catalog:** RO Impt 2.9 SRO Impt 2.8

**History:** Was A1.04 in Rev. 0, RO impt was 3.0, SRO impt was 3.2

**INPO exam database:** 0

#### **Comments:**

- This is a communication standard K/A, as such it should state the expected standard
- there are skills every operator must have, but there are very few rules associated with this topic.
- Remove from K/A catalog.



- K/A needs to be deleted entirely
- Re-write as "Knowledge and/or ability of the procedural requirements for operating plant (cell) phones, paging systems, and two-way radios."
- How do you test ability to answer phone
- Delete this item.
- Should be dropped
- this is general knowledge
- delete too simple
- SRO has to know how to communicate for emergency actions otherwise too generic.
- probably belongs with conduct of ops k/a
- Remove from K/A catalog.
- this ability is demonstrated in performance of task which are covered by other K/A's
- N/A - See additional comments to preceding question.
- needs current technology added
- This is too fundamental and shouldn't be a K / A.
- The communications system is simple enough to operate
- Basic Knowledge
- Remove from K/A catalog.
- Best tested on Operating Test
- The SRO has a higher importance for EPlan
- Delete this K/A
- Revise to ability operate electronic media
- Knowledge is required by both, especially during fires, black-out coping or other emergencies.
- In Today's society I would expect everyone to know how to use phones, pagers, radios, etc. This does not need to be a K/A.
- Delete this from the K/A catalog
- This K/A does not do anything for the operators. If it were changed to state something to the effect of adverse or emergency conditions (i.e how to contact individuals when the normal communication systems are down). Then each station could ask specific questions on their emergency or alternate communication systems. But the way it is now every body can answer a phone.
- Skill of the craft. Not really a discriminating K/A. Basic knowledge.
- For safe operation of the plant this is a very narrow scope, could be eliminated as written without impact on ability to safely operate the unit.
- Should be broken out to emphasize mastery of communication systems relied on for shutdown outside the control room.
- Should be deleted. Adds no value.
- Remove from K/A Catalog.
- Remove this item.
- I don't think this has any safety significance to plant operations
- I do not think this should be a test item.
- fairly important, but not difficult enough to keep in catalog.

- This KA does not test a skill that a licensed individual can necessarily demonstrate unless on a inplant walkthrough or a simulator exam. This is a skill of the craft issue.
- Should drop this item from k/a. It has no relevance to operating license.
- Its important to communicate, but use of phone, PA, radio are also fairly basic skills. Use as an evaluation topic on simulator, but doesn't belong on exam.
- delete, doesn't affect safety
- K/A s should be of higher importance than something so mundane as using a radio or page. Take this one out.
- This KA is a skill of the craft KA and shouldn't be on a licensing exam. Everyone in the plant needs this skill. It is not discriminatory for a licensed operator. the KA should be deleted.
- While it is important to be able to operate phone, pager, etc. I'm not sure how you test this, except in the simulator
- Ability to operate plant phones, paging systems, plant computer systems, radio system and any other means of vital communications.
- Delete this K/A. This is tested during simulator portion of the exam.
- Delete this item.
- This K/A should be a Job Performance Measure (JPM) Evaluated in the Simulator or Plant
- Ability to operate plant communications systems.

**2.1.21 Ability to obtain and verify controlled procedure copy.**

**Survey:** RO Impt 3.5, SD 1.06      SRO Impt 3.5, SD 1.07

**Catalog:** RO Impt 3.1      SRO Impt 3.2

**History:** Was A1.01 in Rev. 0, RO impt 3.3, SRO impt 3.4. Despite the improvements in methods for controlling procedure copies, there continued to be a fairly significant number of LERs and inspection reports recorded in the NRC's Human Factors Information System documenting occasions on which an outdated version of a procedure was used (more than 150/year), right up until 1998 when the ROP was initiated and reporting of these kinds of incidents ended.

**Exam bank questions address which procedure copies (which locations) can be used without verifying the rev in the computer system, how often the proc rev must be verified on a job that extends over several days, and procedure use requirements - whether it must be in-hand, reviewed beforehand, etc. (which isn't really relevant to this K/A).**

**(FYI 2.1.20 is Ability to execute procedure steps.)**

**INPO exam database:** W 2, CE 0, B&W 1

**Comments:**

- Electronic media has rendered most of this moot. With the ability to poll a database for the latest revision eliminates the need to process controlled documents
- Remove from K/A catalog.
- Re-write as "Knowledge and/or ability necessary for obtaining and verifying the correct controlled procedure."
- This ability should have been CLEARLY demonstrated long before a person is ever selected for license class

- Remove from K/A catalog.
- Combine with others, this seems like a real waste of knowledge item. Makes me want to say. Duh...
- N/A - See additional comments to preceding question.
- administrative requirement
- This K/A is meaningless since licensed operators work in an environment where procedures are automatically controlled.
- should be dropped
- This task is so simple that if you cannot perform this you shouldn't even be taking this exam.
- This is enforced in OJT.
- I like specific K/A's, such as this.
- Delete this from the K/A catalog
- this is a basic k/a and the plant site should have trained this k/a in very early in someone's career.
- Eliminate the requirement since it is out-dated.
- No value in this KA.
- This is a General Nuclear Procedure at our site and this knowledge is required for all employees not just operators. Probably could be removed from K/A catalog.
- this is easy and should only be covered on sim or in plant
- This should be an admin task placed in 1021, ES-301B.1.
- This type of question should not be on any type of license exam. This is a basic fundamental question and should have been developed for the non-licensed individual.
- Getting the right procedure rev. is important, but given the maturity of procedures, accidentally getting a previous revision is probably not a significant safety challenge.
- This is usually OJT type training/evaluation.
- Delete this K/A
- I'm not sure about other sites' exams, but this was tested during the in-plant portion of our licensing exam. I think this is a waste of the NRC examiner's time since this is a requirement for all personnel on-site.
- Combine with k/a just prior to this one on the survey
- Delete K/A. Even though it is an important skill for operators to have, there is virtually no discriminatory value when applied to exams, unless examiners start placing old revisions of procedures in the simulator and then set the applicants up to take the wrong course of action when they use the wrong revision - which is not going to happen.
- Delete this K A.
- This is important, but should be re-enforced in OJT.

### **2.1.22 Ability to determine Mode of Operation.**

**Survey: RO Impt 3.75, SD 1.02      SRO Impt 4.1, SD .97**

**Catalog: RO Impt 2.8                  SRO Impt 4.2**

**History:** Not in Rev. 0, added for Rev 2, supposedly based on 43.5, which states, "Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations," and 44.13, which states, "Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated." The exam questions in the INPO database focus on establishing a set of conditions with distractors and ask the candidate to determine which mode the plant is in.

**INPO exam database:** W 4, CE 2, B&W 1

**Comments:**

- MODES are defined in the Technical Specifications with specific data points. Requiring a person to recognize the definition of MODE is of little value.
- Ability to determine 1 from 2 seems irrelevant. Operators must recognize requirements change as modes change. Making the distinction between a few degrees of temp, a few psi in RCS press or 1% reactor power is meaningless by itself.
- This K/A is not a test of knowledge as written. The ability to understand plant conditions should be tested. Mode is only temperature.
- I'm not sure what they are telling me I have to know.
- Re-write as "Knowledge and/or ability necessary for determining the plant's Operational Mode."
- Not descriptive enough to ensure consistent application
- Not worth testing on, if you don't know what mode you're in, you might think about resigning your license...
- Can the Operator correctly apply Tech Specs given different plant modes?
- N/A - See additional comments provided for preceding question.
- Not sure what you're looking for, can SRO tell what Mode the plant is in, or are you looking for Mode of Operation of different equipment?
- Should be dropped
- There's no value added for teaching what is defined by procedure and Technical Specification. Prohibitions contained in plant procedures coupled with current training makes this K/A too narrowly focused to provide a challenging question.
- Change to read, "Ability to determine the plant mode of operation based on the definitions in Tech Specs"
- Wouldn't it be more appropriate to say, "Ability to interpret plant conditions for MODES of operation?"
- This KA has limited value. Not sure how to fix.
- This could also be written as a knowledge statement.
- Rewrite K/A to be a little clearer on the required ability.

**2.1.29 Knowledge of how to conduct and verify valve lineups.**

**Survey:** RO Impt 3.7, SD 1.01SRO Impt 3.6, SD .91

**Catalog:** RO Impt 3.4 SRO Impt 3.3

**History:** Was K1.01 in Rev 0, RO impt 3.6, SRO impt 3.7

**INPO exam database:** W 3, CE 1, B&W 2

**Comments:**

- This is normally an AO function

- \_ This is a skill that is required of a non-licensed person.
- \_ Rewrite as "Knowledge and/or ability necessary to properly conduct and/or verify valve, breaker, and switch lineups."
- \_ This is an integral part of system knowledge.
- \_ Delete K/A. This is a job requirement of non licensed operators.
- \_ N/A - See additional comments provided for preceding question.
- \_ At this site RO and SRO do not perform valve lineups
- \_ This is a skill that is required of a non-licensed person.
- \_ Basic NLO competency.
- \_ Delete K/A
- \_ Hard to evaluate in test environment, leave to site qual card
- \_ GET or Basic Operator
- \_ This is a performance type item. Not test questions needed. Evaluated on QCC and JPMs and simulator.
- \_ Delete this from the K/A catalog
- \_ Should include concepts of independent verification, concurrent verification and when each applies.
- \_ this is another candidate for separating written from admin task.
- \_ This is a skill that is required of a non-licensed person.
- \_ This is a fundamental task for the non-licensed operator. An ro in the control room verifies valve lineups differently than in the field. This k/a should fall into the systems portion of testing.
- \_ Knowledge of correct performance and verification of valve lineups.

#### **2.1.34 Ability to maintain primary and secondary plant chemistry within allowable limits.**

**Survey:** RO Impt 2.6, SD .94 SRO Impt 3.0, SD 1.02

**Catalog:** RO Impt 2.3 SRO Impt 2.9

**History:** Was A114 in Rev. 0, RO impt 2.5\*, SRO impt 2.9

**INPO exam database:** W 2, CE & B&W 0

**Comments:**

- \_ Operators do not control or maintain chemistry control parameters. An understanding of chemistry control is required but the procedures that control chemistry are essentially not operations controlled.
- \_ Operators don't "maintain" chemistry parameters
- \_ The operator does not have a direct impact for maintaining these parameters. They can respond and address but not directly alter these items.
- \_ Operators at my plant do not maintain chemistry limits. We respond to Chemistry dept requests and information provided.
- \_ Remove from K/A catalog.
- \_ Chemistry department samples and advise the CR staff of chemistry concerns. There are no meters we use to adjust primary chemistry with or determine what changes are needed. License operators should understand the reason for control chemistry and the

- As written, this is a Chemistry Dept function. Recommend "comply with ... plant chemistry limitations"
- Re-write as "Knowledge and/or ability necessary to ensure 'out-of-specification' plant chemistry limits are identified by shift operators for action as appropriate by plant chemistry."
- Operators don't really maintain chemistry. Should limit this to "knowledge of chemistry limits"
- This more for Chemistry. We respond to chemistry dept.
- Remove from K/A catalog.
- Actions required to maintain proper Chemistry are recommended by the Chemistry dept. following samples.
- Operators rely on the chemistry dept to alert us to chemistry parameters and provide us with advice on corrective measures. The tech spec relationship is the operators responsibility.
- This is more administrative than specific. I would not expect the operators to have all the limits memorized, but they should know where they are located, how to reference them, when to notify Chemistry, etc.
- Chemistry Dept. tells us what's required to maintain limits. All we do is operate the systems (demins, add chemicals, etc.) based on their requirements.
- Ability to recognize proper response to chemistry control abnormalities.
- Delete this from the K/A catalog. This is really a function of Chemistry as an Ops Support Group. They monitor the plant chemistry and perform or recommend changes based on their monitoring.
- Adding chemicals is the limit of ability. Sampling, analysis, and adjustments are all made outside OPERATIONS, therefore has little impact on the ability of the operator to safely operate the plant. Knowledge of chemistry conditions and effects on corrosion, reactivity, and radiological controls is about the total extent of knowledges required.
- Operators should understand how different configurations affect chemistry. In my experience, however, the Chemistry department drives chemistry issues at a mature plant. The Operators respond accordingly without sacrificing the primacy of their role.
- Only understanding of tech spec related chemistry parameters and actions should be addressed.
- Delete the K & A, since other than operate the plant, ROs and SROs do no activities to maintain chemistry on their own. When directed by chemistry, we have the NLO place a demin in service or flush chemicals to the system, but we do not add chemicals ourselves, nor do we sample the system
- Practical exam only
- Primary/Secondary Chemistry is maintained by the direction of chemistry, we need to know and recognize limits in our procedures and tech specs and operate the plant per our procedures.
- Tough one, Operations does not normally maintain Chemistry limits, simply implements actions based on a Chemistry Instruction. Is it like this for other plants?

- Remove from K/A catalog; Chemistry personnel action, they communicate with operators.
- Change to: Understand the reason why and how chemistry is controlled both primary and secondary.
- The K/A should drop the secondary plant reference. Also, the chemistry limits should be tied to those addressed in Tech Specs.
- I think this is something to be aware of and know that operations may have to respond to a problem, but I do not think this needs to be tested.
- While an RO or SRO interfaces with this ability in some ways (and the SRO is responsible for overall control), this is a chemistry dept function/ability, and the operators mostly manage and must understand the limits.
- This K/A should be eliminated. We have a whole department that is responsible for plant chemistry.
- This KA is no longer performed by the operating crew but is monitored and driven by the chemistry group. This should be removed from the KA catalogue.
- ro/sro's operate the plant. we have chemistry personnel that monitor the chemistry of the systems. This is not an area that should be on ro/sro license exam. This should have been covered in GFE.
- Chemistry makes recommendations for operation to maintain operation within limits. Operators should be aware of the limits but not actions to maintain limits.
- This KA should be revised due to actions by the operator are directed by Chemistry procedure.
- chemistry control is within the chemistry department. Operations makes chem adds after a request from Chemistry.
- Test on Simulator or on a JPM
- This function is provided by our Chemistry personnel. They inform us of chemistry results and whether or not they meet certain 'Action Levels'. We then maneuver the plant if necessary but we, as Operators, don't "maintain chemistry within limits".
- As RO/SRO's, we rely on Chemistry to monitor and make recommendations for chemistry control. We do require a knowledge of chemistry limits, and knowledge of how to change given parameters.
- SRO must know the limits and the general action to restore
- Chemistry control comes from proper system operation. The limits are monitored by chemistry. System Function K/A's should cover this item.



### 2.2.3 Knowledge of the design, procedural, & operational differences between units.

Survey: RO Impt 3.7, SD 1.01      SRO Impt 3.8, SD .98

Catalog: RO Impt 3.1                SRO Impt 3.3

History: Added in Rev. 2

INPO exam database: W 2, CE & B&W 0

#### Comments:

- I think the K/A is different depending on whether the Applicant is dual licensed or not.
- If operators work all units, then it is important--if they are limited to a single unit but work at a multiunit facility it may be unimportant.--If a knowledge

- deficiency exists then it will be addressed by appropriate KAs specific to a given Unit
- We have sister plants
- For Applicants at a site like Millstone (one Westinghouse and one Combustion Engineering unit), this K/A is of limited import. However, for a site like Salem, the K/A is important because the SRO, as Shift Manager, may be providing oversight to either unit. I don't know how I would evaluate a site like Indian Point (two units of the same NSSS) but divergent operating history.
- N/A, were a single unit plant
- Pretty clear!
- we are single unit
- single unit site
- Delete it because an RO or SRO always operates a specific unit, even at a multi unit site so any knowledge deficiency will always be specific to a particular unit, which will be covered by an appropriate KA. In other words, there is no knowledge or ability that this KA uniquely covers.
- the generic side of this needs to be deleted and the systems side retained.
- This KA should apply to plants with dual unit licenses, but not multi-unit plants with separate RO/SRO licenses for each unit.
- I operate at a single unit utility
- (multi-unit) Knowledge of unit differences including design, procedural, and operational differences.
- Our site has unit specific licenses and exams. I don't have familiarity with dual unit licensing.
- I'm at a single unit facility and don't want to dilute multi-unit answers.
- Eliminate
- This is absolutely essential for anyone with a multi unit license.
- single unit plant

#### **2.2.4 Ability to explain variations in control board layouts, systems, instrument and procedural actions between units at a facility.**

**Survey:** RO Impt 3.5, SD 1.05 SRO Impt 3.5, SD .94

**Catalog:** RO Impt 2.8 SRO Impt 3.0\*

**History:** Added in Rev. 2

**INPO exam database:** W 2, CE & B&W 0

##### **Comments:**

- This covers procedure differences that are covered in KA 2.2.3. Delete from here.
- combine with previous k/a
- needs to be divided up into two or 3 parts
- it is important to understand the differences between 2 units if they exist. The problem is this could become too large a focus on a minor, non-impacting difference.
- Consider combining this K/A with K/A 2.2.3.
- This K/A is encompassed by K/A 2.2.3.
- delete - not needed because of 2.2.3



- \_ At [my site] the units are sufficiently different so to restrict cross unit work. The two reactors are listed as 2 single unit sites.
- \_ More specific than 2.2.3. I believe this meets the intent of 2.2.3, and therefore 2.2.3 could probably be deleted.
- \_ Combine with other K/A's
- \_ I have no multi-unit experience and do not hold firm opinions on this K/A
- \_ The ability to determine control board layout variations should be removed from the K/A. This ability should be separate and not tested in a written exam.
- \_ Pretty clear, again.
- \_ single unit
- \_ too similar to 2.2.3; don't keep both
- \_ This KA should apply to plants with dual unit licenses, but not multi-unit plants with separate RO/SRO licenses for each unit.
- \_ I operate at a single unit utility
- \_ combine with previous k/a
- \_ Not familiar with dual unit licensing.
- \_ I'm at a single unit facility and don't want to dilute multi-unit answers.
- \_ mine is a single unit plant. N/A
- \_ Combine with K/A 2.2.3.
- \_ Eliminate
- \_ single unit

## **2.2.5 Knowledge of the process for making changes in the facility as described in the FSAR.**

**Survey:** RO Impt 2.2, SD .79

**SRO Impt 3.2, SD 1.03**

**Catalog:** RO Impt 1.6

**SRO Impt 3.3**

**History:** Added in Rev. 2

**INPO exam database:** W 1, CE & B&W 0

### **Comments:**

- \_ No rewrite, just delete
- \_ It appears this K & A would not apply at all to ROs and SROs
- \_ Design changes are processed by Maintenance & Engineering. SRO input is limited and RO input is non-existent
- \_ Operators do not not perform this task.
- \_ We have many process for making changes at the plant which are broad and complicated. This K/A should either be more specific or dropped.
- \_ This should be CFR 50.59 specific
- \_ Delete this K & A, as operators do not make changes to plant, engineers do
- \_ Rewrite to address only those parts that shift SROs are required to deal with
- \_ Operators do not not perform this task.
- \_ More SRO knowledge only
- \_ Best tested on Operating Test
- \_ Importance too low for inclusion in license exam
- \_ No Exams
- \_ Not overly important for operators.

- has nothing to do plant operations, maybe I should have said delete this k/a.
- Of no value to the operation of the plant.
- This is an obscure task, that most Operators do not get involved in. These changes are typically done by engineering with little operator involvement.
- Does not affect health and safety of the public. This is one avenue that operations used to have an active part in, especially in the early 60's and 70's when operators had engineering degrees. Today these are separate groups. Delete this K/A.
- I would delete this K & A
- RO level license has almost nothing to do with this K/A.
- Clearly a SRO knowledge item, straightforward.
- Needs to be more specific to what changes it refers to etc.
- IF must be retained limit the KA to dealing with the issues where control room SROs get involved only. Administrative issues associated with design changes are functions of Engineering & Maintenance personnel
- It is very difficult to create a valid exam question on this K/A.
- This KA should be taught and included prior to an SRO taking shift, but in the initial licensing process it does not seem necessary.
- Our facility modifications are handled by Engineering. Operators support testing of mods that require testing but rarely, if ever, drive the mods.
- Do not include this area.
- Knowledge should be targeted toward Operations oversight, post-mod testing, and document update requirements.
- Not sure that this is a needed knowledge since the procedures should take care of this requirement. The SRO should know a little more about the process than the RO but the need for this to included in the K/A catalog is questionable.
- We have trained "specialist" to do changes. Operators need to be aware of the requirements but they don't necessarily need the knowledge of the entire process.

## **2.2.7 Knowledge of the process for conducting tests or experiments not in FSAR.**

**Survey:** RO Impt 2.5, SD .91 SRO Impt 3.4, SD 1.07

**Catalog:** RO 2.0 SRO 3.2

**History:** Added in Rev. 2, supposedly based on 43.3, which reads, "Facility licensee procedures required to obtain authority for design and operating changes in the facility," and 45.13, which reads, "Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated." And 10 CFR 50.59.

**INPO exam database:** 0

### **Comments:**

- Operators do not perform this task.
- Not so much too broad, ill-defined may be better description.
- Best tested on Operating Test
- no exam questions
- delete - not necessary to obtain/maintain an nrc license

- \_ 50.59 training and exams associated with performance of infrequent activities.
- \_ Best tested on Operating Test
- \_ Operators do not not perform this task.
- \_ Site specific admin procedures exam.
- \_ The term "experiments" should be removed from the statement. Experiment implies that you don't have expected results, or you're not really sure what's going to happen. It's not the best term to use in this industry lately.
- \_ Delete this from the K/A catalog
- \_ this is a worthless k/a
- \_ If any special test is required by the station, massive meetings and pre-job briefs will occur prior to the test. There is no need to test or train someone on this topic.
- \_ This KA should be deleted. This is outside the scope of RO and SROs.
- \_ This is another useless K & A, delete it
- \_ SRO exam only.
- \_ This is outside the bounds for the Ro/Sro to be tested in my opinion.
- \_ experiments is a bad word, we do not conduct experiments in our power plants.
- \_ Every evolution is performed using an approved procedure for a specific purpose.
- \_ Delete. Not done
- \_ Operators do not perform this task.
- \_ Any tests or experiments not described in the FSAR would be well researched, approved, practiced on the simulator, and reviewed by engineering and plant management prior to an operator doing anything.
- \_ Test and procedures outside the scope of the safety analysis report I feel should not be performed.
- \_ We have trained "specialists" to do changes. Operators need to be aware of the requirements but they don't necessarily need the knowledge of the entire process.

## **2.2.8 Knowledge of the process for determining if change/test/experiment involves a USQ.**

**Survey:** RO Impt 2.4, SD .86 SRO Impt 3.6, SD 1.01

**Catalog:** RO 1.8 SRO 3.3

**History:** Added in Rev. 2, supposedly based on 43.3, 45.13, and 50.59.

**INPO exam database:** W 3, CE & B&W 0

### **Comments:**

- \_ K/A should be deleted
- \_ Remove from K/A catalog.
- \_ [My utility] no longer uses the term "unreviewed safety question". This process is evaluated through the 10CFR50.59 process and would result in a license amendment if needed.
- \_ delete, this is engineering function
- \_ Operators do not not perform this task.
- \_ K/A Should be deleted
- \_ Remove from K/A catalog.
- \_ Make into a SRO only K/A
- \_ with the exception of unreviewed safety question.

- delete K/A not a CRO function
- This K/A, as written, bypasses the established processes at our site. Affected departments, not just Operations, would have a cut at this and any activity should go through multiple layers of approval before reaching the Operating crew.
- Remove from K/A catalog.
- Best tested on Operating Test
- Qualified Safety Reviewer exam; not a function of licensed RO or SRO
- no exam questions
- Operators do not not perform this task.
- 10CFR 50.59 training
- Limited applicability for operators.
- This is 50.59 space and must be limited to the screening, which requires qualification. Most candidates are NOT qualified
- 50.59 and procedures admin training.
- 50.59 training.
- Again, please remove "experiment."
- Delete this from the K/A catalog
- this is a little more important than several of the previous k/a's
- Tests or experiments that involve an unreviewed safety question are discussed with engineering and plant management prior to implementation and can't be trained or tested, since this is something that may never occur.
- Should be deleted. Don't do these type of test.
- Remove from K/A catalog; this item should be part of each plant's administrative requirements AND should be performed/completed by other than operators.
- Suggest replacing unreviewed safety question with license amendment
- This is outside the bounds for ro.sro knowledge
- First, the term unreviewed safety question is no longer in 10CFR50.59, and should be re-written. Also, this is a separate qualification at most plants and therefore should not be part of the operator KA catalog.
- Need to narrow the focus into what a RO would realistically deal with compared to the expectations for a SRO relating to this item.
- USQs are dealt with in design of the plant and subsequent changes by Engineering Support staff who do not require a license. Delete as K/A
- Operators do not not perform this task.
- This is another KA that should be included in an SRO training program prior to taking shift, however, not in the initial licensing program.
- Delete - Already covered under other K/As.
- This is Licensing issue and does not fall with the scope of the operator. The process has changed significantly enough from its inception to be of no value within the context of operations.
- This K/A should be very generic in a license class setting.
- We have trained "specialists" to do changes. Operators need to be aware of the requirements but they don't necessarily need the knowledge of the entire process.

**2.2.9 Knowledge of process to determine if a change/test/experiment increases the probability or consequences of an accident.**

**Survey:** RO Impt 2.2, SD .81 SRO Impt 3.3, SD 1.11

**Catalog:** RO 2.0 SRO 3.3

**History:** Added in Rev. 2 from same bases as 2.2.7 and 2.2.8

**INPO exam database:** 0

**Comments:**

- See K/A 2.2.8; remove this one also.
- Operators do NOT do probabilistic risk assessment to calculate the chance of accidents
- A bit wordy.
- delete KA
- Operators do not perform this task.
- INPO SOER 91-01 mandated new requirements that make this K/A moot.
- Too many K/A's about the 50.59 process
- Don't think that is the operators job.
- This K/A is a little vague. Please reword.
- The concept is about right, just too many words to convey the meaning.
- Remove
- Best tested on Operating Test
- Qualified Safety Reviewer; same comments as for previous K/A
- none, this is not SRO/RO job
- 10CFR50.59 training
- Tests over the Administrative process for performing these evolutions has its own rules and requirements separate from plant response to actions taken
- delete - not necessary to obtain/maintain an nrc license
- 50.59 training
- Please remove "experiment."
- this is pra stuff and should be thought about by sros
- We do not do these types of activities.
- This K/A does not apply to ROs/SROs
- The process does not help us run the plant if this stays in rewrite to focus on just determining the impact.
- Should be reworded to include keywords such as PRA, risk assessment etc.
- redundant to 2.2.8, and part of a separate qualification, not part of operator training.
- This is performed by Engineering Support staff. Not control room licensed personnel. A license is not required.
- Operators do not perform this task.
- This is another KA that needs to be taught after the initial licensing process.
- This K/A needs to be rewritten to reflect the current industry practices. As written, it could be interpreted to mean performing Risk Assessments from memory. It's hard enough to use the computer to run the codes.
- We have trained "specialists" to do changes. Operators need to be aware of the requirements but they don't necessarily need the knowledge of the entire process.

**2.2.10 Knowledge for determining if the margin of safety, as defined in T.S., is reduced by a proposed change/test/experiment.**

**Survey:** RO 2.4, SD .83 SRO 3.5, SD 1.08

**Catalog:** RO 1.9 SRO 3.3

**History:** Same as above.

**INPO exam database:** W 2, CE & B&W 0

**Comments:**

- \_ need to get rid of work experiment
- \_ Remove; similar comment to previous two K/A items.
- \_ Operators do not do this, nor have input to it
- \_ Risk Assessment?
- \_ delete KA
- \_ Operators do not not perform this task.
- \_ This is at the Engineering level, NOT OPERATIONAL
- \_ The facets of 10CFR50.59 do not seem to be stressed as much today. Much of this is left to Licensing or Engineering. This is a mistake in my opinion.
- \_ ROs and SROs have no need for this operation
- \_ Traditionally an SRO function.
- \_ More for SROs
- \_ Qualified Safety Reviewer; same comments as for previous 2 K/As
- \_ no exams
- \_ 10CFR50.59 training
- \_ Do not include this item on written exams.
- \_ delete - not necessary to obtain/maintain an nrc license
- \_ should not be on licensing exam
- \_ 50.59 training
- \_ Please remove term "experiment."
- \_ Delete this from the K/A catalog
- \_ poorly written k/a, it's gibberish
- \_ 2.2.6-2.2.10 Are typical processes that occur outside of normal operation and are typically more the arena of engineering analysis and use of a Qualified Reviewer in Operations, which require additional training beyond the scope of a standard operators license. These and similar K/A should be combined.
- \_ Remove from K/A catalog.
- \_ Delete this K/A
- \_ The process does not help us run the plant if this stays in rewrite to focus on just determining the impact.
- \_ Could be combined with 2.2.9
- \_ Once again, this is part of 10CFR50.59 training (separate qualification at most facilities), and should not be in the KA catalog.
- \_ This is performed by Engineering Support Staff who don't hold licenses. RO & SRO have no need to deal with this on shift. If not determined before it comes to the control room, it needs to be sent back for resolution
- \_ Operators do not not perform this task.

- \_ K/A is too wordy and complicated
- \_ Delete - already covered under other K/As.
- \_ This is too nebulous and fuzzy to accurately reflect what is important. If this is to be retained, then the actual ability should be well defined. As is, it's saying you need to know how to fill out a form.
- \_ Not so much the process, but recognizing when the margin of safety is impacted is what should be considered here.
- \_ This is a 50.59 training program issue. I am not sure it belongs in a LOT class environment issue.
- \_ We have trained "specialist" to do changes. Operators need to be aware of the requirements but they don't necessarily need the knowledge of the entire process.

**2.2.15 Ability to identify and utilize as-built design and configuration change documentation to ascertain expected current plant configuration and operate the plant.**

**Survey:** RO 2.8, SD 1.05

SRO 3.3, SD 1.03

**Catalog:** RO 2.2

SRO 2.9

**History:** Added in Rev. 2, supposedly based on 43.3, and 45.13.

**INPO exam database:** 0

**Comments:**

- \_ Don't know what this K/A is talking about.
- \_ Should be deleted
- \_ This K/A is far too verbose.
- \_ This makes no sense to me
- \_ Seems redundant to previous K/As.
- \_ too broad
- \_ Not sure what you want them to be able to do
- \_ This K/A should be removed from the catalog entirely or moved to a startup section for new plants.
- \_ Needs some specifics
- \_ Shorten to identify and utilize as built. second ka for config change docs
- \_ Confusing
- \_ none needed. we don't read AS BUILTs that I've ever seen.
- \_ If it's asking "Ability to identify and utilize plant drawings, logics, and schematics to ascertain expected plant configuration and operate the plant," then that's what it should say. Otherwise, I'm not really quite sure what documentation it's referring to.
- \_ Delete this from the K/A catalog
- \_ admin at best, worthless k/a
- \_ It is not clear as to what this K/A is trying to describe.
- \_ I suspect that this K/A had greater importance before current standards for procedure use and adherence were in vogue. Licensed operators really don't need to interpret design and modification documentation to OPERATE. However, they should be able to understand such documentation because they are called on to support design and implementation of modifications.

- Simplify the wording. Use two sentences if necessary, or split it into multiple K/As.
- I would revise the K/A to "Ability to read and interpret design and configuration change documentation
- Remove from data base.
- Wording is terrible. Ability to determine any current off-normal plant configuration and its impact on operating the plant.
- Someone is going to have to help me with this one...
- knowledge of implemented design changes would be a reasonable KA, but the above KA is too broad in scope and is not easily understood.
- KA needs rewriting to define what is wanted here.
- In the operations arena we do not worry about the as built design and configuration as we are about the current procedure. If there is a discrepancy between the as built and the current config, then the procedure group and plant staff would handle that issue.
- KA too broad and ambiguous. Should not be tested as operators use licensing basis documents and configuration control to ensure plant configuration.
- This is the worst K/A wording I have seen. SIMPLIFY!!! What is the K/A trying to say?
- combine with similar k/a's
- Could be combined with another K/A.
- This sounds like plant engineering to me.
- Not sure what you want them to do.

#### **2.2.16 Knowledge of the process for making of field changes.**

**Survey:** RO 2.4, SD 1.01                      SRO 3, SD 1.12

**Catalog:** RO 1.9                                SRO 2.6\*

**History:** Added in Rev. 2, supposedly based on 41.10 and 45.13. 41.10 reads,

"Administrative, normal, abnormal, and emergency operating procedures for the facility."

The term "field changes" is derived from basic engineering terminology used during the construction days of the plants. System design drawings were produced back at an AE office as master drawings. Blueprints of these drawings were sent to the site from which the plant was build. When the blueprints arrived in the "field," the construction people discovered they could not build the system to the match the drawing - for many reasons. So they authorized "field changes" - changes made in the field. They of course had to determine that the field change did not adversely affect the design attributes of the system. The process of changing the design drawings to reflect the field changes was referred to as creating the "as built" drawings. The marked up blueprints were returned to the AE and the master drawings were updated with the changes. New blueprints were made and issued.

If the change was an actual design modification caused by a corrective action or the installation of new equipment, it was not called a field change.



Each plant construction office had a set of "master blueprints" - drawings that had all field changes marked on them in "pen and ink". But they did not update ALL the drawings on the site this way. They kept the master set updated and made notations on the copies that a "field change" was installed. This notation required the operator to stop and get a copy of the master blueprint (with actual pen and ink changes) before proceeding to work on the system. The field changes were also sent back to the AE office and the engineers would then incorporate the field changes and completely redraw the master drawing.

With the advent of CAD and the maturity of the plants, the need to be able to work with drawings that are not 100% up to date is far less frequent than it used to be. But it is still important IF the utility makes a permanent change to a system that causes the system to deviate from the design that is contained in the controlled drawings. If the drawings are not maintained 100% up to date, they should have a way to flag changes made in the field to the operator. Most plants now require all controlled drawings to be maintained 100% up to date through admin controls.

INPO exam database: 0

**Comments:**

- \_ field changes have nothing to with ops.
- \_ What is this - is this the same as a temporary Mod?
- \_ what field changes are they referring to
- \_ What is a field change?
- \_ Remove-an Engineering function.
- \_ This K/A is obsolete, procedure compliance requires activities to be proceduralized
- \_ Clarify field changes! To me this means to a procedure but may mean to the plant (as in temporary mod)
- \_ very unclear. I would have a hard time writing a question to cover this
- \_ This K/A does not apply to our plant.
- \_ What is a field change--plant equipment?, procedure? both?
- \_ I am not clear on the difference between this K/A and K/A 2.2.14.
- \_ The KA needs to specify if it relates to procedure changes or temporary modifications or valve lineup changes. This probably should be 3 separate KAs.
- \_ Not clear as to the meaning.
- \_ Could be better written.
- \_ need to better define "field changes"
- \_ Field changes to what? Procedures? Equipment?
- \_ Not an operator concern. Not something that an operator would be involved in. At my plant field changes are modifications to a design as it is being installed that have to be reviewed before the operators would be involved.
- \_ This K/A does not apply to our plant.
- \_ Not sure what area this K/A refers too.
- \_ This is an awareness item
- \_ Delete this from the K/A catalog
- \_ throw this one out...

- \_ Need to clearly define what a "field change" is. My understanding is that a field change is something a System Engineer might do in the process of implementing a modification.
- \_ Remove the second "of" so that the K/A reads: "Knowledge of the process for making field changes."
- \_ Remove from data base.
- \_ K/A should be more descriptive. What kind of field changes? To equipment? To configuration? To operating parameters?
- \_ My problem with this is terminology - does anyone still use "field changes". Do we mean plant modifications?
- \_ Needs to be more specific to what changes are being referred too
- \_ Field changes are possibly obsolete, changes would have to be evaluated to be considered safe and effective. this K/A should be deleted or the attributes should be moved to a more current K/A which is applicable.
- \_ If this field change is part of the temporary or plant modification process (as I would expect under the equipment control section), I would assign a low importance for licensed operators. I see this as a Plant Engr function.
- \_ operators don't need to know this "process", as it is not done by operations.
- \_ What's a field change?
- \_ This K/A does not apply to our plant.
- \_ We do not do field changes, period. If a procedure is incorrect, it is brought back and revised. If plant equipment needs to be changed, there are other ways to deal with this. This is not something we do.
- \_ The KA needs to specify if it relates to procedure changes or temporary modifications or valve lineup changes. This probably should be 3 separate KAs.
- \_ Need to delete this one, ops would not be making field changes at my station.
- \_ I presume this concerns limited-scope design mods.
- \_ Knowledge of the process for making procedure revisions.
- \_ Rewrite as "Knowledge of the process for documenting field changes."

### **2.2.31 Knowledge of procedures and limitations involved in initial core loading.**

**Survey:** RO Impt 2.5, SD 1.08                      SRO Impt 3.2, SD 1.21

**Catalog:** RO 2.2                                      SRO 2.9\*

**History:** Added in Rev 2, based on 43.6, which states, "Procedures and limitations involved in initial core loading, alterations in core configuration, control rod programming, and determination of various internal and external effects on core reactivity."

**The exam questions in the INPO database only address refueling.**

**INPO exam database:** W 3, CE & B&W 0

#### **Comments:**

- \_ Get rid of the word "initial" since this implies the very first core load/cycle for the plant and all plant are older.
- \_ The only time this would be an applicable question for an operating exam is for a new plant

- Initial core load would only occur once in the life of the plant. core reload during refueling would be a better description

### 2.2.33 Knowledge of control rod programming.

Survey: RO Impt 3.5, SD 1.08 SRO Impt 3.6, SD .996

Catalog: RO 2.5 SRO 2.9

History: Same as 2.2.31

INPO exam database: W 5, CE & B&W 0

#### Comments:

- I have no idea what this k/a is talking about
- Should be written like this: Knowledge of rod control and its operation.
- I think you mean overlap requirements.
- What does this mean? Is it intended toward bank overlap, or the signals the system compares, or how and which computers do what functions, etc.?
- Sequence, overlap, reactivity, tilt, AFD, take your pick
- rewrite this one
- this area is better tested in systems or A/EPE.
- Not entirely certain I understand how this applies to Westinghouse because I'm a B&W guy.
- This K/A is extremely vague. Are the operators expected to know how many rods are in each group, when and how fast each group moves, and the inputs to the rod control system? Or, are the operators expected to know the effects produced by control rod programming? These effects include differential and integral rod worths as a function of overlapping, axial flux distribution, and hot channel factors. If the K/A is aimed at the rod control system, then write the K/A to address the rod control system. If the K/A is aimed at the effects produced by various rod programming schemes, then write the K/A to address these effects.
- We don't have any programming for our rods but we do have control rod insertion limits. I answered as if this would be covered by this K/A, if it is then maybe this k/a should be rewritten.
- This seems more system based. Why is this in the generic section?
- I'm not sure what this K/A is looking for, needs to be more specific or maybe just clearer to what is meant by it.
- Get rid of it.
- Recognize problems associated with rod programming
- At our plant control rod programming is limited to ensuring overlap.
- This KA is not applicable.
- This K/A is too broad because on the surface it may appear that Operators should have intricate technician level knowledge of each resistor (etc.) in Rod Control. We have Maintenance organizations that we rely upon to fix these components if they malfunction. What is essential is that the Operator be able to communicate to Maintenance the symptoms of the malfunctions and be able to understand expected response of Rod Control during different transients.
- We don't use rod programming.

### 2.3.5 Knowledge of use and function of personnel monitoring equipment.

Survey: RO Impt 2.9, SD 1.06 SRO Impt 2.9, SD 1.02

Catalog: RO 2.3 SRO 2.5

History: Added in Rev 2, based on 41.11, which states, "Purpose and operation of radiation monitoring systems, including alarms and survey equipment," and 45.9, which states, "Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure," and NUREG-1021, ES-301, which mentions this topic.

INPO exam database: 0

#### Comments:

- \_ It is not clear to me what "personnel monitoring equipment" is. The term is too vague.
- \_ Remove from K/A catalog
- \_ no, a GET topic
- \_ Wearing EADs is a far cry from swinging a meter, what are we talking here?
- \_ What are we monitoring?
- \_ Remove
- \_ Get rid of it.
- \_ Specify what equipment the Operator should be familiar with. This may be site specific.
- \_ The initial licensing process does not need to include all monitoring equipment. In fact, HP is in charge of and uses this equipment and OPS does not have a need to know how to use this equipment.
- \_ Remove
- \_ GET
- \_ GET issue if at all
- \_ Remove from K/A catalog; GET/Rad. Worker training tests this.
- \_ GET, Radiation Worker
- \_ Other - Better tested on operating test.
- \_ GET 2-Radiation Worker Training
- \_ get
- \_ Delete this from the K/A catalog. It is redundant to other standards that require plant personnel to know these limits.
- \_ Make the term "personnel monitoring equipment" more specific.
- \_ This is a function for all nuclear plant employees using general access training and should not be put on a license exam.
- \_ this is a GET topic and does not need to be on the exam
- \_ Remove from K/A catalog; GET/Rad. Worker training (for access) covers this.
- \_ This should be question in system to ensure understanding of where problems may occur and why, looking at things like recirculation mode.
- \_ Operators do not use personnel monitoring equipment. Radiation Protection personnel provide coverage for personnel monitoring. Those personnel are available around the clock.
- \_ Can't identify what a license holder needs to know that others (beyond HP) don't

- \_ GET topic; drop from catalog
- \_ This is of limited importance since we don't self monitor.
- \_ Delete K/A
- \_ GET
- \_ This really is GET knowledge, there is no special monitoring equipment that we expose operators to in the licensing process. These lend themselves to silly JPMs.
- \_ This is covered in general employee training.

**2.3.10 Ability to perform procedures to reduce excessive levels of radiation and guard against personnel exposure.**

**Survey:** RO Impt 3.2, SD .99                      SRO Impt 3.4, SD 1.01

**Catalog:** RO 2.9                                      SRO 3.3

**History:** Added in Rev 2, based on 43.4, which states, "Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions, and 45.10, "Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure."

**INPO exam database:** W 10, CE 3, B&W 0

**Comments:**

- \_ NOT a very clear K/A; except for EOPs (and certain AOPs) this is done by multiple departments.
- \_ When I read this, I think about hot spot flushes. Not sure if that's what others mean.
- \_ Not clear what type of operating procedures would be involved; better to specify: sounds more like HP task from generic perspective
- \_ Hot Spot flushing?
- \_ Define what's meant, is this doing flushes or hanging lead blankets?
- \_ Remove.
- \_ Not clear what type of operating procedures would be involved; better to specify: sounds more like HP task from generic perspective
- \_ Remove
- \_ Remove
- \_ Other -> K/A may be better tested on operating test.
- \_ JPM
- \_ The KA needs to be better explained. Very broad.
- \_ This K/A is too verbose. I would change it to read: Ability to perform procedures to reduce radiation levels and minimize personnel exposure.
- \_ Remove from K/A catalog.
- \_ This K/A seems to apply more to Radiation Protection personnel than Operations. Unless you are talking about procedures that flush piping to lower the dose levels or performing the crud burst procedure.
- \_ This should be a GET item.
- \_ These procedures are not performed by Operations. These procedures are performed by Radiation Protection personnel.

- \_ Clarify it. Are we talking time, distance, shielding; system flushing; or other procedures.

**2.4.7 Knowledge of event-based EOP mitigation strategies.**

Survey: RO 3.5, SD .95 SRO 4.1, SD 1.00

Catalog: RO 3.1 SRO 3.8

History: Added in Rev 2 based on "EOP inspections." Regulatory bases are 41.10, which reads, "Administrative, normal, abnormal, and emergency operating procedures for the facility," 43.5, "Assessment of facility conditions and selection of appropriate procedures during normal, abnormal, and emergency situations," and 45.13, "Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated."

(FYI - 2.4.5 Knowledge of the organization of the operating procedures network for normal, abnormal, and emergency evolutions.

2.4.6 Knowledge symptom based EOP mitigation strategies.

2.4.7 Knowledge of event based EOP mitigation strategies.

2.4.8 Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.)

INPO exam database: W 2, CE & B&W 0

**Comments:**

- \_ Thought all plants symptom based
- \_ Our EOPs are symptom based, not event based.
- \_ Use symptom based EOP's not event based
- \_ Our EOP is symptom based.
- \_ Re-write "event-based EOP mitigation strategies" to "event-based AOP mitigation strategies."
- \_ Thought all plants symptom based
- \_ Scope is right for event based EOPs, but event based EOPs are not used, therefore the K/A is not relevant
- \_ Our EOP is symptom based.
- \_ See additional comments to preceding question.
- \_ Word as "Knowledge of EOP mitigation strategies."
- \_ Very broad. This opens up every word ever written on this subject to testability for the Operator. Their specific site training may not have covered as deep as these questions might come.
- \_ Thought all plants symptom based
- \_ Again, event based EOPs are not relevant
- \_ SRO responsible for strategy; both for implementation
- \_ But close
- \_ I am assuming this means event based abnormal operating procedures as EOPs are all symptom based
- \_ Though all plants symptom based
- \_ Event based EOPs are not relevant

- \_ Use symptom based EOP's not event based no questions necessary
- \_ Our EOP is symptom based.
- \_ Other -> Also tested on operating test.
- \_ My plant uses symptom based EOP mitigation strategies, so this K/A would not apply.
- \_ Delete it.
- \_ As with previous KA may be better to be included in E/APEs
- \_ Hyphenate "event-based"
- \_ Delete if no plants have event based EOPs
- \_ My basic opinion is we need to keep the emergency K/A as they are.
- \_ We use symptom based (ORGs) and function based (FRGs). They address events but are not event-based (diagnosed).
- \_ This KA is Not Applicable. No plants that I know of use Event Based EOPs.
- \_ If my assumption that this KA is addressing events like loss of vacuum or power losses, etc. is NOT correct then this is an insignificant KA because our EOPs are ALL symptom based
- \_ Our EOP is symptom based.
- \_ Change to read: Knowledge of event based AOP and EOP mitigation strategies.
- \_ Combine K/A with 2.4.6.
- \_ Combine with similar k/a
- \_ None of the stations I work with have event based EOPs that I am aware of.

### 2.4.13 Knowledge of crew roles and responsibilities during EOP flowchart use.

Survey: RO 3.4, SD 1.19

SR

O 3.8, SD 1.25

Catalog: RO 3.3

SR

O 3.9

History: Added for Rev. 2.

(FYI - 2.4.12 is "Knowledge of general operating crew responsibilities during emergency operations," and 2.4.14 is "Knowledge of general guidelines for EOP flowchart use.")

INPO exam database: W 1, CE & B&W O

Comments:

- \_ Don't use EOP flow charts
- \_ Don't use flow charts
- \_ Flowchart use?
- \_ Flowcharts are no longer used in our EOPs or OAs. Individual assignments can vary during an evolution. There are not specific assignments to crew members dictated by the EOPs.
- \_ Not all plants have flow charts
- \_ We do not use flowcharts.
- \_ But think that "flowchart" should be deleted; should be applicable to all EOPs; in our case, only a couple are flowcharted

- EOP flowchart does not apply at our station.
- We don't use flowcharts
- We do not use an EOP flowchart.
- Delete "flowchart" from the K/A statement.
- We do not use flowcharts in EOP's
- PWR- no flowcharts here!
- My site does not utilize standard EOP role positions, based on resource availability
- We don't use flow charts.
- Not used at B&W plants
- I see this as redundant to 2.4.12 since emergency operations should be in accordance with EOPs; but like the wording "roles and responsibilities"
- We don't use flowcharts
- We do not use an EOP flowchart.
- Consider combining with K/A 2.4.12.
- Not used at B&W plants
- We don't use flowcharts
- We do not use an EOP flowchart.
- Not a required K/A
- SROs need to know more about Em. Dir function and Event Classification.
- Not used at B&W plants
- We don't use flowcharts
- We do not use an EOP flowchart.
- Other -> K/A also tested on operating test.
- Not a required K/A
- Also test in simulator
- Not used at B&W plants
- B&W plants don't use flow charts in the EOP and Abnormal Procedures
- Should be evaluated during the Operating Exam.
- We do not use an EOP flowchart.
- Site specific EOP exam
- Demonstrate in simulator exam scenario.
- I have never been exposed to EOP flowcharts (I'm PWR limited).
- [My site] does not use flow charts in the Diagnosis of EOPs
- Covered sufficiently in previous K/A 2.4.12. We do not use the flowchart so that has impact on my response.
- EOP flowcharts are not used here.
- Our plant does not use flow chart EOPs, so I can not comment.
- We don't have EOP flow charts, and even if we did this K/A is redundant to the other other K/As related to use of EOPs.
- We don't use EOP flowcharts
- I think this is referring to different EOP flowcharts than what our CE Plant uses.
- We don't use them at [my site].
- We do not use an EOP flowchart.
- Does not apply.



- I don't know
- Delete this K/A for [my site]
- Since we don't use flowcharts, I wasn't always certain of my opinion.
- Knowledge of crew roles and responsibilities during EOP usage.
- PWR - we do not use flowcharts for EOP implementation.
- We don't use flowcharts.
- Does any PWR use flowcharts? I have only CE experience, other than BWR.
- We don't use flow charts
- Not used at B&W plants

#### 2.4.14 Knowledge of general guidelines for EOP flowchart use.

**Survey:** RO 3.2, SD 1.13 SRO 3.9, SD 1.25

**Catalog:** RO 3.0 SRO 3.9

**History:** Added in Rev. 2. Same bases as above.

**INPO exam database:** W 6, CE 1, B&W 0

#### **Comments:**

- Don't use EOP flow charts
- Don't use flow charts
- Flowcharts are no longer used in our EOPs or OAs. Individual assignments can vary during an evolution. There are not specific assignments to crew members dictated by the EOPs.
- maybe EOP/flowchart would be better
- Not applicable.
- We do not use an EOP flowchart.
- Delete "flowchart" from K/A statement.
- Flowcharts not used at [my site]
- Don't use flow charts
- Not used at B&W plants
- Not applicable.
- We do not use an EOP flowchart.
- Flowcharts not used at [my site]
- Not used at B&W plants
- Not applicable.
- RO needs to be familiar and SRO needs to have a strong working knowledge.
- SRO responsible for implementation; both must know guidelines for use
- Flowcharts not used at [my site]
- Not used at B&W plants
- Not applicable.
- B&W plants don't use flow charts in the EOP and Abnormal Procedures
- Also test in simulator
- Not used at B&W plants
- Should be evaluated during the Operating Exam.
- Delete this K/A
- [My site] does not use EOP flow charts
- EOP flowcharts are not used here.

- We do not use flowcharts for EOP's
- Again, feel "flowchart" should be deleted as restrictive; should know guidelines for use of all EOPs
- Same comment as previous question.
- We don't use EOP flowcharts
- We don't use flowcharts
- We don't use EOP flowcharts at [my site].
- We do not use an EOP flowchart.
- Does not apply
- What is EOP Flowchart?
- Delete this K/A for [my site]
- Eliminate K/A
- Combine with previous k/a
- PWR - we do not use flowcharts for EOP implementation.
- Combine with K/A 2.4.13.
- We don't use flowcharts.
- Again, flowcharts aren't used at my plant.
- We don't use flow charts
- Not used at B&W plants

#### **2.4.15 Knowledge of communications procedures associated with EOP implementation.**

**Survey:** RO 3.4, SD 1.01                      SRO 3.8, SD .87

**Catalog:** RO 3.0                                SRO 3.5

**History:** Added in Rev. 2

**INPO exam database:** 0

#### **Comments:**

- Is this asking about 3 way communications, if so delete
- Don't have multiple standards for communication
- Change "communications procedures" to "communications methods"
- Clarify it. communication procedures are what, how to talk, phonetic alphabet, what phones to use???
- It seems that ALL of these K/As associated with EP/AP usage can be combined into one...ability to correctly perform EP/APs.
- RO just needs to know we should be using it the SRO needs to supply it and ensure it works for him.
- Other - Also tested on operating test.
- Operator Requal exams
- Knowledge of procedures for communications are insignificant compared to the ability to communicate.
- Should be evaluated during the Operating Exam.
- Delete this from the K/A catalog. This K defines a purely administrative function and Management expectation that does not merit having its own K. This K is inherent in several other K/As.
- Assuming this means the formal line of communications that occur during EOP implementation.

- Are we talking about E Plan implementation?
- This K/A- is it talking about offsite communications during ERO actions? Is it talking about 3-way communications? I would need more guidance to make better decision on it.
- This must not be important because I know of no communication procedure associated with EOP implementation.
- This K/A is very unclear. Do plants have special communications procedures for EOP implementation? We have specific tailboard requirements for certain EOPs, but no specific communication procedure. Perhaps this K/A should read: Knowledge of tailboard, three-way communication, and peer-checking requirements associated with EOPs.
- K/A should be the ABILITY to use these procedures.
- Clarify the expectation. Is this three-way communications or how to key a radio or how to notify local authorities if an EAL is entered?
- Communication during EOP implementation is evaluated during the performance exam. This not a knowledge area that needs to be tested on a written exam. (Not at the licensing level)
- Our communications protocols are used regardless of the type of procedures we are using at the time (we don't have special EOP comm procedures).
- Knowledge associated with EOP implementation.
- Most communications procedures apply all the time, not being limited to EOPs. That is, unless this is referring to communications with offsite agencies, in which case the distinction needs to be made between Emergency Plan Procedures and EOPs
- Also test in simulator.
- Are the requirements for communications different in the EOPs? This may have been in the past, but I'm not sure how applicable this is anymore.

**2.4.37 Knowledge of the lines of authority during an emergency.**

**Survey:** RO 3.2, SD 1.09                      SRO 4.1, SD .9

**Catalog:** RO 2.0                                SRO 3.5

**History:** Added in Rev. 2, based on 45.13, and as mentioned in NUREG 1021, ES-301. 45.13 reads, "Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated," so the link to this K/A is unclear.

This K/A was intended to refer to the transition of emergency authority as the emergency response organization (ERO) staffs up during the first hour after activation. A typical example would be the Shift Manager initially assumes the role of emergency coordinator after an event is classified. The SM is relieved by the TSC Coordinator - who is subsequently relieved by the EOF Coordinator. This line of authority may vary depending on the licensee's site-specific procedure.

**INPO exam database:** W 1, CE & B&W 0

**Comments:**

- This appears to me to be more of a Conduct of Operations type K/A
- Outside the Control Room names and roles change, inside the CR it is constant

- \_ More of a Conduct of Operations K/A
- \_ Totally irrelevant to handling emergency operations.
- \_ Clarify: during Emergency Plan implementation
- \_ Only SRO has E-Plan implementation expectations
- \_ E-Plan
- \_ Everyone on site needs to know and understand how this K/A functions.
- \_ Maybe combine this K/A with 2.1.1
- \_ Remove it.
- \_ Not relevant. Lines of authority are internal and are hard to find written procedurally and are not relevant to a license process.
- \_ Combine with a similar EOP k/a

### ATTACHMENT 3: K/As that Require Different Knowledge/Ability for the SRO and RO Jobs

#### 2.1.1 Knowledge of conduct of operations requirements.

Survey: RO Impt 3.8, SD .86 SRO Impt 4.2, SD .87

Catalog: RO Impt 3.7 SRO Impt 3.8

History: New in Rev 2

#### Comments:

- \_ I would say mostly the same
- \_ They are very similar but there are additional requirements for an SRO to fulfill
- \_ SROs should always be held at a higher standard than ROs. It only makes sense.
- \_ SROs could have different administrative requirements.
- \_ Expect SRO knowledge to be more in depth, especially for admin requirements
- \_ The criticality is slightly higher for SRO.
- \_ We have many procedures that cover this area.
- \_ Not needed to recall from memory since these are available in an Administrative Procedure.
- \_ While an RO is required to have some understanding of this topic, ultimately it is the SRO's responsibility to ensure the conduct is adhered to.
- \_ K/A for group must be tailored to job responsibility
- \_ Minor differences in the operator competencies for RO vs. SRO as defined in NUREG 1021
- \_ More detailed for SRO level
- \_ Although the SRO is required to adhere to further conditions
- \_ Different aspects in job responsibilities/decision making
- \_ SRO has more management responsibilities.
- \_ The duties and responsibilities are different. The general guidelines require the same knowledge for both the RO and SRO.

#### *Revise How?*

- \_ The conduct of ops is a moving target and it is important to know what it contains AND the basis for the content.
- \_ As commented earlier, break it up into its core components. Such as, developing site specific procedures, administrative controls, organization, reporting requirements, etc.
- \_ Delete this from the K/A catalog
- \_ This is more of an administrative function and not really important to the safety of the plant.
- \_ This knowledge and ability is too generic in nature.
- \_ Keep it

- Expand this K/A to indicate if this is the plants managements operating requirements, i.e. when to trip the reactor, or skin temperature of the SG's prior to starting an RCP.
- Narrow the field. Perhaps provide examples of what Conduct of Operations encompasses.
- A poll should be taken of TWG members concerning major areas of conduct of ops, then look for common grounds as a way to divide the KA into smaller parts.
- The "generic" conduct of operations requirements needs to be better defined. Some of these already exist in the catalog, others may not. Each power plant has a "Conduct of Shift Operations" procedure that covers numerous requirements, from when to take actions to trip the plant, when to take manual control of an automatic system, etc... From the standpoint of a "Knowledge or Ability", this statement is more of a "group" of knowledges and abilities, with the exam writer able to ask a whole host of questions.
- Should be an "application" K/A. That is how to apply these requirements to specific issues/scenarios.
- Generically better written K/As should be provided, more detail and more focus. Across the industry each site interprets what is given in these brief K/As. By now we as an industry should have an understanding as to what is required for every K/A and have the ability to write it down in some detail. At my site we continue to change according to who sets in the control seat.
- I believe the K/A should be broken down into more specific knowledge requirements.
- Break this k/a into manageable categories
- Again refer to NUREG 1021 operator competencies. Major difference for SRO (vs. RO) is additional focus on Tech Spec requirements and Command and Control aspects of SRO job.
- This is rather vague as written. Should be more specific.
- This should specify exactly what is being asked. For our plant this is an [identifying information deleted], conduct of operations, question that could discuss the role of each position as well as educational requirements and job functions. This could also mean job duties of each position, reactor trip notification criteria, control room references available, switchyard ops, manning (which is covered by a different KA) and many other assundry items. I am never comfortable writing a question for this KA b/c it is so broad.
- This k/a is very vague. Conduct of ops requirements for this site tells operators how we do business at this station. Keep it general, but it should be only in the ro/sro site specific exams.
- Testable items should include big picture issues such as taking manual control of controllers, acceptability of pre-emptive actions, and annunciator response. These things may actually be best suited for evaluation on the simulator examination.
- Conduct of operations is primarily about the behavior our people exhibit. It shouldn't matter what setting is observed, the behaviors should be consistent. However, these behaviors are best observed in both simulated and actual operating plant situations.
- Add this to simulator training also

- This is a good K/A to have because it is wide open, allowing for examination of many different topics specific to each facility on how they do business.
- Delete it.
- The conduct of operations should be developed at the highest level. The requirements specified within the document should be carefully crafted and remain unchanged. Revision should only occur by the approval of the highest level of corporate responsibility and ownership for safe reactor operations. (Example: The conduct of operations as provided for the operation of the first commercial reactor: Shippingport Atomic Power Station, could only be amended/revised following approval of Admiral Rickover); Knowledge of this manual should be of the highest level. The compromise is the extent of diluting of the conduct of operations manual/requirement with non specific corporate instruction and lack of operating specifics. Corporate lack of responsibility to the mastery of the KIS (KEEP IT SIMPLE) principle as it applies to the conduct of operations.
- This K/A should be broken down into better defined areas.
- More specific in regards to specific areas of the conduct of operations such as peer checking, independent verification etc.

## **2.1.2 Knowledge of operator responsibilities during all modes of plant operation.**

**Survey: RO Impt 4.1, SD .80 SRO Impt 4.4, SD .73**

**Catalog: RO Impt 3.0 SRO Impt 4.0**

**History: Previously a System Generic K/A in Rev 0, with importance ratings that varied by system.**

### **Comments:**

- SROs require a higher level of proficiency and knowledge of the Defense in Depth analysis in Modes 5 and 6. RO required knowledge in these areas is significantly less than the SROs.
- ROs don't need the level of understanding of ITS basis that SROs need.
- ROs /SROs need to know their responsibilities and they do change during different modes of operation.
- An RO would be responsible for his/her duties only. An SRO would be responsible for knowing his/her duties as well as those of the RO
- RO's should know their responsibilities as well as the responsibilities of the NEO's they supervise. SRO's need to know all Operators' responsibilities.
- It is important for all levels of plant personnel to have knowledge of the responsibilities they fulfill, but, not all responsibilities are the same.
- SRO has responsibilities above and beyond that of the RO
- ROs do not have the same oversight responsibility as SROs
- Admin requirements are more strongly SRO responsibilities
- SRO's have been tested on "administrative knowledge" in cases where operators are not required to be knowledgeable.
- Different responsibilities
- SRO responsibilities differ from an RO.
- RO and SRO responsibilities change when plants enter Shutdown or Defueled modes.

- They both have to know what the others responsibilities are however this should not be in the K / A.



*Revise How?*

- This K/A can have 1,000 questions a broad range of operations, from CSD to full power operations and everything in between. Although this gives artistic liberty to the exam writer, the other aspect of this is tying this K/A to JPM's, scenario's, lesson plans, etc. By the way it is written, I can put this K/A as a reference to 90% of what is developed.
- Recommend breaking this K/A out into each operational mode.
- Need to focus on what types of areas of responsibility. KA is much too broad as written.
- Due to the complexity of our operations and maintenance activities during outage conditions, this K/A becomes a place where unreasonable questions get asked from very long maint. directive documents, need to keep this topic operator specific. We have added many processes to our station over the past 10 years and questions should come with reference materials.
- Again, like the first K/A, but this is actually worse. An operator's responsibility during all modes of operation? What does this encompass? This K/A could be covered by the first K/A in the catalog, and then deleted.
- Over the years I've spent in the industry it has been my experience that we have lost some expertise in this area. It seems the roles and responsibilities of the SRO and RO are not taught or develop as needed by our changing standards/expertise. When I entered the industry in 1973 candidates were developed and trained after experience was gained. Your current understanding and abilities held a great impact on the license you were trained and examined for. This provided insight and background for understanding the roles of a RO or SRO during all modes. Now candidates are chosen based on their ability to move up in the company with little attention given to their background for plant operation. This lack of plant skills equates to a lack of knowledge for personnel responsibilities to plant operations.
- I would recommend that this K/A be divided giving more specific knowledge requirements.
- Job specific
- Operator specific (RO & SRO) responsibilities related to key aspects of "Conduct of Operations" (ex. annunciator response during normal, abnormal and emergency conditions) should be identified by individual K/As.
- In the initial phase of the KA catalogue, I believe this was written for responsibilities of whether to trip, safety and health of the public issues, ramp down, ie. what am I expected to do to protect the plant and the public. Now it means much more and can include reactivity control issues, procedural adherence issues, shift manager oversight, SS oversight and other topics not envisioned 10 years ago.
- Seems pretty open-ended. Unless there are specific situation-dependent tasks identified in procedures, might be difficult to work into a written exam.
- The KA is too generic to identify importance ratings as these would vary greatly depending on the particular responsibility.
- Add "including defueled" at the end of the K/A since this is technically "No Mode."

- This K/A should be removed. It is essentially covered under many others and is overly broad. In addition it doesn't belong in a generic K / A.
- Emphasis should be specific to the requirements given in the 10CFR. Clear legal understanding that the SRO/RO license is the legal contract to protect the health and safety of the public and that you are accountable to the Congress of the United States.

#### **2.1.4 Knowledge of shift staffing requirements.**

**Survey: RO Impt 2.9, SD .95 SRO Impt 3.8, SD .96**

**Catalog: RO Impt 2.3 SRO Impt 3.4**

**History: Added in Rev. 2**

#### **Comments:**

- There are T.S. on this subject and SROs should know manning requirements.
- Actual staffing is not controlled by the RO but is controlled by the SRO.
- Best tested as a JPM
- RO & SRO for watch relief and SRO for over plant staffing
- RO's should have some knowledge of the requirements, as it applies to their role. SRO's should know the staffing requirements for everyone's roles.
- This req. is MET or NOT MET. SRO would direct filling void positions
- ROs must know the requirements regarding "at the controls" where as SROs must know the Tech Spec and administrative requirement for staffing the entire shift.
- The SRO is held to a higher level of responsibility for this KA than a RO.
- SROs are responsible for ensuring proper shift manning
- SRO's are more responsible for meeting the staffing requirements than RO's.

#### *Revise how?*

- I don't feel that knowledge of this K/A has much to do with safely operating the plant, it is more of an administrative knowledge.
- Delete this from the K/A catalog
- All candidates are required to know requirements for shift staffing for all modes of operation.
- Redundant to 2.1.5 (After I read 2.1.5 I came back and edited the review of this K/A. (You told me not to look at the NUREG)
- Overall, good K/A, specific and to the point.
- Reword: Knowledge of minimum shift staffing requirements to include 'at the control' requirements.
- I don't believe this K/A should be changed.
- Construct test questions that hold ROs responsible for RO manning requirements only OR apply to modes where an RO may have control room oversight responsibility.
- Shift staffing should be the responsibilities of an sro.
- It may be worthwhile to ask a question about T/S minimum staffing, but its pretty basic, and not particularly challenging. Staffing requirements are pretty well proceduralized. I don't see getting this right as much of a challenge to operators.

- \_ Ask some outage specific questions on the exams due to the different (longer) work hours.
- \_ Knowledge of site administrative and regulatory shift staffing requirements

**2.1.8 Ability to coordinate personnel activities outside the control room.**

**Survey:** RO Impt 3.4, SD .96 SRO Impt 4.1, SD .72

**Catalog:** RO Impt 3.8 SRO Impt 3.6

**History:** Was A1.10 in Rev. 0 with RO impt 2.9 and SRO impt 3.9\*.

**Comments:**

- \_ The SRO is basing the coordination using a broad view of the plant condition, whereas, the RO is more focused on their area of responsibility. The SRO must ensure that the ROs are coordinating their activities to the best efficiency obtainable.
- \_ The RO may interface with one or more field operators, but his ability to clearly communicate is the issue. The topic also requires multi-discipline communication standards that are addressed at the SRO/Management level. SRO's coordinate resources.
- \_ For an SRO, this coordination of activities encompasses a much wider scope, with much more outside group involvement
- \_ Best tested on Operating Test
- \_ In most cases RO coordination is more limited in scope
- \_ SRO has more responsibility during emergency situations
- \_ Primarily RO--SRO exercising oversight
- \_ RO's - more individual direction, SROs - more resource management.
- \_ More for SRO
- \_ The SRO has overall command of the situation and delegates to the RO.

*Revise How?*

- \_ This is general knowledge on resource management.
- \_ Although I think it's implied, I think the K/A should state "Ability to coordinate Operations' related activities outside the control room."
- \_ Way too broad. I envision breaking this down into knowledge of where Field Operators are required to be during particular activities, evolutions or emergencies and the ability to exercise judgment in making assignments from the control room.
- \_ Applicable to practical exam only
- \_ This is a supervisor's responsibility. I don't think it needs to be in the K/A catalog as it is limited in its role for nuclear safety
- \_ The RO controls most AO activities on a daily basis but the SRO would control his movements more during critical Emergency evolutions.
- \_ The only way to ask a question on this is to use a specific system or event. At that point it now becomes a system/event tied question which is supposed to be avoided in the generic realm. This is also a good candidate for a simulator tied KA, not so much for a question.
- \_ Test on Operating Exam

- May not be needed. If operators can function in the control room why would they not be able to perform outside the control room. K/A is not specific enough.
- Best performed on the simulator.
- Delete this from the K/A.
- While this is an important ability - seems like it's not a testable topic.
- Evaluation of this K/A shall occur during simulator exam performance

**2.1.10 Knowledge of conditions and limitations in the facility license.**

**Survey: RO Impt 3.6, SD .93 SRO Impt 4.5, SD .67**

**Catalog: RO Impt 2.7 SRO Impt 3.9**

**History: Added as new in Rev. 2. However, Rev. 0 included a System Generic K/A that read, "Knowledge of limiting conditions for operations and safety limits," with importance ratings varying by system and job. For example, for the Control Rod Drive System, RO impt was 3.7, SRO impt was 4.1\*.**

**Comments:**

- SROs need a high level understanding
- SROs should know them, ROs should be familiar with them.
- SROs and ROs must know Safety Limits and Limiting Safety System Settings. Both must know any and all conditions and limits in the license itself.
- RO's need to be able to recognize these conditions, SRO's need to be able to recognize and apply to required actions.
- more for sro
- SRO required to know more of basis and non-TS portion of license.

*Revise How?*

- ROs as well as SROs need to know operability concerns of equipment. The importance factor for ROs should be raised.
- Need to break this KA into specifics. Exactly what is being asked for here?
- Need additional focus on the Administrative Controls section of Technical Specifications.
- This needs to be more specific, there are thousands of conditions and limitations of the facility license.
- I would eliminate this K/A, as most OPERATIONAL limitations and conditions of the Facility License have already been incorporated into the Facility's Technical Specifications
- Very broad, are we talking about Tech Specs? FSAR? Some additional words could point the exam author and the program administrator in the right direction.
- This K/A does not make any sense. It needs to be more concise as to what it is asking.
- Do not understand what the KA is looking for.
- This is very broad in scope. The focus areas need to be specifically identified.
- Change this to Knowledge of LCO applicability and remove it from the sample plan to sample with each system and erg/aop. This should be tested only at the generic level.

- \_ SROs need to have more basis knowledge than ROs.
- \_ The type of questions asked under this K/A should be limited to significant and readily recognized conditions/limitations. This K/A could easily be misconstrued to become an "ooly" hunt.

**2.1.12 Ability to apply technical specifications for a system.**

**Survey:** RO Impt 3.4, SD .82 SRO Impt 4.7, SD .45

**Catalog:** RO Impt 2.9 SRO Impt 4.0

**History:** Added as new in Rev 2. Somewhat related System Generic K/As in Rev 0 included, "Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications," "Knowledge of bases in tech specs for limiting conditions for operations and safety limits."

**Comments:**

- \_ SRO's are responsible for implementation
- \_ SROs must be able to make fine distinctions in their operability determinations. ROs only need broad understanding.
- \_ RO's have limited involvement with tech spec determinations at the plant. higher for SRO
- \_ I see this as a key difference in the responsibilities of ROs vs. SROs; this is SRO
- \_ operability issue are ultimately the responsibility of the sro supervisor
- \_ ROs should be required to know when they are in a condition that places them in an Action Statement, but they should not need to have the ability to track the time requirement (except for < 1 hr TS).
- \_ The SRO requires the ability to use the Tech Spec Bases documents also.

*Revise How?*

- \_ Though the ROs need to know entry conditions, they are not necessarily required to know the actions required once the TS is entered. This is more of an SRO K/A.
- \_ For ROs is it more an understanding of the Tech Spec. For SROs it is application of the Tech Spec.
- \_ SROs should subjected to additional exams that focus in detail in this area. More I look and think about this the more I see this a theme I have gone back and added information in some cases and placed the information the wrong blocks else where. The industry needs to train a lot of generic issues for SROs outside of the way we have been doing business.
- \_ Apply is an SRO ability
- \_ Less significant for ROs than SROs but still reasonable for both exams
- \_ RO's should have a fundamental knowledge of how to apply tech specs. The sro should be the ones to apply the actual tech specs. Test the ro's on the fundamentals and the sro's on the specifics.
- \_ Scope applies to all licensed operators however, the SRO is in charge of all implementation with the RO backing him up and knowing what to tell him
- \_ Ability to determine operability issues and apply technical specifications for a system or component

- \_ K/A may need to be divided into two different K/As to differentiate that ROs do not need to have the skill to track greater than 1 hour action statements. ROs should simply be required to know when they have met the entry conditions for action statements that are greater than 1 hour.

### **2.2.23 Ability to track limiting conditions for operations.**

**Survey:** RO Impt 3.1, SD .87 SRO Impt 4.3, SD .67

**Catalog:** RO Impt 2.6 SRO Impt 3.8

**History:** Added in Rev. 2.

#### **Comments:**

- \_ ROs must recognize when an LCO is entered. SROs need to determine when it expires.
- \_ Tracking LCO's usually an SRO function
- \_ SRO only can initiate LCO and has responsibility for compliance; both can track
- \_ ROs should not be responsible for tracking > 1 hr action statements.

#### *Revise How?*

- \_ Essentially, this could be combined with the previous K/A.
- \_ I wish this survey gave me a way to rate the difficulty of some of these items. Several of the K/As listed are important, but trivia. This survey as constructed makes it hard to say 'Yeah this is important but not worth testing.'
- \_ this is an in plant or sim KA
- \_ Remove from generic and make this for systems with TS applied to them.
- \_ This should be tested on the simulator or on a JPM

### **2.2.25 Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.**

**Survey:** RO Impt 3.2, SD .84 SRO Impt 4.2, SD .68

**Catalog:** RO Impt 2.5 SRO Impt 3.7

**History:** Was a System Generic K/A in Rev. 0, with importance ratings varying by system. For example, for the CVCS, RO impt was 2.7, SRO impt was 3.6. For a Reactor trip, RO impt was 2.8, SRO impt was 3.9.

#### **Comments:**

- \_ RO, 1 hour or less LCOs
- \_ SRO must be able to make operability decisions
- \_ ROs should know some Basis info for very important LCOs, but not as much as SROs. I am not sure how to incorporate this comment.

#### *Revise How?*

- \_ Change the K/A to read: Knowledge of technical specification bases for limiting conditions for operations and safety limits.
- \_ The K/A should state that the knowledge is required given a reference.
- \_ Too broad in scope (all LCO bases?)
- \_ This needs to be split in to bases for all TS and then safety limits or knowledge of the bases for just the safety limits. Since nureg-1122 in section 1.4 on page 1-3 has

SRO written items and lists 7 SRO items from CFR 55.43 (b), and number 2 is facility operating limitations in the technical specifications and their bases, this KA appears to double dip into that category. If we apply 1.4 as it is now being applied across the board for SRO questions, it may be we need to limit this objective to just the bases of the safety limits portion of TS.

- The KA should be split into one for safety limits and individual system KAs for limiting conditions for operation. Having only one KA limits the number of Tech Spec questions that can be on an exam.
- Combine with tech spec k/a
- I am not sure how to formulate this into a set of K/As, but ROs should not be held to the same level as SROs wrt TS basis knowledge; however, ROs should be required to know some of the more important TS basis info.

### **2.2.26 Knowledge of refueling administrative requirements.**

**Survey:** RO Impt 2.8, SD .85      SRO Impt 3.9, SD .80

**Catalog:** RO Impt 2.5      SRO Impt 3.7

**History:** Added in Rev. 2

#### **Comments:**

- SRO responsible for oversight
- Refueling SRO position requires more knowledge.

#### *Revise How?*

- This could be broken into many aspects of refueling operations. Such as; refueling shutdown requirements, refueling (moving fuel) requirements, refueling containment integrity requirements, etc.
- SROs really need to know this stuff.
- As an SRO, I was licensed to handle fuel. Yet I was NEVER on either fuel handling bridge and knew very little about it. I recommend excluding fuel handling from the authorities granted under the RO and SRO license. Fuel handling should be a separate and distinct license or certificate.
- The RO/SRO role in Fuel Handling has changed to such a degree that any questions on the subject are of relative insignificance.
- It should be made clear that the Administrative requirements are related to systems.
- At our site ROs have very limited involvement in refueling activities.
- Discuss limited SRO licenses for refueling and whether all SRO's should be tested?
- ROs need to know much of what the SROs need to know because they are qualified to move fuel and need to know how their job interfaces with the Refuel SRO.
- Separate this into a separate refueling K/A for those getting refuel SRO licenses ONLY and generic refueling conditions from an operational standpoint
- Refueling has become specialized. The Initial SRO License exam should probably be pretty generic.

### **2.2.27 Knowledge of the refueling process.**

Survey: RO Impt 2.8, SD .84  
3.7, SD .75  
Catalog: RO Impt 2.6

SRO Impt

SRO Impt

### 3.5

**History:** Added in Rev 2.

**Comments:**

- \_ All Operators need to have this knowledge.
- \_ SRO have more admin responsibilities.
- \_ Fuel Handling SRO has different responsibilities than RO's

*Revise How?*

- \_ There are several aspects to refueling. Maybe it could be more specific, such as "Knowledge of core design and fuel movement processes."
- \_ Every SRO and RO must have an iron-clad understanding of the fuel status at all times. That includes the ability to operate the cooling systems under normal, abnormal and emergency conditions. However, only those ROs and SROs actively engaged in refueling operations need to fully understand the fuel handling mechanisms. For licensed operators who do not handle fuel, a general understanding is sufficient.
- \_ For those of us who use LSROs, we may look at this differently.
- \_ Refueling SRO positions would be chosen from this group. Additional training is routinely provided, to SROs chosen to fill these positions, just prior to the beginning of the refueling.
- \_ At our site ROs have very limited involvement in refueling activities.
- \_ The KA needs to be more specific. Does it mean only core alterations or the process from receiving new fuel to core load?
- \_ The part of this K/A that should be tested is not the actual movement of fuel but the activities to prepare for movement of fuel and recovery afterward. Fuel movement is performed by another group (on our site) under the supervision of a Fuel Handling SRO.

### **2.2.32 Knowledge of the effects of alterations on core configuration.**

Survey: RO Impt 3.0, SD .95 SRO Impt 3.6, SD .93

Catalog: RO Impt 2.3 SRO Impt 3.3

**History:** New in Rev 2 and based on 43.6, which reads, "Procedures and limitations involved in initial core loading, alterations in core configuration, control rod programming, and determination of various internal and external effects on core reactivity."

**Comments:**

- \_ SRO only

*Revise How?*

- \_ Delete this from the K/A catalog
- \_ I am not sure what this KA is asking. Possibly should be deleted.



- This K/A is too broad. As written, a question asking an applicant to calculate Keff after adding a fuel bundle can be justified. What's important is the potential for going critical, what to do if count rate begins increasing, alarms, evacuation, decay heat removal. The K/A should be narrowly tailored to include the functions under the operators' control and exclude functions for which operators have no influence.
- This is a poorly worded K/A. The K/A implies: How is core configuration affected by alterations? What the K/A should address is: How does altering the core configuration affect the operating characteristics of the core? I would reword this K/A to read: "Knowledge of the effects of core configuration alterations on the core operating characteristics."
- The K/A should state "during refueling".
- The use of both alteration and configuration can confuse. We use the term core alterations, not core configurations.
- Reactor engineering is responsible for alterations of the core configuration.
- Re-write K/A as follows: "Knowledge of the effects on the plant of performing core alterations."

### 2.3.8 Knowledge of the process for performing a planned gaseous radioactive release.

Survey: RO Impt 3.1, SD .95 SRO Impt 3.7, SD .80

Catalog: RO Impt 2.3 SRO Impt 3.2

History: New in Rev. 2, based on 43.4, "Radiation hazards that may arise during normal and abnormal situations, including maintenance activities and various contamination conditions," and 45.10, Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure."

#### Comments:

- Many release paths are initiated by AO's, not RO's
- The RO needs to know that a permit is required. The SRO needs to know when, how and why one is required and what to do when a discharge permit is not used.
- SRO oversight: performed from outside MCR at this site.
- SROs have more approval responsibility - admin knowledge.
- Delete this K / A. We don't, and have not ever that I know of, done this.

#### Revise How?

- Performed by personnel from another department (not operators); operators complete the lineup only. Remove from K/A catalog.
- Delete this due to double jeopardy.
- Delete this K / A. We don't and have not ever that I know of done this.

### 2.4.6 Knowledge symptom based EOP mitigation strategies.

Survey: RO Impt 3.7, SD .78 SRO Impt 4.4, SD .72

Catalog: RO Impt 3.1 SRO Impt 4.0

History: Added in Rev.2

**Comments:**

- \_ RO's know HOW; SRO's know WHY.
- \_ SRO is responsible for mitigation strategy; both for implementation
- \_ but not much different

*Revise How?*

- \_ Knowledge "of" symptom based EOP mitigation strategies.
- \_ Wolf Creek uses symptom based EOP mitigation strategies versus event based strategies. I thought all plants had gone to symptom based strategies.
- \_ This may be better tested in E/APEs not as part of the generics
- \_ Change this K/A to read: Knowledge of symptom-based EOP mitigation strategies.
- \_ With the exception of Yellow path, lower tier, mitigation strategies. These are not very high on the cognitive level for ROs and SROs.
- \_ Think the word 'of' is missing from description.
- \_ I assume we're talking ORG MACs (or similar).
- \_ Include SRO requirement to understand bases & background
- \_ Combine K/A with 2.4.7.
- \_ Add "of" after knowledge.

**2.4.8 Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.**

**Survey: RO Impt 3.6, SD .87 SRO Impt 4.2, SD .84**

**Catalog: RO Impt 3.0 SRO Impt 3.7**

**History: Added in Rev 2.**

**Comments:**

- \_ Strategy for integrating use of multiple procedures lies with SRO

*Revise How?*

- \_ To my knowledge, there is no specific strategy for addressing this. We have strived to make all of our AOPs, and EOPs symptom-based. Understanding the hierarchy of procedures is what this should really be addressing (and maybe that's what it's saying).
- \_ If we are only using symptom based procedures, this would be a mute point.
- \_ Not sure about the intent or value of this KA.
- \_ Delete this ka
- \_ Delete K/A, along with 2.4.6 and 2.4.7 and make one generic K/A of "Knowledge of EOP mitigation strategies."
- \_ Test in simulator
- \_ Could this be covered by 2.4.5?
- \_ In many ways this is the true basis for the mitigation strategy of the EOP network. The K/A could very well be expanded to include a significant discussion of the philosophy differences between the two types of procedures.

**2.4.16 Knowledge of EOP implementation hierarchy and coordination with other support procedures.**

**Survey:** RO Impt 3.5, SD .92 SRO Impt 4.4, SD .63

**Catalog:** RO Impt 3.0 SRO Impt 4.0

**History:** Added in Rev 2.

**Comments:**

- \_ More specific to SRO
- \_ Coordination (integration) of support procedures is SRO responsibility

*Revise How?*

- \_ Good one!
- \_ More of an SRO knowledge than RO
- \_ This KA repeats in different words the same fundamental knowledge of EOP and AOP layout and use together. Delete or define scope more specifically
- \_ I am guessing that this KA is targeting EOP interface with other procedures--but I shouldn't have to guess.
- \_ Eliminate
- \_ You see, this is a good generic knowledge item.

**2.4.18 Knowledge of the specific bases for EOPs.**

**Survey:** RO Impt 3.3, SD .80 SRO Impt 4.0, SD .72

**Catalog:** RO Impt 2.7 SRO Impt 3.6

**History:** Added in Rev 2

**Comments:**

- \_ SROs required to know more bases type stuff.
- \_ SRO needs to understand the bases so he can use judgment in directing the ergence in moving through the procedures.
- \_ ROs sometimes need to help the SRO prioritize.
- \_ The SRO should be more familiar with the material as he directs the flow path through the EOPs but the RO should have an understanding also.

*Revise How?*

- \_ Delete this KA and include under specific EPEs

**2.4.22 Knowledge of the bases for prioritizing safety functions during abnormal/emergency operations.**

**Survey:** RO Impt 3.6, SD .79 SRO Impt 4.4, SD .68

**Catalog:** RO Impt 3.0 SRO Impt 4.0

**History:** Added in Rev. 2.

**Comments:**

- \_ SRO responsible for mitigation strategy, including which procedure(s) should be implemented; sequentially or concurrent

*Revise How?*

- \_ B&W plants don't use/recognize Critical Safety Functions. However, prioritizing do to hierarchy/importance to safety is done. The hierarchy is built into the EOP.

- \_ If this means when I would go to a red/orange path, this is covered in previous KAs and in the EPE sections. This is not a necessary KA.

**2.4.23 Knowledge of the bases for prioritizing emergency procedure implementation during emergency operations.**

**Survey:** RO Impt 3.4, SD .74 SRO Impt 4.4, SD .67

**Catalog:** RO Impt 2.8 SRO Impt 3.8

**History:** Added in Rev 2.

**Comments:**

- \_ See comment on previous K/A; I see redundancy since EOPs are used to address degradation of safety functions
- \_ SRO are in the prioritization business, RO's implement

*Revise How?*

- \_ The SRO must understand the prioritization scheme and the background information on the procedure implementation. The RO does need this knowledge so as to be an asset to the team.
- \_ Instead of the knowledge for the bases, the K/A should be the ABILITY to prioritize.
- \_ Needs a little clarification as to the K/A expectation. I envision that an SRO needs to understand this if the need arises to do something not in strict compliance with the EOPs.
- \_ The reason exam questions are not written for this K/A is that it is not clear what "the bases for prioritizing" means. The procedures are already prioritized and no evaluation is needed by the licensed operator. This may no longer be applicable to the way we operate.
- \_ Combine with other EOP K/A s
- \_ Combine with similar k/a's

**2.4.28 Knowledge of procedures relating to emergency response to sabotage.**

**Survey:** RO Impt 3.1, SD .91 SRO Impt 4.0, SD .82

**Catalog:** RO Impt 2.3 SRO Impt 3.3

**History:** Added in Rev 2.

**Comments:**

- \_ SRO only responsibility to implement this procedure.
- \_ SROs will have more communications responsibilities with outside organizations, etc.

*Revise How?*

- \_ Due to heightened security awareness at all nuclear plants, this K/A needs to be increased in Importance factor.
- \_ I understand 9-11 paranoia but I don't agree with it. Worthless subject
- \_ This is an area to be expanded on with the new requirements and procedures associated with security. This area has taken on a much more important function.

- Security is such a big issue not sure we have the information or need the info to test on.
- The operators will still have to respond to the plant. Beyond notifying and working with security I am not sure if I really understand what this is getting at. I guess in general I am not sure it is that important.
- This question can inadvertently reveal safeguards or sensitive security information due public nature of the exam in government records. This should not be tested on license exams.
- Combine with similar k/a
- This could be expanded, in light of 9/11.
- If you know the responses due to accident, then actions taken to respond to sabotage are understood - but performed in a different manner.

**2.4.29 Knowledge of the emergency plan.**

**Survey: RO Impt 3.1, SD .86 SRO Impt 4.4, SD .65**

**Catalog: RO Impt 2.6 SRO Impt 4.0**

**History: Added in Rev 2.**

**Comments:**

- Pretty much SRO Only
- ROs, if they have any responsibility, need only understand those responsibilities assigned to them.
- SROs only are responsible for filling in for the SEC-MCR if necessary. ROs have no E-Plan specific role other than to implement plant procedures excluding PEPs
- SROs will make event classifications and serve as Em. Dir. ROs need to be aware of parameters that SRO will need to classify event.
- SRO's more involved with initiation and activation

*Revise How?*

- KA is too broad - needs to be defined better
- May be too broad. Should be rewritten to better define scope for RO and SRO knowledge
- Very limited knowledge required for ROs.
- sro only

## ATTACHMENT 4: Recommendations for New K/As from Survey Participants

### New KA 1

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- There is no K/A which mentions Risk Assessment. The NRC is very focused on this- there should be a K/A to interpret/recognize risk significant components and Operator Actions.
- Knowledge of events which are required to be reported to the NRC.
- more k/a's are needed for daily normal ops. I realize your testing for the accident of 10E-8 but if you train and test for daily ops emergency stuff will be easier to understand and perform. Just my opinion.
- Knowledge of plant-specific transition criteria from EOPs to Severe Accident Management Guidelines.
- Knowledge of clearance and tagging (switching and tagging) procedures.
- none
- There should be a K/A for the operator interface with the work control system since there is a constant interface between the operator and the maintenance personnel at the station.
- None
- Knowledge of the principles and application of Conservative Decision Making
- For Section 2.1 "knowledge of plant safety procedures which apply to operations personnel functions"
- Knowledge of Risk based maintenance planning. (PRA)
- interpret and implement dual column format procedures during abnormal plant operations
- Section 2.1 Knowledge of equipment/system operability vs. functionality
- Knowledge of reactivity control requirements
- Knowledge of Control Room Access Control.
- Assessing core damage.
- K/A of the effects of natural circ cooldown and the ability to determine adequate energy removal
- Ability to calculate Estimated Critical Conditions for reactor startups
- Knowledge of procedural requirements for instrumentation or component failures
- Knowledge and ability on how to obtain and apply OE.

### New KA 2

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- Ability to predict the risk impact of maintenance per station procedures implemented to comply with 10 CFR 50.65(a)(4).
- Ability to identify and interpret diverse indications to validate the response of another indicator

- Knowledge of conditions requiring facility management notification and attendant documentation.
- 2.1 Off site dose calc. manual as it affects equipment/system operability (eg rad. monitors)
- Knowledge of 10CFR55 regulations for maintenance of an RO/SRO license, including maintaining an active license, changes in medical condition, and continuing training requirements.
- Ability to meet Reportability time requirements.
- Mitigating Core Damage
- K/A of the control of steam bypass during forced and natural circulation cooldown
- Ability to monitor the approach to criticality using Main Control Board indications
- Ability to operate the facility to mitigate instrumentation or component failures
- Knowledge of site security plan and procedures

### New KA 3

---

- Ability to determine event reportability and make necessary reports to government agencies.
- Knowledge of the expectations for procedure adherence, including expected action in response to an identified deficiency
- 2.2 knowledge and procedures associated w/ solid plant operations
- Ability to determine operability / availability of safety related equipment.
- Knowledge of Hazardous Material control/spill procedures.
- Operating with a damaged core.
- K/A of the steam bypass system in detail..using all available control room indication
- Ability to monitor the approach to criticality using an Inverse Count Rate Ratio (1/M plot)
- Knowledge of the requirements for and process to make operability calls

### New KA 4

---

Knowledge of the principles and application of Human Error Reduction Tools/Techniques  
 Knowledge of the Basis for Continued Operation process.  
 Ability to determine when it is appropriate to shutdown the unit.  
 K/A Use of the emergency boration/ reactivity control schemes with the ability to equate the changes in reactivity to normal control schemes  
 Ability to complete paperwork for dose extensions [NOTE: this is normally a health physics function - usually a supervisor - need to add K/A so NRC doesn't require ROs or SROs to complete on NRC exams]

## New KA 5

---

- Knowledge of the principles of effective Teamwork, plus one I am squeezing in:  
Knowledge of expectations for minimizing control room distractions.
- Knowledge of a licensed operator's role in the Probabilistic Risk Assessment program.
- K/A Implement the actions in response to terrorist attack.



## ATTACHMENT 5: WOG TWG Workshop Participants

### Charles W. Sawyer, Jr. (Chair)

10 years in Operations Dept. at McGuire Nuclear Station

10 years in Operator Training

5 years in Work Control

Chair of the WOG Operations Subcommittee

Member of NEI Operator Licensing Task Force

Qualifications:

Licensed as RO and SRO;

Authored 9 NRC exams since 1996.

### Richard D. Brigdon

Westinghouse Classroom & Simulator Instructor 1982 - 1987

NRC Senior Reactor Operator Instructor Certification - Certified to teach all

Westinghouse PWRs - 1983

Vogtle Electric Generating Plant 1987 to present

Instructor - 1987 to 1991 (Initial and Continuing Training - Simulator and Classroom

NRC Senior Reactor Operator License - Vogtle Electric Generating Plant - 1990

Control Room Supervisor 1991 - 1995 - Vogtle Units 1 & 2

Operations Procedures Supervisor - 1995 - 2000

Sr. Operations Instructor - Vogtle Operator continuing Training Programs

Experience writing and supervision of developing pre-license audit exams per NUREG-1021, reviewing NRC developed license exam materials.

### John Brown

7 years Nuclear Navy (3 as an Instructor

15 years Commercial Nuclear Plant experience (4 in Operations, 11 in Operations Training)

Initial License Training since 2000, ILT Lead for 1 year.

Member of the WOG TWG for 1 year.

### Paul Hippely

Currently Braidwood Initial License Training Lead Instructor;

Previously Braidwood Requalification Instructor and Requalification Exam Developer;

Exelon/NRC Exam Development Coordinator - Wrote or assisted in developing 16 Initial License Examinations PWR and BWR;

Braidwood Initial License and Requalification Classroom and Simulator Instructor.

SRO Certification.

Navy Nuclear Power program for 8 years.

Tom Hunt

Twenty-two years experience in training and operations at BWR and PWRs.  
Currently Operations Training Supervisor, St. Lucie Plant, Florida Power & Light Co.;  
Previously Operations Training Supervisor and Simulator Instructor, Plant Hatch, Georgia Power and Kewaunee Plant, Nuclear Management Co.;  
Contract Simulator Instructor, Susquehanna SES, PPL, WNP-2, WPPPS;  
Contract License/Requal Exam Developer, Brunswick Plant, Carolina Power & Light;  
Licensed Operator Examiner, EG&G Idaho.

Qualifications:

SRO license, Plant Hatch (GE-BWR);  
SRO certifications:  
Plant Hatch (GE-BWR);  
Susquehanna SES (GE-BWR);  
Kewaunee Plant (W-PWR).  
Operator Licensing Examiner, NRC.

License exam and company audit exam development using NUREG-1021 back to revision 4.

Thomas E. Kuhar

Staff Nuclear Specialist

RO License for BVPS Unit 1 for 3 years (1976-1979)

SRO License for BVPS Unit 1 for 25 years (1979-2004)

Currently hold an SRO Instructor Certification for BVPS Unit 1 (2004-present)

Non-licensed Operator at BVPS for 2 years

Reactor Operator at BVPS for 3 years

Operator Training at BVPS for the last 26 years as an Operations Instructor, Training Supervisor, ILO and LOR Lead

Responsible for overseeing development of training material and examinations based on the KA Catalog for both licensed operator initial and requalification training. I have been involved in operator training since before the KA Catalog was first issued and have both used it and trained/coached others on its use since then.

WOG Training Group and MANTG Operations Subcommittee representative for BVPS for many years.

Steven Miller

SRO Certified Instructor - Salem Unit 1 and 2(Three Years 2002-2005)

B.S. Nuclear Engineering, Rensselaer Polytechnic Institute

US Navy Nuclear Operator (7 Years) Watch

Supervisor (2 Years) Operations Instructor (4 Years)

Gary Ohmstede

Plant Instructor - nuclear

Farley Nuclear Plant

Licensed SRO and plant operator for 4 years

Plant instructor for 7 years

Involved in 5 written exams: wrote 1 rev 9 draft exam in a secondary role of learning and reviewing the exam.

Reviewed 2 rev 9 draft exams as lead examiner for facility

Wrote 2 rev 9 exams in the past year as lead examiner for facility

### Joe Smith

03/17/03- Present: Completed SRO Certified Westinghouse Instructor (8/07/04) at Kewaunee (**W-PWR**), WI. Initial License Class Program Administrator. Maintain Task to Training matrix. Classroom & Simulator Instructor. Outage Containment Coordinator for 10/04 Split Pin Replacement and Core Barrel IST work.

09/02/02-12/19/02: Perry Power Station (**BWR-6**), OH, - STA Program Lead. Compiled, modified, and delivered NRC Biannual Operator Requal Exam (Part A "Static," and part B "Written"). Developed STA Specific Lesson Plans.

04/01/02-08/30/02: Hope Creek Plant (**BWR-5**), NJ - Initial License Class Instructor. Taught GFES, and Systems Lessons until the students began their Simulator Normal Operations Scenarios.

8/20/01-03/29/02: Perry Power Station (**BWR-6**), OH, - Initial License Simulator & Classroom Instructor. Joined class while they were on OJT. Reviewed Simulator Scenarios. Taught in Simulator and Classroom through, and including the NRC Audit Exam.

01/2001-07/2001: Pilgrim Power Station (**BWR-3**), MA, - SRO Cert Program, develop, prepare and present materials. Classroom, and Simulator Operator.

11/1998- 01/2001: Clinton Power Station (**BWR-6**), Ill, - Initial License Class, develop, prepare and present materials. Classroom, OJT, and Simulator Floor Instructor.

09/1998- 11/1998: Brunswick Nuclear Plant (**BWR-4**), NC, - Lead instructor for a 10 week INPO BWR SRO Certification Class. Simulator Floor and Classroom Instructor. Certified 4 INPO Employees.

04/1998- 08/1998: Hope Creek Plant (**BWR-5**), NJ - Initial License Instructor (Classroom & Simulator). Joined class in the Simulator during Startup Certifications, and left after NRC Audits.

12/1991-04/1998: Brunswick Nuclear Plant (**BWR-4**), Southport, North Carolina  
- Instructor. Maintain SRO Certificate. Using a variety of software programs, develop, prepare, and present materials IAW the SAT process, to initial licensed operator candidates and engineers. Qualified in the Classroom and Simulator.

- 1998 Hot License Class Instructor.

- 1997 Lead instructor for the Engineering Support Program:

- Participate as a student in the simulator as part of a staff operating crew.

- Senior Fuel Supervisor. Posses and maintain Limited Senior Reactor Operator License (LSRO). Supervise contract crews in the removal, re-insertion and verification of the reactor core fuel assemblies. Pass annual NRC written and performance based examinations to maintain LSRO.

- Emergency Communicator. Maintain annual test and drill requirements and be available by pager during assigned crew duty week to act as an Emergency Communications Director in the Technical Support Center (TSC). Pass annual examination to maintain requirements.

1987-1991: New Hampshire Yankee, Seabrook, New Hampshire  
(Westinghouse **PWR**)

- Instructor. Developed, prepared, and presented materials to Auxiliary Operators and Licensed Operator candidates in the classroom and in the simulator.
- Job Performance Measures (JPM) Writer. Created, drafted and issued JPMs', in accordance with approved guidelines, for use during the annual licensed requalification examinations.

1982-1987: San Onofre Nuclear Power Generating Station, San Clemente, California (Combustion Engineering **PWR** - Unit 3)

- Testing On Shift Supervisor. Acted as the operation department representative in discussions with Bechtel Power Corporation to complete hot functional testing requirements prior to fuel loading on the unit #3 reactor. Advised Bechtel and Southern California Edison employees during testing.
- Procedures Supervisor. Supervised SCE Operations and contract procedure writers for Units 2 and 3.
- System Description (SD) Writer. Developed materials used by engineers and operators to understand the operation and design of the plant systems. The job consisted of writing material and routing the drafts to engineers and operators for comment. Resolved comments for final approval by station management.

1970-1982: Maine Yankee Atomic Power Company, Wiscasset, Maine (CE/Westinghouse **PWR**)

- Shift Superintendent. Supervised the RO and SRO and operations crew. Acted as the Senior Emergency Coordinator during emergencies.
- Reactor and Senior Operator. Operated the reactor in accordance with license requirements. Directed an operating crew of 5.
- Fire Brigade Leader. Directed the actions to prevent and extinguish fires. Supervised a fire brigade of 4 workers.

1968-1970: Gulf General Atomic, San Diego, California  
(GGA **Test Reactors**: TRIGA Mark I, TRIGA Mark F and TRIGA Mark III)

- Senior Reactor Operator TRIGA Mark I. Operated the reactor in accordance with the unit physicist and laboratory personnel while conducting non-destructive criminal investigations.
- Senior Reactor Operator TRIGA Mark F. Operated the reactor in a pulse mode to test electronic circuits for use in the space program.
- Senior Reactor Operator TRIGA Mark III. Operated the reactor for steady state power production (Thermionics).

**ATTACHMENT 6: Recommendations for Revisions to K/As**

Table 1: K/As Recommended for Revision or Deletion

Current K/As	Survey Ratings		Catalog Ratings		Problem	Suggested Revision	Rationale for Change
	RO	SRO	RO	SRO			
2.1.3 Knowledge of shift turnover practices.	3.5	3.6	3	3.4	Importance ratings for SRO job had an SD = 1.0.	2.1.3 Knowledge of shift or short-term relief turnover procedures.	Change made to clarify the scope of the knowledge involved by including two examples. "Or" used to indicate that an exam question need not address both examples.
2.1.4 Knowledge of shift staffing requirements.	2.9	3.8	2.3	3.4	Not applicable to RO job.	2.1.4 Knowledge of individual licensed operator responsibilities related to shift staffing, such as medical requirements, "no-solo" operation, maintenance of active license status, etc.	Change made to increase the applicability to the RO job.
2.1.5 Ability to locate and use procedures and directives related to shift staffing and activities.	2.85	3.8	2.3	3.4	SD > 1 for RO and SRO ratings. Meaning of "and activities" unclear. Comments indicated this K/A should be applicable only to SRO.	2.1.5 Ability of the SRO to use procedures related to shift staffing, such as minimum crew complement, overtime limitations, etc.	Change made for clarification and to indicate that this K/A is applicable only to the SRO job.
2.1.6 Ability to supervise and assume a management role during transients and upset	2.4	4.7	2.1	3.4	SD > 1 for RO job. Commenters objected to "upset conditions."	2.1.6 Ability to manage the control room crew during plant transients.	Determined to be applicable only to SRO job, but revised to simplify it.

Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings					
conditions.								
2.114 Knowledge of system status criteria which require notification of plant personnel.	2.9	3.9	2.5	3.3	SD for RO rating > 1. Comments indicated that the intended meaning of this K/A was unclear.	2.114 Knowledge of criteria or conditions that require plant-wide announcements, such as pump starts, reactor trips, mode changes, etc. (CFR 41.10 / 43.5 / 45.12)	Change made to clarify the meaning of the K/A and its applicability to the RO job.	
2.115 Ability to manage short-term information such as night and standing orders	2.7	3.3	2.3	3	SD > 1 for RO and SRO ratings. Comments indicated intended meaning of this K/A was unclear.	2.115 Knowledge of administrative requirements for temporary management directives, such as standing orders, night orders, Operations memos, etc.	Revised to clarify intended meaning of the K/A.	
2.116 Ability to operate plant phone, paging system, and two-way radio	3.2	3.2	2.9	2.8	SD > 1 for RO and SRO ratings. Comments indicated the K/A is "too basic" for testing.	Delete.	This ability is adequately addressed in K/As 2.4.43 and 2.114 and is evaluated in all other operator tasks that require sharing of information outside the control room.	
2.119 Ability to use plant computer to obtain and evaluate parametric information on system or component status.	3	3.9	3.9	3.8	Meaning of "parametric" unclear in this context.	2.119 Ability to use plant computers to evaluate system or component status.	Editorial change for clarity.	
2.121 Ability to obtain and verify controlled procedure copy.	3.5	3.5	3.1	3.2	SD > 1 for both RO and SRO ratings. Comments indicate this ability is "too basic" for testing and that	2.121 Ability to verify the controlled procedure copy. (CFR: 41.10)	Simplified to emphasize the important ability, which is the ability to verify that the procedure is the most recent revision. "Obtain" is assumed.	

Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings				
					computerized procedures make the "obtain" portion obsolete.		
2.1.25 Ability to obtain and interpret station reference materials such as graphs, monographs, and tables which contain performance data.	2.8	3.1	3.3	3.6	"Monographs" is a typo - should be "nomographs." Reviewers believe "obtaining" reference materials is a precondition for interpreting them, so is unnecessary. Examples listed in the K/A are incomplete.	2.1.25 Ability to interpret reference materials, such as graphs, curves, tables, etc.	Editorial change for clarity.
2.1.29 Knowledge of how to conduct and verify valve lineups.	3.7	3.6	3.4	3.3	SD for RO job > 1. Comments suggested increasing the scope of the K/A.	2.1.29 Knowledge of how to conduct system lineups, such as valves, breakers, switches, etc.	Increased the scope of the K/A to clarify its applicability to the RO job.
2.1.34 Ability to maintain primary and secondary plant chemistry within allowable limits.	2.6	3	2.3	2.9	SD for SRO job > 1. Operators' responsibility for "maintaining" plant chemistry has decreased over time.	2.1.34 Knowledge of primary and secondary plant chemistry limits.	Licensed operators must know chemistry limits, but Chemistry department determines the actions that operators implement to "maintain" plant chemistry.
2.2.3 Knowledge of the design, procedural, & operational differences between units.	3.7	3.8	3.1	3.3	SD > 1 for RO rating.	2.2.3 Change parenthetical to (multi-unit license) from (multi-unit). Do not re-rate, use the survey importance ratings from multi-license sites only.	Response variability was the result of raters from single unit sites. The SD decreased below 1.0 when ratings from only multi-unit license sites are used.
2.2.4 Ability to explain variations in control board layouts, systems, instrument and procedural actions	3.5	3.5	2.8	3.0*	SD > 1 for both RO and SRO ratings.	Same as above.	Same as above.



Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings				
between units at a facility.							
2.2.5 Knowledge of the process for making changes in the facility as described in the FSAR.	2.2	3.2	1.6	3.3	SD > 1 for SRO ratings. Comments indicated that this is more an Engineering function than Operations, but operators must be familiar with the process. Reference to the FSAR is unnecessary and confusing.	2.2.5 Knowledge of the process for making design or operating changes to the facility.	Editorial change to increase the relevance of this K/A to Operations and its clarity.
2.2.6 Knowledge of the process for making changes in procedures as described in the safety analysis report.	2.9	3.7	2.3	3.3	Reference to the safety analysis report is unnecessary and confusing.	2.2.6 Knowledge of the process for making changes to procedures. (CFR: 41.10 / 43.3 / 45.13)	Editorial change.
2.2.7 Knowledge of the process for conducting tests or experiments not in FSAR.	2.5	3.4	2	3.2	SD > 1 for SRO ratings. Comments indicated that reference to "experiments" is outdated and has a negative connotation in today's operating environment. Reference to FSAR confusing.	2.2.7 Knowledge of the process for conducting special or infrequent tests.	Editorial change.
2.2.8 Knowledge of the process for determining if change/test/experiment involves a USQ.	2.4	3.6	1.8	3.3	SD > 1 for SRO ratings. Comments indicated "USQ" no longer used in the regulation. Operators generally do not make these evaluations without special training.	Delete.	Required knowledge is already addressed in 2.2.5 and 2.2.7.
2.2.9 Knowledge of process to determine if a	2.2	3.3	2	3.3	SD > 1 for SRO ratings. Comments indicated operators generally do not make these	Delete.	Required knowledge already addressed in 2.2.5 and 2.2.7.

Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings				
change/test/experiment increases the probability or consequences of an accident.					evaluations without special training.		
2.2.10 Knowledge for determining if the margin of safety, as defined in T.S., is reduced by a proposed change/test/experiment.	2.4	3.5	1.9	3.3	SD > 1 for SRO ratings. See comments for 2.2.7 - 2.2.9.	Delete.	Required knowledge already addressed in 2.2.5 and 2.2.7.
2.2.11 Knowledge of the process for controlling temporary changes.	2.7	3.7	2.5	3.4*	Comments indicated that the reference is unclear -- "temporary changes" to what? Procedures? Design?	2.2.11 Knowledge of the process for controlling temporary design changes.	Editorial change to clarify the intended reference.
2.2.14 Knowledge of the process for making configuration changes.	3	3.8	2.1	3	Comments asked "configuration changes to what?" and indicated that Engineering would be responsible for initiating such changes.	2.2.14 Knowledge of the process for controlling equipment configuration or status.	Revised to address operators' responsibility, which is to control equipment/plant status, rather than initiate configuration changes.
2.2.15 Ability to identify and utilize as-built design and configuration change documentation to ascertain expected current plant configuration and operate the plant.	2.8	3.3	2.2	2.9	SD > 1 for both RO and SRO ratings. Comments indicated raters could not interpret the intended meaning of the K/A.	2.2.15 Ability to determine the expected plant configuration using design and configuration control documentation, such as drawings, line-ups, tag-outs, etc. (CFR: 41.10)	Editorial change to improve the interpretability of this K/A and clarify its applicability to the RO and SRO jobs.
2.2.16 Knowledge of the process for making of	2.4	3	1.9	2.6	SD > 1 for both RO and SRO ratings. Comments	Delete.	Outdated K/A. Operators are not involved in making field changes, now an Engineering

Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings				
field changes.					indicated that the term, "field changes," is unclear.		function.
2.2.17 Knowledge of the process for managing maintenance activities during power operations.	2.7	4	2.3	3.5	Comments indicated that Operations' role in managing at-power maintenance activities has decreased with the addition of Work Planning and Control functions at most plants. However, SROs have oversight responsibilities when authorizing work to proceed.	2.2.17 Knowledge of the process for managing maintenance activities during power operations, such as risk assessments, work prioritization, etc.	Editorial change to add examples of the type of tasks SROs perform related to at-power maintenance.
2.2.18 Knowledge of the process for managing maintenance activities during shutdown operations.	2.8	4	2.3	3.6	Same as above.	2.2.18 Knowledge of the process for managing maintenance activities during shutdown operations, such as risk assessments, work prioritization, etc.	Same as above.
2.2.23 Ability to track limiting conditions for operations.	3.1	4.3	2.6	3.8	Reviewers believe there are many limiting conditions that this K/A could be referencing.	2.2.23 Ability to track Technical Specification limiting conditions for operations.	Added "Technical Specifications" to clarify the intended scope of this ability.
2.2.33 Knowledge of control rod programming.	3.5	3.6	2.5	2.9	SD > 1 for RO rating.	Delete.	Required knowledge already addressed where it applies in Systems section.
2.2.34 Knowledge of the process for determining the internal and external effects on core	3.9	4	2.8	3.2*	Comments indicate that, although the wording of this K/A is taken verbatim from a portion of 10 CFR 55, the K/A is unclear without the	2.2.34 Ability to use procedures to determine the effects on reactivity of plant changes, such as RCS temperature.	Editorial change to clarify the K/A and restore the contextual information from 10 CFR 55.

Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings				
reactivity.					additional text in the CFR.	secondary plant, fuel depletion, etc. (CFR: 41.10 / 43.6) Move to section 2.1.	
2.4.6 Knowledge of symptom based EOP mitigation strategies.	3.7	4.4	3.1	4	Comments indicated reference to "symptom-based" EOPs is unnecessary because all EOPs are now symptom-based.	2.4.6 Knowledge of EOP mitigation strategies.	Reference to "symptom-based" EOPs unnecessary.
2.4.7 Knowledge of event-based EOP mitigation strategies.	3.5	4.1	3.1	3.8	SRO SD > 1. Comments indicated K/A is confusing because EOPs are not "event-based."	Delete.	Knowledge is addressed in revised 2.4.6.
2.4.8 Knowledge of how the event-based emergency/abnormal operating procedures are used in conjunction with the symptom-based EOPs.	3.6	4.2	3	3.7	Comments repeated that EOPs are not event-based.	2.4.8 Knowledge of how abnormal operating procedures are used in conjunction with EOPs.	Eliminates reference to "event-based EOPs" for clarity.
2.4.10 Knowledge of annunciator response procedures.	3.9	3.9	3	3.1	Comments indicated there are 100s of these, some of which are important and others aren't.	Delete.	Knowledge addressed in revised 2.4.31 and 2.4.50.
2.4.13 Knowledge of crew roles and responsibilities during EOP flowchart use.	3.4	3.8	3.3	3.9	SD > 1 for both RO and SRO ratings. Comments indicated that variability is the result of few raters being familiar with EOP flowcharts.	2.4.13 Knowledge of crew roles and responsibilities during EOP usage.	Eliminates reference to "flowchart EOPs" to increase the applicability of this K/A to sites that don't use flowcharts.
2.4.14 Knowledge of general guidelines for	3.2	3.9	3	3.9	SD > 1 for both RO and SRO ratings. Same comments	2.4.14 Knowledge of general guidelines for	Same as above.

Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings				
EOP flowchart use.					as above.	EOP usage.	
2.4.15 Knowledge of communications procedures associated with EOP implementation.	3.4	3.8	3	3.5	SD > 1 for RO rating. Comments indicated that communication procedures apply under any circumstances in the control room and are not limited to emergency operations.	2.4.15 Move to 2.1. Conduct of Ops. and revise as "Knowledge of the station's requirements for verbal communications when implementing procedures."	There are no special communications requirements for implementing EOPs vs. conducting normal or off-normal operations.
2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions including:1. Reactivity control2. Core cooling3. Reactor coolant system integrity and heat removal4. Containment conditions5. Radioactivity release control.	4	4.6	3.7	4.3	Reviewers believe the use of "including" in this K/A indicates that an exam question must address all of the listed safety functions.	2.4.21 Knowledge of the parameters and logic used to assess the status of safety functions, such as reactivity control, core cooling and heat removal, reactor coolant system integrity, containment conditions, radioactivity release control, etc.	Editorial change to clarify that the safety functions listed are examples of topics for separate exam questions.
2.4.24 Knowledge of loss of cooling water procedures.	3.9	4.2	3.3	3.7	Comments indicated this K/A is too vague. "What cooling water?"	Delete.	Loss of cooling water events are completely addressed in the Systems and E/APE Sections, where the "type of cooling water" is specified.
2.4.28 Knowledge of procedures relating to emergency response to sabotage.	3.1	4	2.3	3.3	Reviewers noted that operators have broader responsibilities post-9/11.	2.4.28 Knowledge of procedures relating to a security event.	Revised to permit addressing security events in addition to sabotage.
2.4.30 Knowledge of which events related to	2.6	4.2	2.2	3.6	Comments indicated this K/A is too limited by only	2.4.30 Knowledge of which events related to	Fills a "hole" with respect to internal management notifications and notifications of

Table 1: K/As Recommended for Revision or Deletion

	Survey Ratings		Catalog Ratings				
system operations/status should be reported to outside agencies.					referencing outside agencies.	system operation/status should be reported to internal organizations or external agencies.	other groups/departments for both emergency operations and emergency plan implementation.
2.4.31 Knowledge of annunciators alarms and indications, and use of the response instructions.	4.1	4	3.3	3.4	Commenters noted this K/A is redundant with 2.4.10. Delete 2.4.10 and revise this one.	2.4.31 Knowledge of annunciator alarms, indications, or response procedures.	Eliminated "use of response instructions" portion because it is addressed in 2.4.50.
2.4.34 Knowledge of RO tasks performed outside the main control room during emergency operations including system geography and system implications.	4.1	4	3.8	3.6	Commenters didn't understand "system geography and system implications."	2.4.34 Knowledge of RO tasks performed outside the main control room during an emergency and the resultant operational effects. (CFR 41.10 / 43.5 / 45.13)	Revised to clarify intended meaning of the K/A.
2.4.35 Knowledge of local auxiliary operator tasks during emergency operations including system geography and system implications.	3.6	3.8	3.3	3.5	Same as above.	2.4.35 Knowledge of local auxiliary operator tasks during an emergency and the resultant operational effects.	Same as above.
2.4.36 Knowledge of chemistry / health physics tasks during emergency operations.	2.4	3	2	2.8	Commenters indicated that these tasks are proceduralized in the EOPs.	Delete.	Operators are not trained in HP/Chemistry tasks. Requirements for interactions between Ops and HP/Chemistry are clearly defined in Emergency Procedures and Emergency Plan.
2.4.37 Knowledge of the lines of authority during an emergency.	3.2	4.1	2	3.5	SD for RO job > 1. Commenters were unclear as to whether this K/A refers to EOPs or the emergency plan.	2.4.37 Knowledge of the lines of authority during implementation of the emergency plan.	Revised to clarify intended meaning of the K/A.

**Table 2: K/As Recommended for Relocation to Another Sub-section within Section 2**

Current K/As	Survey Ratings		Catalog Ratings		Problem	Suggested Revision	Rationale for Change
	RO	SRO	RO	SRO			
2.26 Knowledge of fuel handling administrative requirements.	2.8	3.9	2.5	3.7	Fuel-handling is listed as a Conduct of Ops topic in NUREG-1021.	Move to section 2.1	Editorial change for consistency with NUREG-1021.
2.27 Knowledge of the refueling process.	2.8	3.7	2.6	3.5	Same as above.	Move to section 2.1	Same as above.
2.28 Knowledge of new and spent fuel movement procedures.	2.5	3.4	2.6	3.5	Same as above.	Move to section 2.1	Same as above.
2.29 Knowledge of RO fuel handling responsibilities.	2	4.1	1.6	3.8	Same as above.	2.2.29 Knowledge of the fuel-handling responsibilities of SROs. Move to section 2.1	Editorial change. Rationale for moving to Section 2.1 same as above.

2.2.30 Knowledge of RO duties in the control room during fuel handling such as alarms from fuel handling area, communication with fuel systems operated from	3.9	3.8	3.5	3.3	Same as above.	Move to section 2.1	Same as above.
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the control room in support of fueling operations, and storage facility, supporting instrumentation.							
2.2.31 Knowledge of procedures and limitations involved in initial core loading.	2.5	3.2	2.2	2.9	SD > 1 for both RO and SRO ratings. Comments indicated that limiting the knowledge to initial core loading makes this irrelevant until new plants are built.	2.2.31 Knowledge of procedures and limitations involved in core alterations. Move to section 2.1	Revised to increase the scope of the K/A to apply to both initial core loading and any core alterations. Move for same reasons as above.
2.2.32 Knowledge of the effects of alterations on core configuration.	3	3.6	2.3	3.3	Becomes redundant, if the recommended revision to 2.2.31 is implemented.	Delete, or move to section 2.1 if retained.	Proposed revision of 2.2.31 addresses CFR requirements.
2.1.10 Knowledge of conditions and limitations in the facility license.	3.6	4.5	2.7	3.9	Several LCO-related K/As are in 2.1 and some are in 2.2. LCOs are based on equipment status, less relevant to Conduct of Ops. Grouping these K/As in one section avoids double-dipping LCO topics in 2 different sections.	Move to section 2.2.	In order to group LCO-related K/As in relevant section.

2.1.11 Knowledge of less than one hour technical specification action	3.9	4.5	3	3.8	Same as above.	Move to section 2.2.	Same as above.
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statements for systems. (CFR: 43.2 / 45.13)							
2.1.12 Ability to apply technical specifications for a system.	3.4	4.7	2.9	4	Same as above.	Revise to capitalize "Technical Specifications" for consistency. Move to section 2.2.	Same as above.
2.1.33 Ability to recognize indications for system operating parameters which are entry-level conditions for technical specifications.	4.4	4.7	3.4	4	Same as above.	2.1.33 Ability to recognize system parameters that are entry-level conditions for Technical Specifications. Move to section 2.2.	Same as above and editorial change.
2.1.22 Ability to determine Mode of Operation.	3.75	4.1	2.8	4.2	SD > 1 for RO job. Comments indicate raters unclear about what specific ability is required here.	2.1.22 Ability to determine Technical Specification Mode of Operation. Move to Section 2.2 as revised.	Editorial change to clarify that the ability relates to Tech Specs. Move to 2.2 for reasons described above.
2.1.24 Ability to obtain and interpret station electrical and mechanical drawings.	3.5	3.9	2.8	3.1	The reviewers determined that this ability is necessary for equipment control, rather than conduct of ops.	Move to section 2.2.	More closely related to issues of equipment control.

2.4.15 Knowledge of communications procedures associated with EOP implementation.	3.4	3.8	3	3.5	SD > 1 for RO rating. Comments indicated that communication procedures apply under any circumstances in the control room and are not limited to emergency operations.	2.4.15 Knowledge of the station's requirements for verbal communications when implementing procedures. Move to 2.1.	There are no special communications requirements for implementing EOPs vs. conducting normal or off-normal operations.
2.4.33 Knowledge of the process used track	3	3.3	2.4	2.8	Reviewers believe that the applicability of this K/A should not	Add "to" before "track." Move to section 2.2.	More relevant to equipment control than

inoperable alarms.					be limited only to emergency or off-normal operations.		to emergency operations.
2.4.48 Ability to interpret control room indications to verify the status and operation of system, and understand how operator actions and directives affect plant and system conditions.	4.2	4.4	3.5	3.8	Same as above.	Add "a" before "system." Move to section 2.2.	Same as above. Editorial change.

**Table 3: Recommendations for New K/A and Replacements for Sub-Section 2.3**

Current K/As	Survey Ratings		Catalog Ratings		Problem	Suggested Revision	Rationale for Change
	RO	SRO	RO	SRO			
	TBD	TBD			N/A	Add to Section 2.1: Knowledge of procedures, guidelines, or limitations associated with reactivity management. (CFR: 41.10 / 43.6).	“Reactivity management” is a new and important topic in operator training since Rev.s 0 and 2 were published.
2.3.1 Knowledge of 10 CFR: 20 and related facility radiation control requirements	3	3.5	2.6	3	The survey responses indicated several significant problems with the K/As in sub-section 2.3, “Radiation Protection.” The problems include (1) overall, the K/As are rated as lower in importance; (2) K/As with SDs > 1; (3) the commenters indicated that some of the K/As are “too basic” for testing in a licensing exam; (4) some	See below for suggested new K/As to replace these.	To address the current weaknesses in subsection 2.3.
2.3.2 Knowledge of facility ALARA program.	3.1	3.2	2.5	2.9			
2.3.3 Knowledge of SRO responsibilities for auxiliary systems that are outside the control room (e.g. waste disposal and handling system).	2.2	3	1.8	2.9			
2.3.4 Knowledge of radiation exposure limits	3.2	3.7	2.5	3.1			

**Table 3: Recommendations for New K/A and Replacements for Sub-Section 2.3**

	Survey Ratings		Catalog Ratings					
and contamination control, including permissible levels in excess of those authorized.					K/As are irrelevant to the operator's job; and (5) some K/As are difficult to interpret.			
2.3.5 Knowledge of use and function of personnel monitoring equipment.	2.9	2.9	2.3	2.5				
2.3.6 Knowledge of the requirements for reviewing and approving release permits.	3.3	3.5	2.1	3.1				
See above.	TBD.		N/A.		See above.	2.3.1 Knowledge of Radiological Safety Principles pertaining to licensed operator duties. [CFR: 41(a)]	See above.	
						2.3.2 Knowledge of Radiological Safety Procedures pertaining to licensed operator duties. [CFR: 41(a)]		
						2.3.3 Knowledge of radiation or contamination hazards that may arise during normal, abnormal, or emergency conditions or activities. [CFR: 43(b)(4)]		
						2.3.4 Knowledge of radiation exposure limits		

**Table 3: Recommendations for New K/A and Replacements for Sub-Section 2.3**

	Survey Ratings	Catalog Ratings			
				under normal or emergency conditions. [CFR: 41(b)(12) / 45(a)(10)]	
				2.3.5 Ability to use radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 45.9)	
				2.3.6 Ability to approve release permits. (CFR: 43.4 / 45.10)	
				2.3.7 Ability to comply with radiation work permit requirements during normal or abnormal conditions. (CFR: 41.12 / 45.10)	
	TBD.			2.3.8 Knowledge of radiation monitoring systems, such as fixed radiation monitors and alarms, portable survey instruments, personnel monitoring equipment, etc. (CFR: 41.12 / 45.9)	
				2.3.9 Ability to control radiation releases.(CFR:	

**Table 3: Recommendations for New K/A and Replacements for Sub-Section 2.3**

	Survey Ratings	Catalog Ratings			
				43.4 / 45.10)	