17939

HARMON, CURRAN & SPIELBERG
2001 S STREET, N.W.
SUITE 430
WASHINGTON, D.C. 20009-1125

TELEPHONE
(202) 328-3500
FAX
(202) 328-6918

September 18, 1996

Docketing and Service
United States Nuclear Regulatory Commission
Washington, DC 20555

To whom it may concern:

Enclosed, please find the original "SECOND REPLY AFFIDAVIT OF MARVIN RESNIKOFF, PH.D," a copy of which was filed yesterday, September 17, with your office.

Sincerely,

Diane Curran

Diane Curran /s6

DS03

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Yankee Atomic Electric Company	)	
	)	Docket No. 50-029
(Yankee Rowe Nuclear Power Station)	)	ASLBP No. 96-718-01-R

SECOND REPLY AFFIDAVIT OF MARVIN RESNIKOFF, PH.D

I, Marvin Resnikoff, being duly sworn, state as follows:

1) On September 6, 1996, I filed an affidavit in support of CAN's and NECNP's opposition to YAEC's motion for summary disposition, Affidavit of Marvin Resnikoff, Ph.D (hereinafter "Resnikoff Affidavit"). On September 13, 1996, I filed Reply Affidavit of Marvin Resnikoff, Ph.D (hereinafter "Resnikoff Reply Affidavit") in support of CAN's and NECNP's Reply to the NRC Staff's Response in Support of YAEC's Motion for Summary Disposition.

2) This Second Reply Affidavit is submitted in response to factual assertions made in the Reply Memorandum of Yankee Atomic Electric Company (Motion for Summary Disposition) (September 13, 1996) (hereinafter "Reply Memorandum"), and the Reply Affidavit of Russell A. Mellor (September 13, 1996) (hereinafter "Mellor III.")

3) YAEC incorrectly claims that I am not qualified to testify on the subjects of dosimetry, health physics, and construction engineering. Reply Memorandum at 3. As my resume shows, I have considerable experience and expertise in decommissioning issues, having worked on those issues since 1974. In my work on decommissioning issues, I have become generally familiar with nuclear power plant designs and the activities that are included in decommissioning work. It is not necessary to be a construction engineer in order to evaluate a decommissioning plan and its radiation dose estimates. I also possess considerable expertise and experience in the areas of dosimetry and health physics, having devoted much of my time during the last six years to those issues. During that period, I have been qualified as an expert witness in dosimetry and health physics and have testified on those subjects in numerous court cases. This is discussed in my affidavit and the attached Exhibit E, which lists various cases I have worked on. Although this information was provided to YAEC, apparently it was was ignored.

4) I do not understand Mr. Mellor's paragraph 4, and therefore am unable to respond to it.

5) Mr. Mellor claims I have incorrectly added 25 person-rems to the Yankee Rowe decommissioning dose estimate to account for under-reported background radiation exposures. Mellor III, par. 5. See also Reply Memorandum at 5-6. Mr. Mellor and I have no disagreement about subtracting "rack time." However, we disagree about the remaining exposure after subtracting rack time. As I previously stated, YAEC's assertion about the amount of background radiation to be subtracted is inconsistent with YAEC's procedures for subtracting background radiation.

6) Moreover, Mr. Mellor's affidavit raises another aspect in which YAEC may be underreporting decommissioning doses. As Mr. Mellor states, some workers are at the site part-time, i.e., for less than an entire year. Mellor III, par. 8. Such part-time control badges

may be taken out of service and "read" before they have accumulated a full year's "on the rack" dose. If, as it appears, YAEC is correcting for control badge readings based on a full 40-hour-a-week, 52-weeks-a-year job, then it is underreporting the doses received.

7) Mr. Mellor further argues that background at the plant is not as high as 131 millirems/year but can be 95 millirems/year, i.e., outside the gatehouse. Mellor III, par. 6. My affidavit was based on YAEC's discovery responses, which gave an onsite background radiation level of 131 millirems/year. This is the first time that YAEC has given an onsite background radiation figure of 95 person-rems. In any event, a 95 person-rem reading is above the millirems/year background reading recorded in a nearby town, and thus only serves to indicate that the Yankee Rowe site is contaminated at uneven levels. I therefore disagree that my correction for background radiation dose should be corrected as Mr. Mellor suggests.

8) In par. 7, Mr. Mellor asserts that naturally-occurring background is included in exposure values reported for workers with measurable exposure. He says this should result in a 17 person-rem credit for workers with measurable exposure. Mr. Mellor's calculation appears to be reasonable for workers to whom a "measurable exposure" is attributed. However, Mr. Mellor does not address my concerns with respect to workers to whom no measurable exposure is attributed. I continue to believe that YAEC has underestimated this dose by about 25 person-rems. Moreover, as discussed above, he fails to take into account the potential underestimation of doses for part-time workers, which would cut into the 17 person-rem "credit" he assigns.

9) Mr. Mellor claims that it is incorrect to attribute YAEC's 1992 activities to decommissioning, because YAEC's license constrained it to stay in operational mode until at least April of 1992. Mellor III, par. 10. I disagree. It is important to look at the nature of the 1992 activities, and whether their essential purpose was to decommission the plant. In February of 1992, YAEC off-loaded the full core and removed the control rods. This is not a normal operational activity, as only a third of the core is generally removed during standard operations. Rather, removal of the entire core signalled a decision to close the plant for good and to commence decommissioning. The control rod removal, crushing, and disposal activities which followed in 1992 constituted a continuation of such decommissioning activities.

10) Mr. Mellor correctly asserts that I do not dispute the fact that the 1992 plant closure activities, with the possible exception of the Control Rod disassembly, "would have been completed for either DECON or SAFSTOR, and therefore, do not impact the 900 differential between DECON and SAFSTOR." Mellor III, par. 10. However, he misses the point of my argument, which is that YAEC's DECON estimates are underestimated by excluding this figure.

11) Mr. Mellor states that the GEIS considers operation and maintenance activities during DECON to be inapplicable to decommissioning doses. Mellor III, par. 11. According to Mr. Mellor, the entry for "custodial care" under the SAFSTOR option in the GEIS refers to "long-term care unique to the SAFSTOR operation, not either the operation of the spent fuel during the DECON period or the undertaking of license-required routine maintenance surveillance and inspection during the DECON period." Id. I disagree with Mr. Mellor. First, I do not see any basis for the distinction made by Mr. Mellor between DECON routine maintenance and inspection and SAFSTOR routine maintenance and inspection. Both activities have the same purpose, which is to maintain the plant in a safe condition pending its ultimate dismantlement and disposal. Second, the term "NA," as used in the GEIS for the DECON

alternative, presupposes that decommissioning will be carried out immediately and that no custodial care will be required. This is not the case at Yankee Rowe. As YAEC has previously acknowledged, it "modified" the DECON alternative to make it something of a hybrid between DECON and SAFSTOR. See Memorandum of Yankee Atomic Electric Company in Support of Motion for Summary Disposition at 2, note 1 (September 3, 1996). As discussed in the FSAR, YAEC plans to delay detailed planning and engineering for dismantlement until 2002, with decontamination and dismantlement activities beginning in 2003. Id. FSAR at 3-4. Thus, YAEC's O&M activities would necessarily involve the type of "custodial care" activities attributable to SAFSTOR. Finally, contrary to Mr. Mellor's implication, spent fuel pool care should be treated as decommissioning because it is a necessary element of maintaining the plant in a safe condition pending completion of decommissioning, and is not attributable to disposal and removal.

12) Mr. Mellor incorrectly states that, in challenging YAEC's "to go" estimates, I have ignored information provided by YAEC which shows the reasonableness of those estimates. Mellor III, pars. 12, 13. He refers to Exhibit 6 to his September 3, 1996, as containing detailed estimates of exposure hours, effective dose rates and estimated doses. Id. Exhibit 6 does not fit that description, and thus I think Mr. Mellor means to refer to Exhibit 5. Exhibit 5 is a series of spreadsheets which appear to be identical to TLG spreadsheets that YAEC provided to the intervenors in discovery. Inexplicably, however, Exhibit 5 has "Bates numbers" -- located at the bottom right-hand corner of each page -- that are different than the Bates numbers used by YAEC on the discovery documents provided to intervenors. Thus, Mr. Mellor's statement in par. 13 that YAEC did not use TLG spreadsheets to project doses appears to be incorrect.

13) Moreover, Mr. Mellor's assertion in pars. 12 and 13 that YAEC has provided detailed dose information for all its "to go" activities is contradicted by other documents. For instance, RP-96-19, a March 27, 1996, Memorandum from Cox and Babineau to Heider and Mellor, contains a "Table 3" which lists the following "scheduled activities with incomplete data:" vapor container activated concrete removal, yard area contaminated removals, lower neutron shield tank removal, upender removal, fuel chute decon removal. According to YAEC, "[e]xposure estimates for these activities are included in Attachment 2." However, YAEC also warns that, "the data should be considered preliminary." Id. (emphasis added). Some other activities don't have hours and dose rates assigned to them at all, only an estimate of the dose, e.g., Main Coolant System Decon, Decon Preps, MC Spools, Radioactive Waste Spent Fuel Pool Cleanup. Id., Attachment 2. Moreover, without a site characterization report, YAEC cannot make a precise estimate of number of hours and exposures. Thus, contrary to Mr. Mellor's assertion, the information provided by YAEC was much less than sufficient to evaluate the accuracy of YAEC's dose estimates.

14) I disagree with Mr. Mellor that the Decommissioning Plan data "provides (sic) a high degree of confidence that the extent of concrete contamination is well known for the Yankee site." Mellor III, par. 14. Although YAEC seems to have estimated the amount of concrete, and has done some sampling, it does not appear that YAEC has made calculations of how this information translates into worker doses. As I have previously stated, removal of concrete will be a dusty operation.

15) Mr. Mellor claims I am incorrect in asserting that demolition work is likely to be dirty. Mellor III, par. 14. He bases his statement on the assertion that YAEC will not use explosives during decommissioning. Mellor III, par. 14. This assertion is inconsistent with the Decommissioning Plan itself. Table 2.3-2 in Decommissioning Plan refers to

decontamination methods such as "carbon dioxide blasting," "hydro blasting," "abrasive blasting." It also requires filtration to control airborne contamination -- thus, YAEC is clearly worried about airborne exposures. Table 2.3-2 also refers to techniques such as "scabbling," "spalling," and "scarifying." Whether or not these technically qualify as explosive techniques, they can be reasonable inferred to be dirt and dust-creating techniques, just as are explosions. Similarly, Table 2.3-3 refers to demolition methods such as "mechanical cutting/removal" methods, "abrasive wheel," "machining," "diamond wire for concrete cutting," "saws," and "impact hammer." These terms all convey that demolition will involve the generation of dirt and dust. Thus, it is simply not true that I have ignored information in the Decommissioning Plan.

16) Mr. Mellor also claims that results of ALARA review packages show the reliability of YAEC's dose estimates. Mellor III, par. 15. As I have previously discussed, near-term ALARA reviews are generally much more accurate than long-term dose projections using imprecise inputs to models. Resnikoff Affidavit, par. 30; Resnikoff Reply, par. 5. I would note in this regard that all of the examples given in Mr. Mellor's chart entitled "ALARA Index Exposure Summary" show jobs that were reviewed shortly before they were completed (i.e., between about ten days and six months.) This type of data cannot serve as a reliable indicator of the accuracy of longer-term dose estimates.

17) Mr. Mellor claims that my assumption that decommissioning will take another 2.5-years is unfounded. Mellor III, par. 16. To the contrary, my time estimate is supported by YAEC's record of decommissioning. According to Mr. Mellor, YAEC has now completed 60% of its decommissioning tasks. If it took four and a half years (from 1992 to mid-1996) to complete 60% of decommissioning activities, then it is reasonable to assume that the next 40% of the job will taken another 2.5 to 3 years to complete.

18) In par. 17, Mr. Mellor attempts to defend the conservatism of his dose estimates based on the decay of cobalt-60. His argument, however, simply ignores the fact that even under his decay projections, the radioactive contamination of the Yankee Rowe site will not decay to background limits for hundreds of years.

19) Mr. Mellor asserts that it is inappropriate to consider inhalation doses because they are not included in the GEIS. Mellor III, par. 18. In 1988, when the GEIS was written, little significance was attributed to inhalation doses, and therefore it is not surprising that they were not included. Only whole body doses were considered. However, it is now acknowledged that inhalation doses account for a small but significant contribution to decommissioning doses, and therefore the TEDE dose is measured in inhalation and whole body exposures taken together. Inhalation doses are a real and significant source of radiation doses during decommissioning. The fact that this was not explicitly acknowledged in the GEIS should not prevent it from being considered here, as our knowledge of the problem has grown with time.

20) I would also note that Mr. Mellor bases his assertion that consideration of inhalation doses is inappropriate on the false premise that YAEC decommissioning doses should be compared to the GEIS to determine whether the difference in DECON and SAFSTOR decommissioning doses exceeds on the order of 900 person-rems. For this reason, he apparently considers that no factor that was omitted from the GEIS should now be included in the decommissioning dose estimate for Yankee Rowe. This makes no sense. The point of this process, and of any decommissioning dose estimating process, is to determine as accurately as possible what will be the actual dose from the particular facility decommissioning project. Thus, estimates of the decommissioning dose for Yankee Rowe should be based on Yankee Rowe

data, or whatever comparable data is available, given that YAEC has no SAFSTOR estimate for Yankee Rowe. In sum, the total estimated dose for DECON for the Yankee Rowe plant should be compared to the most recent available estimate for Yankee Rowe, which is contained in NUREG-0130.

21) Mr. Mellor asserts that YAEC correctly calculated internal exposures due to alpha-emitting radionuclides. Mellor III, par. 18.c. Mr. Mellor states that the dose is assigned "at the time of inhalation." Id. However, this assertion is unsupported because the Form 5's provided to intervenors do not designate the date of inhalation. Moreover, some of these Form 5's show the presence of transuranics, which cannot be detected by whole body counters. Mr. Mellor does not explain how YAEC assayed these radionuclides. I have made my best estimate for internal exposures by taking the half-way point in the period that's listed on Form 5 as the time of exposure. It appears that YAEC, in contrast, has inappropriately estimated the doses by arbitrarily electing to calculate back from the activity measured at the end of the period.

22) Mr. Mellor asserts that there was no assignment of a hot particle inhalation dose because there have been no inhalations of hot particles since the hot particle issue was identified in the mid-1980's. Mellor III, par. 18.d. I do not believe this is credible, and Mr. Mellor has provided no documentation to support his position. If there is damaged fuel at a reactor, then hot particles inevitably will be on that site. That is the case at Yankee Rowe.

23) In par. 19, Mr. Mellor asserts that YAEC is not scaling transportation doses to the size of the Yankee Rowe plant, but to the amount of waste it generates. This appears to me to be a distinction without a difference, and I would note that Mr. Mellor does not quantify the distinction he makes. The Yankee Rowe plant is smaller than the reference reactor analyzed in the GEIS, and therefore it has produced less waste. This is consistent with my own analysis.

24) Mr. Mellor argues that YAEC has collected sufficient soil contamination data to adequately project occupational exposures during the process of remediating the site to 15 millirems/year TEDE above background. Mellor III, par. 22a. - 22c. He also asserts that it has provided intervenors with summary reports of site characterization activities in 1994, 1995, and 1996, following submission of the Decommissioning Plan. But neither his affidavit nor any of the documents provided to intervenors provide any information on such crucial issues as how much soil must be removed, how many hours it will take to remove it, or how many shipments will be generated. Moreover, although YAEC has taken some soil samples, it is clear that YAEC does not have all the information it needs to make a full characterization of contamination on the site. For instance, as I previously discussed, some borehole readings increase with depth. Resnikoff Affidavit, par. 51. This indicates that the full extent of the contamination is unknown, and that further sampling must be done to determine its parameters.

25) Mr. Mellor also refers to "average" levels of contamination. Mellor III, pars. 22 a. and b. The average level of contamination of the site means very little when it comes to determining doses during cleanup, because it provides no information about localized areas of contamination, or how much soil must be cleaned up in those areas. Nor do I believe that Mr. Mellor's reliance on the GEIS estimate for soil cleanup doses is appropriate. Soil contamination is essentially a site-specific feature that depends greatly on the way a plant was managed during its operating life. At this stage, YAEC should be able to do more than rely on a generic estimate.

26) Mr. Mellor claims that YAEC provided intervenors with data for 1993 through 1995 on public exposures caused by routine effluent releases from the evaporator. Mellor III, par. 23. As I have previously stated, YAEC has not provided enough information to validate its conclusions, and it remains open to dispute.

This concludes my affidavit.

Marvin Resnikoff

Subscribed and sworn to this 17th day of September, 1996.

Notary public

DOUGLAS WINTER
Notary Public, State of New York
No. 31-4848910
Qualified in New York County
Commission Expires April 17, 1997