From: Tanya Eaton /NRR
To: Christopher Boyd, Diane Jackson, Gareth Parry, ...
Date: Mon, Jun 12, 2000 3:28 PM
Subject: Format for responses to Spent Fuel Pool Public Comments

Good afternoon,

On June 7th, I delivered public comments to the staff. There was no information contained in the packet regarding how to address the public comments. Therefore, I have included the guidelines in the attached file (formatcomment.wpd). If you are responding to public comments, please refer to this document. I also included the June 7th note, which summarizes the public comments (publiccomments.wpd). However you still need Attachment B to read the comments in the proper context.

Also, I have an updated copy of the Feb. 15th report. Most changes so far have been editorial. If you would prefer to use the latest copy instead of the Feb. 15th draft report, I will get a copy to you right away. I can not send the file by email because it is too large. Just email me at TME and I will bring a copy to you.

Thanks,

Tanya
415-3610
O-11-H22

CC: Charles Tinkler, Cynthia Carpenter, Farouk Eltaw...

M171

June 12, 2000 (2:56PM)

Formatting of Public Comment Responses

The responses to the public comments should be formatted as follows:

(1) All responses to public comments should be in Word Perfect format; Font: Arial, 11pt.

(2) Refer to the "staff" instead of "we" or "our" to remain consistent with the draft technical report, which was not written in plain English. (i.e., The staff revised the criteria for...)

(3) Refer to "Sections" instead of "Chapters". (i.e., Section 3.0 instead of Chapter 3.0)

(4) Include hyphens in the following words as suggested by the tech. editor: (make-up, off-site, on-site, boil-off, walk-downs)

(5) **Format for Section and Subsection titles:**

Number(1.0)<Tab or F7>Title With First Letter Capitalized

Examples:

1.0 Executive Summary

2.1.2 Safety Margins

Format for Graph, Appendix, or Table titles:

Table<1space>Subsection-Number<2 spaces>Title

Examples:

Table 3.1 Spent Fuel Pool Cooling Risk Analysis (this is table 1 in Section 3 of the body of the report) or

Table A2c-1 Summary of Navy Crane Data (this is table #1 located in Appendix 2c)

Figure A2c-1 Heavy Load Fault Trees

(6) For each comment assigned to your branch in Appendix A, prepare your responses in the same order. The following is an example of how to respond to public comments which were already addressed, and public comments which were not previously addressed and require a writeup.

(For example: SPLB)

Public comment #1: (State the concern). The staff has already addressed this comment in Section..... of the February 15th draft report.

Public comment #2: (State the concern). [Provide your writeup]. [Indicate where to insert this statement in the body of the report or the Appendix, i.e, Section 2.3.1 or Appendix A2b, Section 1.1]. **Please do not refer to page numbers from the draft report.** As the report is revised and sections are added/deleted, the page numbers will change.

(A) Instead, provide Tanya Eaton (O-11-H22) with a hard copy of the page showing exactly where the public comment response should be inserted. Just write on the page, [Insert Public Response #1 here].

(7) Submit public responses:

(A) By email or on a disk to Tanya Eaton by noon on July 7, 2000.
CC: George Hubbard so that he's aware of all responses to public comments.

(B) In addition, submit any pages from the draft report to show where public comments should be inserted. If you need a copy of the most recent/up-to-date draft report, contact Tanya Eaton and it will be provided to you immediately.

Any Questions? Contact:

Tanya Eaton
O-11-H22
415-3610
tme@nrc.gov

June 7, 2000

NOTE TO: Goutam Bagchi, Stu Richards, George Hubbard, John Hannon, Mark Rubin, Richard Emch, Jared Wermiel, Glenn Tracy, Cindy Carpenter, Faruok Eltawila

FROM: Tanya Eaton, John Lehning NRR/DSSA/SPLB

Background

On Feb. 15th, 2000, the "Draft Final Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Plants," was released for public comment. In a letter dated March 15, 2000, the Union of Concerned Scientists commented that the NRC staff solicited comments from the public, when it had no intention of addressing their comments. Therefore, to ensure that we address all stakeholder comments in the Final Technical Study, we have compiled a list of ALL comments which come from transcripts of meetings with the public, letters from the public, and emails received, from April 1999 until the present time.

In order to address each public comment, please review the comments assigned to your branch (located in Attachment A). Attachment A provides a summary of each documented public comment which must be addressed in the final report. A list of references that we reviewed, is contained at the end of Attachment A. Attachment B contains excerpts of the documents reviewed, which highlight the specific public comments shown for your branch. Thus, you do not have to retrieve all of the documents that we reviewed for public comments.

Also, there may be some comments identified in other branches which may require technical input from your branch. Comments where you may be asked to provide technical support are indicated throughout Attachment A with yellow tabs.

Final Writeup

If the public comment in your section was already addressed, please indicate "comment already addressed" in your final writeup and provide the location (example, Feb. 15th report, Section 2a, page 5).

If the public comment was not addressed, provide a written response to the comment.

If you find that you need to expand or modify statements already contained in the Draft report to address the public comment, contact Tanya Eaton so that she can electronically send you the portion of the file for modification. Or you can type it out again and indicate where it should be inserted within the final report.

All responses to public comments are due to George Hubbard by: July 17, 2000.

Forward any comments/question to Tanya Eaton at 415-3610 or TME@nrc.gov

ATTACHMENT A

Summary of Public Comments/Staff Commitments

References are listed on the last page. The attachment highlights the exact location of the comments within each reference document.

DE (Contact: Goutam Bagchi)

1. Page 300,Shadis: Stresses on transfer tunnel [Ref. 1]
2. p 302, Atherton: Aging effect on qualification of equipment. **Rich Barrett assist if needed** [Ref. 1]
   Aging effects on SFP [Ref. 1]
   Irradiation effects on SFP [Ref. 1]
3. Page 306 and 447, Atherton: Aging effects on SFP: strengthening vs. Hardening of the concrete and the strength of the liner over time. [Ref. 1]
4. Page 13, Shadis statement: Seismic vulnerabilities of SFP transfer tubes must be assessed to properly determine the risk of draining SFP's. [Ref. 2]
5. Page 2, Atherton comment: The NRC should perform a more rigorous analysis of the effects of aging upon the SFP and its associated structures and equipment. [Ref. 7]
6. Page 2, Atherton comment: The NRC should identify all SFP's that were not initially designed to seismic criteria and explain their level of quantification, including SFP racks. [Ref. 7]
7. Page 2, Atherton comment: The NRC should perform a worst case analysis of the result of a seismic event which collapses the SFP building, and/or drains the pool and/or damages the spent fuel. [Ref. 7] **SRXB assist if needed**
8. Page 3, Atherton comment: The NRC should require that specific areas be inspected and that these areas be accessible. [Ref. 7]
9. Page 3, Atherton comment: The NRC should specify why it is not cost effective to perform a plant-specific seismic evaluation for each SFP and what impact this has on safety. [Ref. 7]

DLPM (Contact: Stu Richards)

1. Page 87, Lochbaum: It is difficult to figure out how this effort fits into the overall big picture of what the NRC is doing on decommissioning. [Ref. 1]
2. Page 262 Shadis: Look at all of the activities that happen during decommissioning when developing regulation, not just a narrow view of SFP. [Ref. 1]
3. Page 422, Shadis: Confused on the way Part 50 is being applied in place Part 72 might be more applicable. [Ref. 1]
4. Page 464, Cameron: Design basis accidents, address areas beyond the TWG study. [Ref. 1]
5. Page 64, Paul Blanch: SECY 99-168 doesn't cover all decommissioning issues. [Ref. 2]
6. Page 72, David Stewart-Smith: Consider a fire in the LLW storage area, including large amounts of LLW in case disposal capacity is lost mid-stream during decommissioning. [Ref. 2]
7. Page 97, R. Shadis: Wants an adjudicatory hearing and a prior NRC review/approval step at the onset of decomm. [Ref. 2]
8. Page 5, Shadis statement: Since more radioactive materials are being handled during decommissioning than during operation, why are resident inspectors removed or at least why does NRC not use contract radiation protection personnel? [Ref. 2]
9. Page 6, Shadis statement: NRC should hire a contractor to determine why/how 10 CFR Part 50 was contorted to fit decomm. reactors with the duct tape of 10 CFR 50.82 to avoid adjudicatory processes with potential regulatory handles. [Ref. 2]
10. Page 6, Shadis statement: Little of what operators or reactor inspectors have learned is applicable to decommissioning. NRC needs personnel specifically trained in and dedicated to decommissioning. [Ref. 2]
11. Page 8, Shadis statement and elsewhere: Untrained NRC public representatives frequently misinform the public, particularly about the opportunities for a hearing on reactor decommissioning. [Ref. 2]
12. Page 8-13, Shadis statement: Several specific examples of interactions with NRC staff that he feels demonstrate improper or inaccurate information provided by staff members. [Ref. 2]
13. Page 15, Shadis statement: The time delays experienced by licensees who must submit individual heatup analyses and applications for exemption from NRC regulations could be mitigated by preparation of such documentation well in advance of decommissioning. [Ref. 2]
14. Page 1, UCS comment: The NRC staff owes its stakeholders the courtesy of addressing their concerns, particularly when comments are solicited by the NRC staff. Otherwise, the NRC staff must stop actively soliciting public comment when it has no intention of considering. [Ref. 3]
15. Page 2, UCS comment: IDC #5 must be revised to require direct measurement of SFP temperature/water level. [Ref. 3] **SPLB/SPSB assist if needed**
16. Page 1, Atherton comment: Seeks another 3 months from date of memo to formally respond to draft. [Ref. 7]
17. Page 2, Atherton comment: The NRC should identify and address possible conflicts of interests, and differing professional opinions as to the use of PRA. For instance, Dr. Hanauer was quoted in a memo to say, "you can make probabilistic numbers prove anything, by which I mean that probabilistic numbers mean prove nothing." [Ref. 7] **Mark Rubin assist if needed**
18. Michele Kiddell email: Dr. Hanauer was quoted in a 1975 memo to say, "you can make

probabilistic numbers prove anything, by which I mean that probabilistic numbers prove NOTHING." If a respected technical advisor has expressed doubts about the NRC's use of probabilistic numbers, how is the NRC going to use probabilities convincingly to protect health and safety? I feel that this is an invalid way of measuring safety, and should not be used. Each day these reactors stay opened you are poisoning the environment. This is unacceptable. [Ref. 12] **Mark Rubin assist if needed**

19. Page 1, Atherton comment: The NRC should make publically available references used in the study at no cost. [Ref. 7]
20. Page 4, Atherton comment: Interim regulations should be time-limited, to be reviewed again at some future date. [Ref. 7]
21. Page 3, Mats Sjöberg/ Ferenc Müller on report: Have you considered the "second" worst event at plants. For example waste handling. AT Barseback NPP, a fire in the bitumen storage is found to be the second worst case, although with limited off-site consequence. [Ref. 9]
22. Page 3, Mats Sjöberg/ Ferenc Müller on report: We would appreciate if an electronic copy via email of the following references: (Ask Dick Dudley if already complete) [Ref. 9]

Sailor, et.al., "Severe Accidents In Spent Fuel Pools in Support of Generic Issue 82", NUREG/CR-4982.
"A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants," NUREG/CR-6451, dated August 1997.

SPLB (Contact: George Hubbard)

1. Page 256/7, Shadis: Heavy objects, such as crane rail or masonry wall, falling into the SFP or taking out electricity during decommissioning activities. [Ref. 1] **DE assist if needed**
2. Page 305, Atherton: Is SBO of SFP area acceptable? [Ref. 1] **SPSB assist if needed**
3. Page 14, Shadis statement: Could foreign materials with lower ignition temperatures enter a drained SFP and catch fire, thus raising the temperature of SF to the point of rapid zirconium oxidation? [Ref. 2] **SRXB assist if needed**
4. Page 14, Shadis statement: Since the National Severe Storm Center is predicting more frequent and more intense severe weather phenomena, shouldn't the size and velocity of wind-driven missiles and maximum height of storm surges be reassessed? [Ref. 2]
5. Page 14, Shadis statement: How can there be no SFP degradation issues if type 304 stainless steel employed in fuel racks and assemblies is known to exhibit stress-corrosion cracking in oxygenated or stagnant borated water? [Ref. 2] **DE assist if needed**
6. Page 2, UCS comment: The draft report should be revised to include credible hazards to plant workers at permanently closed plants. [Ref. 3] **SPSB assist if needed**
7. John Mcloughlin comment: All pools leak, dry storage is the only way for long term safety. The longer you think about it, the more reasons you have for no pools. [Ref. 5]
8. Page 3, Atherton comment: The NRC should identify all SFP's that leak. Degradation of the lines and concrete should be investigated. The leaks should be sealed. [Ref. 7]
9. Page 3, Atherton comment: The NRC should determine the qualifications and degradation of spent fuel racks. [Ref. 7] **DE assist if needed**
10. Page 3, Atherton comment: The NRC should determine the proper methods of extinguishing a possible zirconium fire. [Ref. 7]
11. Page 3, Atherton comment: What happened to the commitment verbally agreed up on through Mr. Meisner of Maine Yankee to install a single failure proof crane system using safety grade electrical equipment. [Ref. 7]
12. Page 3, Atherton comment: The draft report omitted acts of sabotage and vandalism. Emergency evacuation plans should be prepared with this consideration of terrorism. [Ref. 7] **SPLB coordinate with IOLB**
13. Page 4, Atherton comment: It is suggested that NRC err on the side of safety since terrorist acts can not be specifically addressed. [Ref. 7] **SPLB coordinate with IOLB**
14. Page 94, P. Blanch: What is SFP design basis during decomm? [Ref. 2]
15. Page 5, ACRS: Recommend putting rulemaking on hold until the inadequacies discussed herein are addressed by the staff. [Ref. 11] (Already addressed in GT dated May 22, 2000. Make reference to this in App. 8)
16. Page 1, Mats Sjöberg/ Ferenc Müller on report: Does IDC #3, also include means of communication? [Ref. 9]
17. Page 1, Mats Sjöberg/ Ferenc Müller on report: IDC #4, is there a new Tech. Spec (for shut down plants) in place. In that case, are the emergency diesels at the plant still operable? Or is this a higher expectation (than during operation of the plant) to provide electricity and water supply? [Ref. 9]

SPSB (Contact: Richard Emch acting for Richard Barrett)

1. Page 91, Lochbaum: Licensee plant management affecting human performance [Ref. 1]
2. Page 114, Gunter: human performance - multiple shifts can make same mistake; simple task of watching SFP can lead to tedium. [Ref. 1]
3. Page 124, Shadis: human performance lowers over time for tedious tasks - need to take a conservative view. [Ref. 1]
4. Page 162, Gunter: has common mode failure been evaluated. [Ref. 1]
5. Page 186, Lochbaum: Enforceable regulations for operator attentiveness - how often are operator rounds. [Ref. 1]
6. Page 303, Atherton: How to minimize the probability of failure of system to mitigate accidents. [Ref. 1]
7. Page 451, Atherton: relevancy of TMI, SBO [Ref. 1] (Rich Barrett)
8. Page 14, Shadis statement: The risk of SFP's to aircraft crashes should take into consideration changes in local air traffic as represented by flight control logs of local airports and military bases. [Ref. 2]
9. Page 2, UCS comment: What is the generic frequency of events leading to zirconium fires at decommissioning plants before the design and operational characteristics are implemented? [Ref. 3]
10. Page 2, UCS comment: What will the NRC do to protect plant workers and the public from SFP risks at permanently closed plants and operating plants before these design and operational characteristics being implemented? [Ref. 3] **SPLB assist if needed**
11. Shannon M. Rohrer comment: Found places in the report referring to "uncovering the core" when it was clear the authors meant "uncovering the fuel". [Ref. 6] (Tanya Eaton corrected throughout report).
12. Shannon M. Rohrer comment: PRA answers were off by an order of magnitude for some sequences. [Ref. 6] (Mike Cheok responded)
13. Page 2, Atherton comment: The probability of the happening of accidents as the event occurred should be calculated so that a more realistic probabilistic perspective is determined. [Ref. 7]
14. Page 3, Atherton comment: NRC should determine which failure rates used in the risk-informed process are reliable and which are not and the results should be included in the study. [Ref. 7]
15. Page 4, Atherton comment: The NRC should identify the number of operators assigned to each shift an how these operators are protected so that their availability is guaranteed in the event of an accident. [Ref. 7]
16. Page 4, Atherton comment: The NRC should address what measures are taken to minimize operator boredom and maintain alertness due to standing watch over a SFP " graveyard." [Ref. 7]
17. Page 4, Atherton comment: The NRC should address what measures are in play to minimize operator error in a postulated SFP accident. [Ref. 7]
18. Page 4, Atherton comment: The NRC should review the justification for containments in operating reactors and explain why a containment would/would not be advisable over a SFP. [Ref. 7] (Glenn)
19. Page 4, Atherton comment: To the extent possible, experimental validation of risk informed results should be addressed. [Ref. 7] (Glenn)
20. Page 2, Atherton comment: How has the NRC considered the availability of local resources as identified by ICD #2,3,and 4 should the local infrastructure be destroyed. [Ref. 7] **IOLB (EP) assist if needed**

21. Page 2, ACRS: The ruthenium inventory in spent fuel is substantial. If there are significant releases of ruthenium, the RG 1.174 LERF value may not be an appropriate surrogate for the prompt fatality quantitative health objectives (QHO). Because of the relatively long half-life of ruthenium-106, it is likely that the early fatality QHO would not longer be the controlling consequence. [Ref. 11] **RES assist if needed**
22. Page 4, ACRS: Risk-informed decisionmaking regarding the SFP fire issues should use realistic analysis, including an uncertainty analysis. The ACRS is concerned about the conservative treatment of seismic issues. [Ref. 11] **DE assist if needed**
23. Page 4, ACRS: Since the accident analysis is dominated by sequences involving human errors and seismic events which involve large uncertainties, the absence of an uncertainty analysis of the frequencies of accidents is unacceptable. The study is inadequate until there is a defensible uncertainty analysis. [Ref. 11]
24. Page 2, NEI: Seismic - There should be no SFP screening level distinctions based on plant SSE for the CEUS. For the WUS, it is reasonable to require that certain plants demonstrate a HCLPF of 2 X SEE. [Ref. 10] **DE assist if needed**
25. Page 5-7, NEI: Consequences: The consequence assessment provides a misleading conclusion that there is about a factor of 2 reduction in prompt fatalities if the accident occurs after 1 year instead of 30 days. [Ref. 10] **RES assist if needed**

    Page 5: The study does not note that the absolute value of fatalities is a couple of order of magnitudes below the numbers for operating plants. This is not surprising since it is the short-lived nuclides which drive this result. [Ref. 10]

    Page 5: The study does not highlight the fact that the most significant reduction in early fatalities occurs within the first 30 days. [Ref. 10]

    Page 5: By failing to emphasize the above, the staff's risk study lends misleading support to the idea that a 1 year waiting period is justified prior to reducing EP requirements. In fact the risk study does not support this conclusion. [Ref. 10]

    Page 6: The consequence analyses contained in Appendix A seems to contradict the staff's conclusion that 1 year is an appropriate waiting time for EP. [Ref. 10]

    Page 6: The study seems to establish the 1 year delay time based on providing sufficient time for operator response to upset conditions. A much shorter delay period supports the same conclusion..(Table 3.1, App. 2a). The total time available for operation action is 133 hours, as calculated. The same calculation for a 6 month period reveals 118 hours available for operator action. This is a substantial period of time, which allows the same conclusion....a 6 month period provides adequate decay time necessary to reduce the pool heat load to a level that would provide sufficient human response time. [Ref. 10]

    Page 6: The conclusion that should be drawn from the consequence analysis is that prompt fatalities are very small in comparison to operating reactor accidents, and are sufficiently reduced in the first month after shutdown to support eliminating off site emergency preparedness. [Ref. 10]

    Page 6: Most significant is the 1 rem offsite dose consequence (EPA PGA that distinguishes between offsite/onsite response. Below 1 rem, no offsite response

is called for. [Ref. 10]

26. Comments on Appendix 2b, Seismic - [Ref. 10] **DE assist if needed**

Attachment A, NEI letter, Section 2:

Page 1: The comments on conservatisms associated with the design basis earthquake at licensed NPPs should be moved to a separate section. Furthermore the deterministic method should be contrasted with the probabilistic method. [Ref. 10]

Page 4: Use of the LLNL probabilistic estimates at high ground motions may not be credible. EPRI results are also likely to be overly conservative at high ground motions. [Ref. 10]

Attachment A, NEI letter, Section 3:

Page 3: The requirement that some plants with higher SSE values perform detailed HCLPF assessments of the SFP is not warranted. There should be no SFP screening level distinctions based on plant SSE for the CEUS. For the WUS, it is reasonable to require that certain plants demonstrate a HCLPF of 2 X SSE. [Ref. 10]

27. Page 2, Mats Sjöberg/ Ferenc Müller on report: An US earthquake response spectra 10-5 (0.5g) is considered as an 10-7 in Sweden. Does this justify exemption from further consideration, due to low yearly frequency for Zr-fire? The SFP at the Swedish plant is calculated with an earthquake of 0.1g, see response spectra Figure 1, and found to comply with the Swedish standard design standard. **DE assist if needed** [Ref. 9]

SRXB (Contact: J. Wermiel)

1. Page 256, Criticality due to chemical stripping of primary piping [Ref. 1] (Tony Ulses)
2. Page 451, Barrett: worst case draining of the SFP. [Ref. 1] (Joe Staud.)
3. Page 60, Ray Shadis: Concern about primary system chemical decon. and the potential for contaminated solution to go overboard into public waters or be flushed back into the SFP. [Ref. 2]
4. Page 14, Shadis statement: During primary system decontamination at decomm. reactors, is it possible to misalign the valves and send corrosive chemicals into the SFP? Could these chemicals precipitate boron from the SFP water? Is there a potential for criticality? Is there a potential for fuel damage? **EMCB assist if needed** [Ref. 2]
5. Page 15, Shadis statement: In a half-empty SFP, if a SFP liner presses racks together, or, if fuel racks or assemblies or boral plates fail, are localized heat and criticality issues to be considered? [Ref. 2]
6. Page 4, Atherton comment: NRC should identify the scenario where a steam explosion is possible because of a severe criticality event and the basis upon which the probability was determined to be "highly unlikely." [Ref. 7]
7. Page 4, Atherton comment: The NRC should identify all radioactivity in the SFP and that capable of being dispersed in an accident (beyond that on p A3-11 to A3-13). [Ref. 7] **RES assist if needed** } (3)
8. Orange County (OC) comment: Criticality accident analysis does not consider risk of a criticality accident that arises from placement of low-burnup fuel assemblies in a pool where the licensee relies on burnup credit to prevent criticality. [Ref. 8] (Tony Ulses)
9. OC comment: Study is deficient in that it ignores phenomenon associated with partial draindown of SFP that will suppress convective heat transfer by presence of residual water at the base of fuel assemblies. [Ref. 8]
10. OC comment: Study is deficient in that partial draindown will lead to a steam-zirc reaction producing hydrogen gas which could reach explosive concentrations in the atmosphere of the spent fuel building, potentially leading to a breach of that building. [Ref. 8]
11. Mats Sjöberg/ Ferenc Müller on report: [Ref. 9] Page A1-7 in the report says:

> "When zirconium reaches temperatures where air oxidation is significant, the heat source is dominated by oxidation. The energy of the reaction is 262 kcal per mole of zirconium. In air, the oxidation rate and the energy of the reaction is higher than zirconium-steam oxidation."
>
> We can transfer 262 kcal to other units:
> 262 kcal pel mol Zr = 1.1 MJ per mol Zr (1 mol Zr = 91.2 kg Zr) =
> 1.1E+06/91.2 = 1.2E+04 J/kg Zr. We can conclude that the air oxidaton energi according to the report is = 1.2E+04 J per kg Zr
>
> The corresponding values for Zr-steam reaktion in the Melcor manual = 6.43E+06 J/kg Zr (Ref. Bottom Head Package, Reference Manual, Table 3.6. Heats of reaction at 1,700 K) The Maap code uses 6.18E+08 J per mol Zr = 6.78E+06 J/kg Zr, for
> Zr-steam reaktion i.e. near the same as Melcor.
>
> There is a factor 500 difference in the oxidaton energy and to the wrong direction.

12. Mats Sjöberg/ Ferenc Müller on report, Release Fractions, Page A4-5, Table A4-3. 100 % release is assumed for noble gases, iodine and cesium. We feel that this is too conservative. The latest estimates by the Swedish Radiation Protection Institute for the Tjernobyl case says that 100 % of the noble gases, 50-60 % of the iodine and 20-40% of the cesium were released at the accident. [Ref. 9]
13. Page 3, ACRS: The ACRS has difficulties with the time at which the risk of zirconium fires becomes negligible. Issues related with the formation of zirconium-hydride precipitates in the fuel cladding are spontaneously combustible in air. Spontaneous combustion of zirc-hydrides would render moot the issue of "ignition" temperature which is the focus of the staff analysis of air interactions with exposed cladding. The staff neglected the issue of hydrides and suggested that uncertainties in the critical decay heat times and the critical temperatures can be found by sensitivity analysis. Sensitivity analysis with models lacking essential physics and chemistry would be of little use in determining the real uncertainties. [Ref. 11]
14. Page 3, ACRS: The staff analysis of the interaction of air with cladding has relied heavily on geriatric work. New findings through a cooperative international program PHEBUS FP provide information relating to the well-known tendency for zirconium to undergo breakaway oxidation in air whereas no tendency is encountered in steam or in pure oxygen. Other findings relate to how nitrogen from air depleted of oxygen will interact exothermically with zircaloy cladding. The ACRS does not accept the staff's claim that it has performed "bounding" calculations of the heatup of Zircaloy clad fuel even when it neglects heat losses. [Ref. 11]
15. Page 4, ACRS: Since the staff has neglected any reaction with nitrogen and did not consider breakaway oxidation, it had not made an appropriate analysis to find this " ignition temperature". [Ref. 11]
16. Page 4, ACRS: The search for ignition temperature may be the wrong criterion for the analysis. The staff should be looking at the point at which cladding ruptures and fission products can be released. One arrives at a lower temperature criteria for concern over the release of radionuclides. [Ref. 11]
17. Page 4, ACRS: The staff focuses on eutectic formations when intermetallic reactions are more germane to the issues at hand. [Ref. 11] **RES assist if needed** } (4)
18. Page 4, NEI: T/H - Depending on fuel burnup/storage array details, the development of standard methods is needed for consistent application of regulations. [Ref. 10]
19. Page 1, Mats Sjöberg/ Ferenc Müller on report: Licensing limits of Zr-fire. It is very conservative to use 570 degrees C as a licensing limit (gap-release temperature). [Ref. 9]
20. Page 1, Mats Sjöberg/ Ferenc Müller on report: Fire propagation/radioactivity releases. We think it is probable that the Zr-fire, which starts in a fuel element with the highest burnup rate stays within that fuel element. It is very hard to conceive that this fire can propagate to the whole SFP, which also includes fuel from several years old fuel cycles. Limits on fire propagation will directly limit the possible radioactivity releases. [Ref. 9]

IOLB: (Contact: Glenn Tracy)

1. Michael Holmes comment: Section 4.3.2, "Security" of the draft report casks a shadow

on the entire 10 CFR 73.51 rulemaking and needs to clarify the scope of the safety issues. He recommended that the last paragraph in Section 4.3.2 be clear and completely identify the scope and basis of the ISFSI safety concerns from the radiological sabotage and theft identified in 10 CFR 73.1. He also stated that this paragraph appears to contradict the May 15, 1998, NRC rulemaking on Physical Protection for Spent Nuclear Fuel and High-Level Radioactive Waste, Federal Register Vol. 63, No. 94 Pages 26955 - 26963. See email for further detail [Ref. 4] **Skip Young reviewing now.**

2. Page 420, Shadis: With new personnel and decommissioning personnel - how to instill/ ensure the same "safety culture" as during operation? [Ref. 1] (David Trimble)
3. Page 3, NEI: Sabotage - NEI disagrees with the staff's conclusion that there is no methodology currently available to assess probabilities of terrorist activity or behavior which might culminate in attempted sabotage of spent fuel. In fact, SNL, has applied a probabilistic approach to security in decommissioning on the Maine Yankee docket. NEI encourages the staff to review this report. [Ref. 10]
4. Page 3, NEI: EP - The decommissioning rule should specify that the licensee is excused from 10 CFR 50.47 off-site EP requirements after the short lived nuclides important to dose have undergone substantial decay resulting in off-site dose consequences due to license basis accidents of less than 1 rem (the EPA protective action guideline). [Ref. 10]
5. Page 3, Mats Sjöberg/ Ferenc Müller on report: What does "reducing unnecessary regulatory burden" mean in practice when it comes to emergency planning? What kind of reductions are foreseen for the following: manpower onsite/offsite, emergency equipment, communication means, alarm means, notification of personnel/public, EP, plans, KI, EPZ radius? [Ref. 9]
6 Page 30, Gunter: What about Security/bomb threat/intentional events [Ref.1]
7. Page 37/38, Shadis: fire scenarios - resin container fire; fire in a waste storage building; fire in a container vehicle with waste stored in it that could trigger emergency response mechanisms. [Ref. 1]
8. Page 91, Lochbaum: Protection of plant workers, particularly less severe accidents such as pool uncovery without a zirc fire. [Ref. 1] **DRIP assist if needed**
9. Page 2, UCS comment: Asked about calculations for radiation dose experienced by members of the fire brigade responding to resin fires. [Ref. 3] **DRIP assist if needed**

RGEB (Contact: Cindy Carpenter)

1. Pages 3-4, NEI: Insurance - The obligation for decommissioning plants to participate in the secondary financial protection should be reviewed in light of the low public risk posed for SFP's for decommissioned plants. Industry does not believe that the risk justifies requiring participation. (The majority of the 3 in 1 million risk of significant offsite consequences comes from an upper bound determination of the risk posed by seismic events, not on a best estimate of the seismic risk). [Ref. 10] Insurance

   Page 3: If it is determined that participation will be required during the short time that decommissioning plants pose a none-zero risk, then the level of participation should be in proportion to a best estimate of the risk posed relative to the risk posed by operating plants. [Ref. 10]

   Page 4: If any participation is required, it should be only for the short period that clad surface temperatures greater than 570 degrees C can occur in a loss of water configuration. The calculation of this temperature should be by an approved methodology. [Ref. 10]

   Page 4: The capacity required for primary financial protection should be eliminated for consideration of any potential for accidents with significant offsite consequences. NEI proposes that for other events with offsite consequences, onsite coverage be reduced to $25M for the period when spent fuel remains in the pool and offsite coverage be reduced to $5-10M. [Ref. 10]

   Page 4: When fuel has been removed offsite or placed in an offsite ISFSI, we recommend onsite coverage be reduced to $25M while the site still contains significant sources of radioactive material. Onsite coverage could be reduced to zero when there are no sources exceeding 1000 gallons of fluid. Offsite coverage should be reduced to $5-10M for plants with fuel offsite or in an onsite ISFSI. [Ref. 10]

RES (Contact: Faruok Eltawila)

1. Page 2, ACRS: The staff made additional MACCS calculations which assumed 100% release of the ruthenium inventory. For a 1 year decay time with no evacuation, the prompt fatalities increase by 2 orders of magnitude over those in the draft report which did not include ruthenium release. The societal dose doubled, and the cancer fatalities increased four-fold. [Ref. 11]
2. Page 2, ACRS: The ACRS is concerned about the appropriateness of the source term used in the study. The staff did consider the possibility that "fuel fines" could be released from fuel with ruptured cladding (as a result of decrepitation). It did not, believe these fuel fines could escape from the plant site. Evidence suggest that fuel fines could be entrained in the vigorous natural convection flows produced in a SFP accident. Nevertheless, the staff considered the effect of 6 X 10^{-6} release fraction of fines. This minuscule release fraction did not affect the calculated findings. There is no reason to think that such a low release fraction would be encountered with decrepitating fuel. [Ref. 11]
3. Page 3, ACRS: The uncertainties associated with many of the critical features of the MACCS code do not seem to have been considered in the analyses of the SFP accident. [Ref. 11] **Also SPSB assist if needed**

   -One of the uncertainties is that the spread of the radioactive plume from a power plant site is much larger than what is taken as the default spread in the MACCS calculations.
   - The initial plume energy assumed in the MACCS calculations, which determines the extent of plume rise, was taken to be the same as that of a reactor accident rather than one appropriate for a zirconium fire.
   -The consequences found by the staff tend to overestimate prompt fatalities and underestimate latent fatalities just because of the narrow plume used in the MACCS calculations and the assumed default plume energy.
4. Page 3, ACRS: The staff needs to review the air oxidation fission products release data from Oak Ridge National Lab. and from Canada that found large releases of cesium, tellurium, and ruthenium at temperatures lower than 1000°C. Based on these release values for ruthenium, and incorporating uncertainties in the MACCS plume dispersal models, the consequence analysis should be redone. [Ref. 11]
5. Page 3, Mats Sjöberg/ Ferenc Müller on report, [Ref. 9]: Is a gap release considered to give moderate off-site consequences at the time when Zr-fire is no longer a threat? **SPSB assist if needed**

(5) (6) (7) (8) (9)

Policy Issues on consequences/risk (who addresses?):

1. OC comment: Draft study does not address where people who have been relocated from uninhabitable land will reside while the land recover from radioactive contamination. Furthermore, the study does not explain the regulatory basis for using 4 rem over 5 years as the threshold dose for relocation **(Jason of RES to address)**. Finally, the study fails to address the social and economic implications of losing the use of thousands of square kilometers of land for several generations. [Ref. 8]

(10)

References:

1. Public Concerns Raised At the Decommissioning Workshop on July 15-16, 1999.
2. Public Comments/Staff Commitments, November 8, 1999 Commission Meeting.
3. UCS Letter dated March 15, 2000.
4. Michael H. Holmes, email dated March 7, 2000.
5. John McLoughlin email dated February 23, 2000.
6. Shannon M. Rohrer email dated March 15, 2000.
7. Peter James Atherton letter dated April 10, 2000.
8. Orange County Response to Shearon Harris Board.
9. Mats Sjöberg/ Ferenc Müller email to Dick Dudley dated April 25, 2000.
10. NEI Public comments, dated May 2, 2000
11. ACRS Letter dated April 13, 2000 from Dana A. Powers to Chairman Meserve
12. Email from Michele Kiddell - SAFE Legacy dated April 7, 2000.