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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Glenn O. Bright
Dr. James H. Carpenter
James L. Kelley, Chairman

'84 APR 17 A10:47

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In the Matter of CAROLINA POWER AND LIGHT CO. et al. (Shearon Harris Nuclear Power Plant, Unit 1)	Docket 50-400 OL ASLBP No. 82-468-01 OL

Joint Intervenors Response to Applicants
Seventh Set of Interrogatories (Joint 7)

G1. Answers will be supplemented as information is available and reviewed.

G2(a)Except for nonwitness expert(s) who may have assisted, none. (b) see specific responses (c) OBJECTION: this information is not required under the Board's 5-27-83 Order; Applicants must show that it is not possible for them to obtain information or opinions on the subject of this contention by other means, before they can even request disclosure of this information (see 10 CFR 2.740). Objections made by Joint Intervenors and by Wells Eddleman to similar interrogatories in all past responses are incorporated by reference at this point, as if fully set forth here. If you want a list of them we'll try to provide it, but it's all in responses previouslyserved on the parties. (d) Not Applicable, per Applicants' clarification that they do not wish persons who simply mail, hand over, or deliver information identified.

3. See objection to 2(c) and response to 2(d) above. "AA" is not a witness; if this situation changes, "AA" will be identified under the interrogatory requesting ID of witnesses.

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4(a) and (b) See specific responses. Where no pages are identified, the entire document is relied on or used.

5(a) and (b) See specific responses.

SPECIFIC INTERROGATORY RESPONSES

VII-34. Analysis is still incomplete. Wells Eddleman has been both ill and extremely busy since about the time those responses were filed. Consultation with experts including "AA" as W.E. recalls, have not resulted (except as stated herein, e.g. at VII-35(e) below) in any significant change in the analysis reported, but Joint Intervenors have recently retained experts to analyze matters including these. That analysis may not have been begun yet, and definitely has not been completed or communicated to Joint Intervenors yet.

VII-35 (a) Except as previously stated, we're not sure. This is one of the things we are trying to get our experts to analyze.

(b) will be provided per our experts' report(s) (c) Except as previously stated, we don't know further, one way or the other. See response to (b) above. (d) See response to (c). (e) Yes, we believe there are problems as previously identified. "AA" is being consulted about this. (f) see previous responses; opinion of "AA" as WE recalls it. (g) not applicable, see (c) and (e).

VII-36. We're asking our experts.

VII-37 (a) Yes. Of course, each tube is most likely to rupture at only one point; all steam generator tubes are subject to rupture, but we believe the expanded tubes can be more subject to rmupture due to their thinner walls, unrelieved stress of expansion, wall defects, vibration, denting, etc. (b) It's pretty obvious that a thinner wall is weaker than a thicker wall of the same material, all other things being equal. Unrelieved stresses put a constant force against the metal or parts of it at and near where the expansion occurred. For more details, we are consulting our experts.

VII-37(c) Not Applicable.

VII-38 (a) Basic metallurgy and physics. The expansion, in particular, may open small cracks or pits on the outer surface, or otherwise roughen it as it is stretched. This gives more sites for corrosive attack. We're asking our experts formore details re this entire matter.

(b) We believe they are. (c) The tubes are already subject to rupture when unstressed and unthinned. Obviously a thinner tube section, with more stress, is more subject to rupture. The opening (or leaking from) several tubes at once in the Ginna accident shows that the prexsent ASME standards (assuming the Ginna plant and Westing house complied with them) shows that even the unstressed, unthinned tubes cannot comply with the criterion that only one tube should fail at a time in each steam generator. We are asking our experts for more detail and analysis on this. (d) Not Applicable.

(e) Cold working can result in an increase in yield strength, but at a cost of increased brittleness. We don't know if we agree that the yield strength will increase as described in NUREG-1014, or that this will increase the margin between leak and break, or that increasedyield strength will improve safety. We think it could reduce safety by allowing somewhat higher pressures before failure of the tube (and thus more catastrophic failure). We are asking our experts concerning all these matters. (f) see (e) (g) N/A

VII-39(a) See respônses to VII-38(a),(c) and (e) above. In addition, loose objects impacting a more brittle, more stressed, thinner tube wall (the expanded part) can either directly, or through flow blockage or diversion (eg leading to extra forces or to vibration of the tube) or through setting up corrosion between the metal of a loose part or portion or particle thereof trapped against or near

the tube or its expanded part, all can weaken the tubes of make them more subject to rmupture. Impact could cause a crack to propagate leading to rupture, for example. We're seeking more info on this situation also from our experts.

(b) The sleeve would not fit both the expanded part and the unexpanded part. Thus the sleeve would not actually reinforce the tube where it has been expanded, leaving a site for corrosion, denting of the sleeve, vibration, etc. While it is possible to refer to a tube with an illfitting sleeve as "sleeved", it won't provide the same protection as a tube sleeved with a properly fitting sleeve.

(ac) Expanded to the same extent, at the same rate, at all points. In particular, above and below the expanded portion, some area of partial expansion may exist; also due to impurities or differences in the metal, or due to residmual or other stremsses, expansion may be uneven, e.g. at a weak spot in the tube.

(d) It may be. It certainly beats letting the tube leak or leatting it sit there subject to sudden or other failure.

(e) Common sense. We'll also ask our experts.

(f) The tube may be able to be physically plugged, but the integrity of the plug-in-position may not be as readily assured, particularly if the expanded tube is ruptured at any point, which would allow forces to act on the plug. Plugs have come out of steam tubes at other plants, as we understand it. We're asking our experts about these matters also. (g) see (g).

VII-40. We're asking our experts. We believe that the greater possibility of failures of expanded tubes will lead to m ore maintenance and cleaning and inspection work. We believe that more inmspection of the modified D-4 steam generators will be necessary (compared to a steam generator which never had the vibration etc problems) and that'll mean more radiation exposure in inspecting & setting up inspections.

VII-41. We haven't gone back to SECY 82-72 to check thoroughly; however, WE recalls statements to the effect that radiation exposures due to steam generator problems and work are significant and were above what NRC used to estimate; also, that multiple tube failures are a realistic possibility, leading to accidents more severe than had been thought credible (by NRC and/or nuclear industry); also, that steam generators are needing more repairs and are having more problems, leaks and accidents than had been anticipated. Obviously, leaks allow primary coolant out of the primary system, increasing radiation exposure and accident risks; radiation and radioactive material can be released from steam generators to atmosphere directly through atmospheric dump valves or indirectly in many ways during an accident. (It happened at Ginna.) We are asking our experts about this conclusion and its basis.

VII-42. See response to VII-40 and previous responses. We believe exposure would be reduced by installing new steam generators not subject to the Model D or D-4 steam generator problems. We're also asking our experts more re this matter.

VII-43. ALARA requires minimizing radiation exposure. The nuclear industry tends to take a sloppy view that many exposures are necessary. We believe that greater efforts to minimize radiation exposure are necessary. Compare, e.g. the views of Dr. Edward Radford and of J. Rotblat reported in articles in the 9/78 Bulletin of the Atomic Scientists to the effect that occupational radiation exposure limits should be lowered by a factor of 10.

VII-44. WE recollection of reports on steam generator "fix" by switching Robinson to phosphate after tube corrosion/leak problems. Have not had time to investigate in detail yet.

VII-45(a) We don't have a list yet. We'll ask our experts. This applies to both (i) and (ii). (b) Corrosion expands metal around the tubes (orm, more precisely, the corrosion products have a greater volume than the metal, as is seen in rusting steel);these squeeze the tube, creating a narrow part and stressed walls. Contact with corrosion products makes the tube more subject to corrosion also. We believe, based on conversations with nonwitness experts "W W Bill Blow" and "Ceil Cope" that AVT water chemistry is unable to prevent this and other forms of corrosion. However, it's been a long time since we communicated with these folks; we'll ask our present experts. (c) Not without something to dent, like a steam generator. Running the steam generator with AVT water chemistry, we believe, can cause denting. See response to (b) above. We'll ask our experts for more information on this. (d) see (c) and (b) (e) Not applicable.

VII-46. We'll ask our experts. Further analysis so far incomplete.

VII-47. We're not sure there are any. What does "acceptably minimize" mean? Acceptable to us? To CP&L? To the NRC? to the public? We will ask our experts for more information.

VII-48. We'll ask our experts for more details. We're not sure that any or all of these methods can keep corrosion or cracking at levels acceptable to us, or to anyone.

VII-49. See response to VII-38(a) and other responses above.

VII-50. Safety grade means nuclear Class 1 or Class 1E as applicable. Opinion of "AA" as we understand it is that all the components should be safety grade. We'll ask our experts for more details.

VII-51(a) "The whole system" includes power supplies, wiring, instruments, conduit, sensors, connections of all kinds, and all other components of a loose parts monitoring and/or reporting system, including devices to record, transmit, give alarms or indications of loose parts.

VII-51(b) see VII-50 response. (c) We'll ask our experts. (d) we'll ask our experts, but its obvious that bigger objects have bigger impacts (e) through stupidity, negligence, mismanagement, etc. We understand that objects as large as a welding rig have been found inside nuclear reactor vessels and/or steam generators.

We'll ask our experts further about all matters in all parts of VII-51.

VII-52. We believe that removal of loose parts by robots or mechanical means or other means, taking excellent care not to damage the steam generator or other parts of the reactor/NSSS/safety systems, would allow removal of the loose parts with less radiation exposure to humans. We do not favor leaving or getting loose parts in SG's, nor having them in there, nor exposing people to radiation from nuclear sources.

VII-53. Except as stated previously, our analysis has to go further. We'll also ask our experts.

VII-54. See above response to VII-53.

VII-55. Even if it did, we're not sure that intent is worth much in practical terms, since it's implemented by the NRC Staff and CP&L. We'll ask our experts. VII-56: N/A see 55.

VII-57 (a) Many of them do. If the work on radioactive things can be done without exposing people, it would be better to do it that way. See, e.g., response to VII-52 above.

VII-58. (a) We don't possess the report. We'll ask our experts. (b) "AA" says these are important issues re SGs.

VII-59. We think so. We'll ask our experts for more info.

VII-60. Except as previously stated, we'll have to ask our experts and/or do more analysis. VII-61 N/A.

VII-62. Except as previously stated, no further analysis has been done by us so far. We will also ask our experts.

VII-63. See VII-62 and previous responses. VII-64: N/A

VII-65. Except as previously stated, no further analysis yet done. We do believe that offsite doses from a steam generator tube rupture event could (1) imperil the health and safety of the public and (2) exceed allowable limits. We're not sure which guidelines you are referring to. We'll ask our experts re all of this.

VII-66. Multiple tube ruptures, or even a single tube rupture without appropriate action to limit radiation releases, could result in large amounts of the core radioactive inventory being released. a ruptured tube can be equivalent to a small LOCA. If steam containing radioactive material is released or is vented to atmosphere, the radiation release can be quite significant. Our analysis of this matter is incomplete and we will ask our experts about it too.

VII-67 N/A.

VII-68. Additional radiation doses do not protect the public health and/or safety. See response to VII-66 and VII-65 above. Also See NUREG-0909 p. I-19 item 2 re excessive I, Cs, Co, Ba & Mo nuclides Nobody knows for sure what will happen in a SGTR accident.

VII-69. Even BEIR evidently agrees that there is no "safe dose" of radiation. They reject the threshold hypothesis. See also responses referenced in answer 68 above. We'll also ask our experts re this and may do or have done more radiation analysis (re dose, etc). VII-70: N/A.

VII-71(a)It appears that WE misrecalled this. NUREG-0909 refers to a single rupture and multiple tubes damaged. See, e.g. pp 7-16 and 7-17; see also p.7-18 re loose parts and tube damage.

(b) We have not made a complete analysis, but the excess radioactive release or transfer (for radio-iodines) referred to in answer 68 above, the info about corrosion and tube damage, e.g. at pp 7-1 thru 7-21, the loose parts and extensive damage identified on pp7-17 and -18, we think supports our contention. We will also ask our experts.

(c) See (b).

VII-72(a). Try reading NUREG-0909. Both the PORV and the SG Code valve lifted. (b) Analysis not complete, but it's obvious that extra radioactive material has to be cleaned up somehow, and this can involve more exposure to humans if steps aren't taken to (i) prevent release of such material inside containment, and/or (ii) clean it up without exposing humans.

We will ask our experts further re both (a) and (b).

VII-73 (a) Read NUREG-0909. If they hadn't been able to isolate the steam generator, the release could have been much greater, we believe. We will ask our experts further. (b) We did not measure radiation levels at Ginna. We are far from sure the NRC, licensee, et al, measured them accurately. We do not believe this estimate is necessarily correct. Nor do we believe that just being within 10 CFR 100 guidelines protects the health and safety of the public adequately. Analysis not now complete. We will ask our experts further. (c) see (b) (d) N/A: Joint VII was formulated long before Eddleman 180 and thus does not "incorporate" it, though it may include some of the same issues, and W.E. believes it does.

VII-74. We disagree.

VII-75. Even if true, the phosphate chemistry plants have operated longer than plants that start up on AVT (Harris hasn't operated), so it's not clear which have the worst problems at the same stage of operation. Seawater or brackish coolant has caused problems. We have not analysed this statement comprehensively. We'll ask our experts.

Re 3-loop plants, we believe, based on analysis by Chas. Komanoff, an expert in statistics and economics and nuclear capacity factors, 3 loop plants lose an average of 11.8% or so CF compared to 2-loop capacity factor, and the salt-cooling-related loss is more like 0.5 to 0.8 %.

We don't know which plants you claim are similar to Harris. We would identify Beaver Valley I, North Anna I and II, and VC Summer. Our analysis of these matters (re operating record of plants with AVT which are similar to Harris, and always used AVT -- we don't know for sure which, if any, of the above plants have always used AVT, and VC Summer is very new and went thru a long startup period and may not even yet be in commercial operation), is incomplete. We'll ask our experts. We do not accept Koppe's statement. We'll ask our experts.

(a)(b)(c)(d) Analysis currently incomplete. VII-76 N/A.

VII-77. We believe crevices are responsible for some problems with SGs. We are not convinced AVT will prevent formation of c revices, nor that crevices are the only SG problem. We do disagree.

VII-78. Re other damage besides from crevices, see e.g. NUREG-0909 pp 7-17 thru 19 (and 7-16), etc; SECY-82-72 (as remembered); we haven't completed a listing of documents which support this, but believe that others in W.E.'s possession do. We'll ask experts further.

VII-79 N/A.

VII-80. We emphatically disagree. This is a <u>non sequitur</u>. Koppe is wrong to use all Westinghouse plants as a comparison group. Those over 600 or 700 MW are (and each group is) very different statistically in performance. We believe Harris performance will not be even as good as NRC Staff projects, or surely could be. VII-81: see above. More info will be in Eddleman response to Summary Disposition on 15-AA, to be filed 4-16-84 under extension of time granted by Judge Kelley 4-11

VII-82. Not applicable.

Production of documents: Any of the above documents not already produced or in possession of Applicants or NRC may be produced by contact w/ Wells Eddleman to arragnge time and place mutually acceptable.

ATTEST

The above answers are true and carrect to the best of my present knowledge and belief.

April 11, 1984

Wells Eddleman

Wells Eddleman
for Joint Intervenors

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of CAROLINA POWER & LIGHT CO. Et al.)
Shearon Harris Nuclear Power Plant, Unit 1)

Docket 50-400
O.L.

CERTIFICATEOF SERVICE

I hereby certify that copies of Joint Intervenors Response to Applicants Seventh Set of Interrogatories (Joint 7)

HAVE been served this 12th day of April 1984, by deposit in the US Mail, first-class postage prepaid, upon all parties whose names are listed below, except those whose names are marked with an asterisk, for whom service was accomplished by Express Mail April 11 by special agreement with Applicants counsel Baxter, ok'd by NRC Staff also -- all other parties to be served in mailing of the 12th.

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