NRC Comments - on NEI ISA Summary Guidance Document dated 6/24/2000

Major Comments

Section 1.0

1. In section 1.2 it is stated that the ISA Summary is not subject to NRC approval. The text should indicate that the ISA Summary may or may not be subject to NRC approval, depending on the results of the current Commission considerations. When a decision is made, the language should be revised to reflect the Commission decision.

Section 2.0

2. In section 2.1, the second bullet, should be revised to state "...high- and intermediate-**consequence** accident sequences, **as defined by 10 CFR 70.61**." [Note, in the rule, "high" and "intermediate" only refers to consequences. This change should be made to all text that refers to high and intermediate risk rather than consequences.] Also, the fourth and fifth bullets should be combined to read, " will the designated IROFS, together with the management measures identified to apply to IROFS, provide reasonable assurance of compliance with the performance requirements of 10 CFR 70.61?"

3. In this section there is also a sentence which states "The performance requirements of 10 CFR 70.61 apply to accident sequences identified by the applicant in the ISA to be high and intermediate risk." This sentence is not meaningful given the language of the rule (see comment 2 above), and should be deleted. The following sentence should be revised to read, "The ISA Summary will focus on analysis of the high and intermediate consequence accident sequences ... ISA."

Section 3.0

4. In Table 1, under Process Specific Information, the 3rd, 4th, and 5th bullets should have §70.65(b)(4) added to the regulatory citation in addition to §70.65(b)(3).

5. In Table 1, under Items Relied on for Safety, the 1st bullet should have §70.65(b)(4) added to the regulatory citation. All bullets should have §3.4.3.2(8) added to the Chapter 3 reference

Section 4.0

6. In section 4.2.2, The line item "description of management measures" should be moved to Section 4.2.3 or to a new section 4.2.4 and revised to "description of management measures **associated with each IROFS**." This is because the management measures are IROFS specific, not process specific, and need to be explained for each IROFS. A new section 4.2.4, "demonstration of compliance with the performance requirements of 70.61," (and a corresponding section 6.4) would be consistent with the requirement of 70.65(b)(4).

Section 6.0

7. In section 6.2, ISA Summary Section 2; Item "*General Types of Accident Sequences*", last sentence The phrase "...several processes each having a set of functionally identical IROFS can be considered the same type and listed and described only once" should be revised to make clear that "functionally identical" does not mean parameters described as generally as "geometry controls" or "concentration controls."

Appendix A

8. In section A.2, Step 2, second paragraph The sentence "Qualitative numerical values for accident likelihood are presented in Table A-1." should be replaced with a more accurate statement of what is done to arrive at Table A-1. Also, "qualitative numerical values" is an oxymoron - the indices in the table are later (Step 4) used as quantitative values in an algebraic summation. Suggest replacing the sentence with "**A qualitative assessment of likelihood is used to establish a quantitative (numerical) score, as presented in Table A-1.**"

9. In A.2, Step 2, last paragraph, a sentence has been added explaining that "...the risk of off-site intermediate-consequence events is assumed to be greater than for on-site events, *principally because accidents at Part 70 facilities are generally very localized. Any off-site effects would be clearly indicative of a very serious plant failure.*"

   The NEI text italicized here seems to argue, contrary to the stated NEI assumption, that there would be **less risk** of off-site intermediate-consequence events because accidents at these facilities are generally (more likely) localized (fewer or lesser off-site consequences). Further, if off-site effects are clearly indicative of "serious plant failure", is not "serious plant failure" **less** likely than smaller plant failure(s)?

10. For Table A-1, what is the definition of the "life cycle of the system", as stated in the table, in years? The life cycle of the system in real time must be estimated in order to provide some basis for establishing likelihood that can be compared with staff's SRP. If not defined by the applicant, staff will make an estimate during the review process.

11. In A.2, Table A-3, the lower right hand corner of the risk matrix appears to be in an "acceptable" area - not grayed out. Any intermediate consequence must have likelihood no greater than "unlikely", thus this corner cannot be considered an acceptable level of risk.

12. In A.2, Step 4, in both Examples 1 and 2 of Likelihood Adjustment, the first bullet purports to represent the accident sequence - but it only identifies the accident consequence. Other sequence events must be identified - the initiating event, and subsequent failures of IROFS. Where sequences include more than one IROFS, multiple sequences must be defined that could have differing likelihoods of arriving at the consequence. IROFS failures must be considered one at a time, with consideration of each being the first to fail. Further, for each sequence, the duration of failures that are precursors to a final barrier failure must be accounted for.

    In both examples, why was the last bullet directing the use of Table A-5 deleted from the

former draft? This step seems a logical conclusion to the exercise and is described in the text.

13. In Table A-5 in the Risk Zones, NRC must be able to determine that a claimed "highly unlikely" is equivalent to approximately E-5/yr/accident, and that a claimed "unlikely" is equivalent to approximately E-2/yr/accident. How can this be determined from the qualitative indices proposed by NEI, for which no correlations with the SRP acceptance criteria are offered?

    Risk Zone 2 - Does not meet the performance requirements, but NEI says would allow operation "for a specified period to allow for correction". This is inconsistent with the rule, which says that deficiencies must be corrected by the time of ISA Summary submission to NRC. Subsequent discoveries may be corrected "promptly" – several days.

14. In the paragraph following Table A-5, in the case described, a criticality consequence, the "frequency of the initiating event" must be controlled by an identified IROFS because two IROFS are necessary. All IROFS and their assurance measures must be identified and described. Also, the duration of failure before discovery must be accounted for, for each IROFS taken to be the first to fail. The flaws in the discussion of the case are:

    - Does not take into account duration of failure of the first IROFS failure.

    - Does not recognize that the initiating event is in fact controlled by IROFS, unless the event is a truly random occurrence beyond the control of the plant manager (such as a naturally occurring meteorological or seismic event). The IROFS associated with the usual initiating event must be identified and assurance measures provided to support the assumed frequency of the initiating event.

Appendix B

15. "Credible" – Inadequate definition - Must be at least correlatable with definition in chapter 3 of SRP - NEI definition depends on "life of the facility", a vague notion that most reasonably could be taken to be about 100 years. This period is too short, as it would result in events less frequent than E-2/yr being considered incredible.

16. "Unlikely" and "Highly Unlikely" - Inadequate definition - NEI definitions depend entirely on the indeterminable adjective "robust" - NRC has provided useful definitions in Chapter 3 of the SRP.

Appendix C

17. The discussion on page 24 following Table A-5, Appendix A, indicates that credit will be taken for unlikely initiating events in assessing double contingency protection. This is acceptable and, when it is done, it indicates that the initiating event frequency is being relied on for safety. Thus, if the initiating event is an infrequent plant operation, an unlikely process upset, failure of a protective feature, failure of an operating procedure, or any other characteristic under control of the facility, then it is an IROFS. Thus, as stated in the SRP, except for external initiating events, every initiating event implies the existence of an

IROFS. This failure to identify all IROFS is indicated in Table UD-2. Examples from Table UD-2 are:

- UD-1 Addition of too many uranium oxide solids. This initiating event would appear to be incorrect execution of an operating procedure for the process. This procedure is thus an admin control and an IROFS.

- UD-4 Incorrect sequence of acid and solid addition. This appears to be the same type of situation as UD-1, an operating procedure that is an IROFS.

- UD-5 Plugging of in-line filters on dissolver discharge. This is an example of a situation that requires assessment of outage duration for the in-line monitor compared to the frequency of plugging in order to assure that the accident is highly unlikley. Both items of information should be available. In general, such situations do rely on limiting the frequency of the initiating event in order to limit the frequency of accidents.

18. Table UD-2 does not describe what surveillance methods and frequencies are used for hardware IROFS. The index assignments in Table A-4 refer to functional testing. This is one way of addressing the surveillance issue, but, whatever method is used, its nature and frequency should be stated in the list of specific IROFS. The reviewer needs to know whether the various IROFS fail in a self-indicating manner, are fail-safe, or are tested at a determined frequency, in order to evaluate compliance with the requirement of Part 70 that management measures be sufficient that IROFS are available and reliable when needed. IROFS where this is needed include the weigh scale interlock of UD-1, the automatic level control for UD-7, the liquid level monitor of UD-4, and perhaps the in-line flow monitor of UD-5.

19. In Table UD-2, accident UD-3, reliance is placed on spacing procedures and “floor design”. The information provided is insufficient to evaluate whether such protection is adequate. This may be a case where the reason why it is unlikely that criticality would occur is the safety margin. The requirement is >50 inches. If the system would be critical if one container were misplaced by one inch, the protection would be inadequate. If, instead, it requires that 9 containers be spaced 25 inches apart to be critical, and this is impeded by the “floor design”, then the protection may be adequate. The adequacy is dependent on the safety margin in the controlled parameter, “spacing”. This is often true for administratively controlled systems. In such cases, the staff requires that the margin be stated in the IROFS table. Thus, in addition to the required spacing (the safety limit), it is usually necessary to list the failure limit, for administrative controls, to show that there is a sufficient margin of safety.

Editorial Comments

1. The definition of “credible” in Appendix B is ambiguous. As stated in the SRP, virtually any internal failure event that could happen in the plant must be addressed by the ISA, since these are rarely inherently incredible.

2. The likelihood portion of the risk assessment method represented by Tables A-1 through A-4

when applied to actual process systems would, in general, be expected to correctly identify whether accidents are sufficiently unlikley. However, the method does not explicitly include use of a failure duration index. This will make the evaluation of double failure events questionable, for example, UD-5.

3. Section 1.3, Relation to NUREG-1520

"...presents guidance on the content of an ISA and outlines Acceptance Criteria..." should be revised. The SRP more than "outlines" acceptance criteria; it presents definitive statements of what the criteria are.

4. Section 1.4, Risk Assessment Methodology

Last sentence, "...are adequate in number and type to meet...", should be revised to say "...are adequate in number, type, and combined failure likelihood to meet..."

5. In section 1.5, the second line, "will met" should be revised to "should meet"

6. In Section 4.1, Content Overview, the first sentence paraphrase of the requirements is only slightly improved from the prior draft. For accuracy, this paragraph should reference Section 3, Table 1 of the document.

7. Section 5.2, Methodology Overview "In the final step, the Matrix Risk Factor is evaluated..." should be revised to "In the final step, the Matrix Risk Factor is **modified...**", since the "taking into account" of the IROFS is for the specific purpose of reducing the Matrix Risk Factor.

8. Section 6, Detailed Content of the ISA Summary; The phrase "in-depth technical information" in the sentence "The ISA Summary should not contain detailed procedures or in-depth technical information" is too vague and should be better defined.

9. Section 6.2; Item "*IROFS*", Last sentence This should read "...how such IROFS were graded according to their safety-importance**, the likelihood of failure, and the duration of failure.**

Appendix A,

10. In Section A.1 Method Overview, second paragraph states "For convenience, a 3x3 matrix... is used in this guidance document to assess accident risk." should be revised to state "...is used ...to **present** accident risk." The assessment of specific risk is done before presenting the result in the matrix.

11. In A.2, Step 4, first paragraph, the use of the term "Matrix Risk Index" is inconsistent with prior usage in the document of "Matrix Risk Factor".

12. In A.2, Step 4, Table A-2, the "Qualitative Descriptor" column for Numerical Values 3 and

1, uses the word “multiple” and is puzzling - why the necessity for multiple health effects? Any health effects or lost-time injury would seem enough to trigger the associated severity level.

13. In A.2, Step 4, paragraph following Table A-4, the sentence “The Matrix Risk Factor is adjusted by subtracting the appropriate IROFS score... and then comparing it to the risk zones shown in Table A-5." is imprecise and confusing because “it” could mean either the MRF or the IROFS score. Revise to state “The unmitigated likelihood index selected in step 2 is adjusted by subtracting the appropriate IROFS score, and then the appropriate risk zone is identified in Table A-5 by identifying the final adjusted likelihood index.”

Appendix C

14. In Table C-2, the management measures column does not describe the selected measures in enough detail to determine if the measure is “graded” below some maximum level or if the measure is at the maximum level. In either case, the table should reference a more detailed description of the management measures selected, which description should be found in Chapter 11 of the applicant’s license application.

15. As indicated in the SRP tabular listings of IROFS like UD-2 that include several columns of information usually leave little room for textual description of the IROFS itself. Accident UD-3 is one example of a system of IROFS that needs more text to explain it.