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NUCLEAR REGULATORY COMMISSION  
Before the  
ATOMIC SAFETY AND LICENSING BOARD

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Administrative Judges:  
Charles Bechhoefer, Chairman  
Dr. Thomas S. Elleman  
Thomas D. Murphy

In the Matter of

YANKEE ATOMIC ELECTRIC COMPANY  
(Yankee Nuclear Power Station)

License Termination Plan

Docket No. 50-029-LA

ASLBP No. 99-754-01-LA-R

Served: January 2, 1999

**NEW ENGLAND COALITION ON NUCLEAR POLLUTION'S CONTENTIONS**

Pursuant to Orders of United States Nuclear Regulatory Commission [NRC] (October 23, 1998), the Atomic Safety and Licensing Board [ASLB] (November 30, 1998), and NRC regulations governing intervention and the filing of contentions at 10 CFR Part 2, New England Coalition on Nuclear Pollution [NECNP] hereby submits contentions concerning Yankee Atomic Electric Company's [YAEC's] License Termination Plan [LTP] in the above captioned proceeding. Dr. Marvin Resnikoff, Senior Associate at Radioactive Waste Management Associates, assisted in the preparation of the Contentions and has reviewed them. *See Declaration of Dr. Marvin Resnikoff* at ¶3 (December 31, 1998), a copy of which accompanies the Contentions. Dr. Resnikoff states in his declaration that the technical facts presented in the contentions are

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true and correct to the best of his knowledge, and the conclusions drawn from those facts are based upon his best professional judgment. *Id.*

**Contention A. YAEC's LTP Does Not Adequately Characterize the Site.**

Contrary to the requirements of 10 CFR 50.82, the site characterization data and methodology YAEC employs in its LTP for the Yankee Nuclear Power Station, Rowe, Massachusetts [Yankee Rowe] is not adequate. In pertinent part, YAEC cannot demonstrate that the LTP will assure the level of protection of public health and safety which the NRC regulations mandate. 10 CFR 50.82(a)(9), (10), (11).

**Basis:**

NRC regulations require, in pertinent part, that YAEC's LTP include a site characterization, identification of remaining dismantlement activities, plans for site remediation, detailed plans for the final radiation survey, a description of the end use of the site, if restricted, an updated site-specific estimate of remaining decommissioning costs, and a supplement to the environmental report, pursuant to §51.53, describing any new information or significant environmental change associated with the licensee's proposed termination activities. 10 CFR 50.82(a)(9)(ii)(A)-(G). YAEC's LTP must also demonstrate that the remainder of decommissioning activities to be implemented under the plan "will be performed in accordance with NRC regulations, will not be inimical to the common defense and security or to the health and safety of the public, and will not

have a significant effect on the quality of the environment.” 10 CFR §50.82(a)(10).

Contrary to the requirements of §50.82, YAEC employs site characterization methodology and presents data in the LTP which are insufficient to demonstrate that the public health and safety will be protected, in the following respects:

1. YAEC has not detailed the distribution of radionuclides in off-site locations and has not surveyed off-site locations to the same precision as on-site locations;

2. YAEC cannot show that on-site locations have direct  $\gamma$  exposure rates  $\leq 5$  micro-Roentgens per hour ( $\mu\text{R/h}$ ) above background;

3. YAEC has not shown that direct  $\gamma$  exposure rates of 5  $\mu\text{R/h}$  above background are protective;

4. YAEC has not shown that direct  $\gamma$  exposure rates at 1 meter above ground are protective;

5. YAEC has not characterized the full extent of on-site subsurface contamination, and

6. YAEC has not detected all  $\alpha$ -emitters likely to be present at the Yankee Rowe site.

**Discussion of the above listed issues:**

1. **Background radiation**

In order to determine the contribution of YR nuclear reactor operations to the radioactivity remaining on-site, it is important that YAEC precisely determine the

background radiation levels. As YAEC must subtract background radiation from radiation readings at the site, the issue of the actual level of background radiation in western Massachusetts is significant. "Because the background levels will be subtracted from total radiation or radioactivity levels to determine the net residual activity from licensed operations, it is necessary that backgrounds be determined with a detection sensitivity and accuracy at least equivalent to data from which it will be subtracted."<sup>1</sup> Background at YR site has been much higher than the 67 mrem/year background at Williamstown, Massachusetts.<sup>2</sup> It is also higher than at other neighboring properties.<sup>3</sup> See Table 1, Appendix to Contentions at APP-1. YAEC maintains, without proof, that the high background at the site is due to bomb fallout, specifically cesium-137.<sup>4</sup>

NECNP contends that YAEC must compare site survey readings to the background radiation levels of neighboring properties in order to arrive at an accurate determination of background radiation. In addition, YAEC must identify all potential radionuclide contaminants at the site<sup>5</sup>, the relative ratios of these nuclides, and the general extent of contamination. With a ratio of radionuclides, YAEC can evaluate off-site readings and compare these to on-site readings. As YAEC readily admits, however, it has not yet

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<sup>1</sup> J.D. Berger, *Manual for Conducting Radiological Surveys in Support of License Termination*, NUREG/CR-5849 at 2.6. (June 1992).

<sup>2</sup> R.A. Mellor, YAEC, Response to informal request for information (August 15, 1996) at 1d.

<sup>3</sup> YAEC, "Annual Radiological Environmental Operating Report, January-December 1995," (April 1996) at Table 5.3.

<sup>4</sup> YAEC, LTP at 2-3.

<sup>5</sup> NUREG/CR-5849 at 2.7.

determined background levels.<sup>6</sup>

## **2. On-site direct gamma**

According to the LTP, YAEC has not yet conducted a complete survey of the YAEC site. Preliminarily, YAEC has taken 400 surface soil samples<sup>7</sup> and detected cesium-137, cobalt-60 and silver-108m. NECNP maintains that YAEC needs to conduct a complete survey of the entire site to determine the presence and location of higher than background radiation readings. YAEC has also conducted *in situ* gamma spec measurements using a collimated beam “to reduce on-site background radiation levels.”<sup>8</sup> While these surveys, using a high purity germanium detector, are useful for identifying local areas with higher than background  $\gamma$ -emitting radionuclides<sup>9</sup>, NECNP contends that direct gamma readings above background, with a non-shielded detector, are appropriate for determining the likely direct- $\gamma$  radiation exposures to future on-site residents. In any case, survey readings above background cannot be determined unless background is determined.

## **3. Direct $\gamma$ exposure rates of 5 $\mu$ R/h are not protective.**

Under the LTP’s Final Status Survey Plan [FSSP, located in the Appendix to the LTP]], YAEC proposes to locate areas with direct gamma readings greater than 5  $\mu$ R/h above natural background.<sup>10</sup> NECNP contends that this exposure rate is not protective of

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<sup>6</sup> YAEC, LTP at 2-4.

<sup>7</sup> *Id.*

<sup>8</sup> *Id.*

<sup>9</sup> A.M. Huffert, *et al.*, Background as a Residual Radioactivity Criterion for Decommissioning, NUREG-1501, Nuclear Regulatory Commission, August 1994.

<sup>10</sup> YAEC, LTP at A-7.

the public health and safety, and will not maintain the total effective dose equivalent (TEDE) to less than 15 mr/y.

In a "worst case" scenario, if an adult spent 100% of the time outdoors, the gamma dose alone would be approximately 37 mrem/year. Other pathways would also contribute. However, other, non-worst case, scenarios are also possible and credible. A child or care provider might spend nearly 100% time at the site (NUREG-1500 and 5512 scenarios assume an adult male is away 24.7% of the time<sup>11</sup>). The NRC staff (in NUREG 5512) assume an indoor shielding factor of 0.33.<sup>12</sup> A full-time resident, spending time indoors and outdoors, would receive a direct gamma dose of 17 mrem/year; other pathways would also contribute. Thus, for a full-time resident, the TEDE would exceed 15 mrem/year, under the YAEF survey methodology. A dose rate of 5  $\mu$ R/h greater than background is only protective under a residential scenario in which an adult male spends 55% of the time indoors, 20% outdoors and 1% gardening. This restricted scenario for direct exposure level, together with other pathways, will maintain TEDE below 15 mrem/year for a hypothetical adult male, according to NUREG-1500, using the DandD

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<sup>11</sup> Compare generally M.C. Daly, *et al*, U.S. NRC, "Working Draft Regulatory Guide on Release Criteria for Decommissioning," NUREG-1500 (August 1994) and W.E. Kennedy and D.L. Strenge, *Residual Radioactive Contamination from Decommissioning*, NUREG/CR-5512, vol. 1 at 6.36 (October 1992) with Eckerman, K.F., *et al*, "Health Risks from Low-Level Environmental Exposure to Radionuclides, Federal Guideline Report No. 13," EPA, 1998 [FRG #13], Appendix to Contentions at APP-3 and 4. Table 6.23, NUREG/CR-5512, shows 200 days indoors, 70.83 days outdoors, 4.17 days in the garden, out of a total 365.25 days in a year. The remaining time, 24.7%, is spent away. Regarding the biased use of an adult male standard, one has to compare the ingestion/inhalation rates for an adult male, which are those in NUREG/CR-5512, to those for a child which appear in FGR #13, to see how much greater will be a child's exposure (and that of many women, and, generally, all smaller individuals).

<sup>12</sup> W.E. Kennedy and D.L. Strenge, *Residual Radioactive Contamination from Decommission-*

software. Yet, a person, such as a child, stay-at-home parent, or home bound individual, would receive a direct gamma dose greater than 15 mr/y. These are likely and credible (not worst case) scenarios.

Failure to implement NRC radiation protection standards in a way that equally protects children, women, other small persons, home-bound persons, and persons who may be closer to the ground due to a handicapped condition (e.g., wheelchair bound individuals) is arbitrary, capricious, and a violation of the mandates of the Atomic Energy Act, 42 U.S.C. § 2011 *et seq.* (protecting health and safety of all members of the public), the Administrative Procedure Act, 5 U.S.C. § 501 *et. seq.* (barring federal agencies from taking actions which are arbitrary, capricious, abuse discretion, or not otherwise in accordance with law), and the Americans with Disabilities Act, 42 U.S.C. §12101 *et seq.* (barring discrimination against persons with disabilities). It also violates the provision of the United States Constitution, Amendment V, insofar as it has been interpreted as assuring that agencies of the federal government must apply laws (and regulations) to equally protect similarly situated persons. “[A] law nondiscriminatory on its face may be grossly discriminatory in operation.” *Griffin v. Illinois*, 351 U.S. 12, 17, n.11 (1956). Moreover, under the Constitution’s protections, people have protected fundamental rights to engage in family life and raising children. *See, e.g., Turner v. Safley*, 482, U.S. 78. 96 (1987), *Zablocki v. Redhail*, 434 U.S. 374 (1978), *Loving v. Virginia*, 388 U.S. 1 (1967). Just as the State may not interfere in the exercise of such fundamental rights, the federal



government may not do so either, nor may it protect only some persons' exercise of such right over other similarly situated persons. The NRC's utilization of an adult male tolerance standard for radiation exposure needlessly, arbitrarily, and irrationally exposes children, women, handicapped persons, and other persons to radiation exposures greater than permitted under 10 CFR Part 20, Subpart E. Congress cannot empower an agency of the federal government to deny citizens equal protection of the laws and regulations of the United States. U.S. Const., Amend V. Thus, the NRC cannot have discretion to interpret its regulations in a way that affects such a denial. *Id.* Moreover, such a denial is arbitrary, capricious, an abuse of such discretion, and otherwise repugnant to law. *Id.* (Amend. V also protects against such gross due process infringement as occurs with an equal protection violation).

**4. Direct  $\gamma$  exposure rates at 1 meter above ground will not protect children and other persons.**

The standard method of taking radiation surveys, at height of 1 meter above ground, will not protect children. If the dose is due to direct gamma radiation from contaminated land surfaces (groundshine), the direct gamma dose is higher for children than for an adult. That is, a direct gamma dose of 5  $\mu$ R/h at 1 m above ground provides a higher dose for children. This due to the fact that children (and women, and short persons, and many handicapped individuals) are smaller and closer to the radiation source than are adult males. "Limited calculations indicate that the dose to organs of the body

from external radiation increases with decreasing body size.”<sup>13</sup> This means that children and small adults will receive higher doses than adult males. If YAEC takes radiation measurements at a 1 m height, NECNP contends that YAEC needs to evaluate the likely radiation dose to a child and consider this information in determining release criteria for the site. NECNP realleges and incorporates by reference herein the legal points raised *supra* at A.3.

**5. On-site subsurface contamination not characterized.**

YAEC has not estimated the full extent of subsurface contamination on the site. Meter surveys over the site cannot determine the contamination depth. YAEC needs to take core samples, particularly near the Potentially Contaminated Area (PCA), a warehouse used for storage of low-level waste prior to shipment,<sup>14</sup> and the decon pad (which is located in the decon room).<sup>15</sup> The few preliminary borings YAEC has taken near the PCA warehouse show concentrations of cobalt-60 and cesium-137 increasing with depth. *See* Table 2, Appendix to Contentions at APP-2. This means that YAEC has never determined the full extent of soil contamination on the site, and, therefore, cannot accurately determine the full costs for remediating the site. NECNP contends that the YAEC site characterization must determine the full extent of subsurface contamination for the following reasons: i) The computer model DandD, employed in NUREG-1500,

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<sup>13</sup> K.F. Eckerman, *et al*, “Health Risks from Low-Level Environmental Exposure to Radionuclides, Federal Guideline Report No. 13,” (EPA 1998) at 88; *see also* chart from this report, Appendix to Contentions at APP-3 and 4 (“Age- and gender- specific usage rates of environmental media, for selected ages”).

<sup>14</sup> YAEC, Yankee Rowe Final Safety Analysis Report at 252-1.

requires as input a total radioactive inventory in order to determine the full extent of ground water contamination; ii) The guidance values YAEC is employing assume no residual radioactivity below 15 cm in soil;<sup>16</sup> NUREG-1500 cautions: "Licensees using these tables should verify that the assumptions of the scenarios are appropriate to the site, including no residual radioactivity below 15 cm in soil."

**6. YAEC has not detected all  $\alpha$ -emitters likely to be present at Yankee Rowe.**

YAEC has not detected all  $\alpha$ -emitters likely to be present at the Yankee Rowe site. In order to maintain the total effective dose equivalents (TEDE) less than 15 mr/y, all radioactive materials, including  $\alpha$ -emitters, must be determined. When ingested or inhaled,  $\alpha$ -emitters contribute to the TEDE. YAEC is not surveying for  $\alpha$ -emitters, such as plutonium isotopes and americium-241. NECNP contends that YAEC should take soil samples and specifically, measure for gross  $\alpha$ . Further, YAEC should conduct an  $\alpha$ -spec for all  $\alpha$ -emitters on soil samples YAEC takes from over the entire 2000-acre site. A study has revealed that  $\alpha$ -emitters, such as plutonium-241, have been detected in Yankee Rowe piping<sup>17</sup> and are, therefore, likely to be present elsewhere on the site.

**Additional bases:**

**7. YAEC's designation of affected versus non-affected areas of the site is arbitrary.**

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<sup>15</sup> LTP, Fig. 2-3.

<sup>16</sup> NUREG-1500 at 17.

<sup>17</sup> A. Mancini and R. Applebaum, "Decontamination of Large Components - Test Case," paper presented at ANS Winter Meeting, Washington, D.C. (November 10-14, 1996).

Since the number of soil samples and the survey intensity is much lower in non-affected areas of the site (as few as 30 soil samples and 10% scans), major areas of the site may be contaminated above regulatory limits,<sup>18</sup> and YAEC would not detect this condition. Thus, YAEC cannot, therefore, provide the requisite assurance that the health and safety of the public will be protected.

According to U.S. Nuclear Regulatory Commission, Region I, Combined Inspection Reports 50-29/98-01 and 50-29/98-02, conducted January 1, 1998-March 31, 1998 (June 24, 1998), YAEC reclassified an area from affected to non-affected. YAEC never supported the basis for this reclassification, and it appears to be arbitrary. According to the Inspection Report:

The Northeast Buffers Zone was initially classified as unaffected based on no documented use of radioactive materials in this area and that it was not used for site operations or decontamination activities. However, because the characterization data were limited and based on one sample (of nine) exhibiting Co-60 contamination at levels greater than 25% of guideline, the decision was made on 3/5/97 to reclassify the area as affected. Four months later, this decision was reversed with the reasoning being that the threshold for classification as affected is an individual sample exceeding 75% of guideline. Since this threshold was not met, the survey area was again reclassified as unaffected.

*Id.* at 9. This arbitrary flip-flop of classification indicates that YAEC's sampling is either inadequate, not based on consistent methodology, or both.

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<sup>18</sup> That is to say, the TEDE, calculated as whole body dose plus ingested and inhaled committed doses, may be greater than 15 mrem/year.

**8. YAEC has averaged out high soil concentrations of radiation.**

Rather than investigating the cause of high soil concentrations, YAEC takes the occurrence as reason to take more samples until the average of all samples is below guideline values. "When a reading exceeds the Guideline Value, especially for an unaffected area, the licensee should investigate to determine the cause of the instrument reading rather than simply take additional measurements and average the value over a one-meter area." U.S. Nuclear Regulatory Commission, Region I, Inspection Report 50-29/98-03, conducted June 1-July 31, 1998, at 4 (Oct. 1, 1998). YAEC's philosophy is not consistent with the guidance in NUREG/CR-5949, which specifies that averaging or systematic samples are collected after soil samples have been collected and analyzed from locations identified by scans. The survey methodology, with which YAEC's method is inconsistent, is shown in Fig. 4-4, NUREG/CR-5949.

**9. YAEC's scan surveys are consistently biased toward low readings.**

Side-by-side comparisons between YAEC's energy compensated Geiger Mueller [GM] detector with Oak Ridge's much more precise Pressurized Ionization Chamber [PIC] showed a low bias by 10% to 20%. NRC Inspection Report 50-29/98-03 at A2-8. YAEC employed a conversion factor to correct GM rates. *Id.* Neither YAEC nor NRC inspectors have identified the basis for this discrepancy in measurements. *Id.*

**10. YAEC has not evaluated scanning sensitivity for field survey instruments.**

Following NUREG/CR-5849, the minimum detectable concentration for survey instruments should be determined. NRC Inspection Report 50-29/98-03 at A2-4.

According to the NRC, YAEC has not yet done so. *Id.* at A2-5. YAEC has conducted a site survey using a sodium iodide detector. *Id.* YAEC has, likewise, not determined the sensitivity of this instrument. *Id.* at A2-4.

**Contention B. YAEC's LTP Contains Unreviewed Safety Questions**

Contrary to the requirements of 10 CFR 50.59 and 50.82, YAEC has not carried out safety evaluations for unreviewed safety questions involved in the remaining dismantlement activities.

**Basis:**

According to NRC regulations, the LTP must include, in pertinent part, "identification of remaining dismantlement activities." 10 CFR §50.82(a)(9)(ii). The NRC can only approve the LTP if it demonstrates that "the remainder of decommissioning activities...will not be inimical to the common defense and security or to the health and safety of the public." 10 CFR §50.82(a)(10). For the reasons stated below, NECNP contends that YAEC has not made the necessary showing and, hence, the Commission cannot approve the remaining dismantlement activities. Further, the remaining dismantlement activities involve unreviewed safety questions that YAEC must evaluate pursuant to 10 CFR §§50.59, 50.82 and/or Part 72.

According to YAEC's LTP, the remaining activities include removal of all spent fuel and GTCC waste from the spent fuel pool and dismantlement of the SFP and its

supporting systems.<sup>19</sup> One storage alternative which YAEC poses in the LTP is the storage of spent fuel in an on-site dry cask storage facility.<sup>20</sup> The location of the ISFSI is not specified in the LTP. Following removal of spent fuel, the ISFSI will be decommissioned. Following clean-up and a final status survey, the site will be returned to a “green field” condition. If Yankee Rowe is considered an “operating” reactor, under the Part 50 license, unreviewed safety questions must be considered under §50.59. If Yankee Rowe is considered a “decommissioned” reactor, irradiated fuel safety issues must be considered under 50.82 or Part 72.

YAEC must consider the following unreviewed safety issues:

- 1) Heavy objects falling into the spent fuel pool;
- 2) A tornado strike damaging the spent fuel pool;
- 3) Sabotage of the spent fuel pool;
- 4) Down-sizing of qualified nuclear personnel.

**Discussion of above listed bases:**

1) YAEC has not evaluated the safety of moving very heavy objects near the fuel pool. Under the Final Safety Analysis Report (FSAR), Technical Specification 3.2 lists the maximum cask weight that can be moved into the fuel pool as 75 tons.<sup>21</sup> But proposed transportation casks, or inner canisters and transfer casks, can exceed 125 tons.

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<sup>19</sup> YAEC, LTP at 3-1.

<sup>20</sup> *Id.* at 3-4.

<sup>21</sup> YAEC, FSAR at 100-3 (amended in 1998 to a 75 ton rating).

Thus, movement of irradiated fuel [IF] from the storage pool into the NAC-MPC cask is not bounded by the present analysis.

NECNP contends that this is an unreviewed safety question that necessitates a revision to the present FSAR. As the quotation below confirms, YAEC is in apparent agreement, yet the analysis has not yet been carried out. According to YAEC:

Movement of fuel from the Spent Fuel Pit to either an on-site or off-site fuel storage facility is not bounded by this analysis. A separate safety analysis is needed to ensure that there are no unacceptable consequences during movement from the Spent Fuel Pit. This analysis must also include any interactions between fuel movement and decommissioning activities. The analysis will be completed before movement of fuel out of the Spent Fuel Pit.<sup>22</sup>

Issues that must be considered include, but are not limited to, the crane capacity. Accident scenarios should include a 125-ton cask drop directly into the fuel pool, as well as an indirect drop into the fuel pool, where the cask first strikes the edge of the pool.

2) With removal of surrounding structures, the IF pool becomes vulnerable to a strike by a tornado-generated missile or sabotage. NECNP contends that the fuel pool structure must be fortified by either a concrete structure or earth-mounded berm to withstand a tornado-generated missile or anti-tank missile. This scenario becomes a greater danger as YAEC continues to downsize qualified security and other personnel. The IF pool building is a mere butler shell, that is, a steel-braced frame and metal sheeting.<sup>23</sup> The structure is easily penetrated by a tornado-generated missile, either a car or a solid metal cylinder.

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<sup>22</sup> *Id.* at 408-1.



3) With removal of surrounding structures, the IF pool becomes vulnerable to a car rolling down the hill into the IF pool building, either accidentally or as a malevolent act. The IF pool building and the proposed ISFSI are also subject to attack with an anti-tank penetrator, such as a MILAN or TOW2 missile. NECNP contends that either the IF pool building or the ISFSI must be protected by an earth-mounded berm. The TOW2 anti-tank missile can penetrate greater than 27 inches of armor and has an effective range of 3.75 km; the MILAN anti-tank missile can penetrate more than 39 inches of armor and has an effective range up to 2 km.<sup>24</sup> Each cask holds a large radioactive inventory that could be dispersed into the Deerfield River by a sabotage event.

NECNP contends that, in addition to sabotage by anti-tank missiles, the IF pool must be protected from rolling vehicles. While utilities running nuclear reactors under 10 CFR Part 50 must protect such operating reactors from moving vehicles that might contain explosives, it is not clear the same protections extend to decommissioned reactors. NECNP contends that such requirements should apply to decommissioned reactors. NECNP also contends that the roads leading to the plant should be altered so that it is physically impossible for a moving vehicle to approach the IF pool building (and any ISFSI constructed on site).

4) YAEC's LTP should discuss the potential health and safety effects of downsizing qualified nuclear personnel. As fewer and fewer fully qualified persons are

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<sup>23</sup> *Id.* at 246-1

<sup>24</sup> R. Halstead, and R. Ballard, "Nuclear Waste Transportation Security and Safety Issues; The Risk of Terrorism and Sabotage Against Repository Shipments," Nevada Agency for Nuclear

employed in the process of achieving license termination and final site survey, YAEC takes a greater and greater risk that there will not be adequately experienced and qualified persons on hand to respond immediately to an accident, leak, or spill. Such absent persons would be experienced in , *e.g.*, security, emergency response to nuclear accident situations, and radiation protection issues unique to emergency response to radiation-type accidents.

**An additional point:**

NECNP contends that the Panel should make a specific finding about when NECNP (and/or any other interested persons) will be permitted to address the issue of the YAEC's LTP proposed use of dry storage: (a) as an unreviewed safety issue for an operating reactor under 10 CFR §50.59; (b) as a safety issue for a decommissioned reactor under 10 CFR §50.82; (c) as a safety issue for a dry storage facility under Part 72; or (d) in whatever way it may be addressed. If the Hearing Panel chooses to either not address the issue or believes that it has been excluded from the proceeding by Commission order, NECNP requests that the matter be submitted to the Commission in the context raised herein for a complete clarification of the status of such issues. YAEC's Environmental Report and LTP do not address any of NECNP's concerns or issues concerning creation, maintenance, monitoring, preparedness, and security provisions for an independent dry storage facility.

NECNP contends that, by permitting Part 50 licensees to undertake dry storage

after a shut-down facility has gone through the preliminary stages of decommissioning, particularly under the recent Part 50 decommissioning amendments which eliminated the need for prior approval of a complete decommissioning plan and requisite EA and/or EIS of the plan, the NRC has impermissibly segmented a major federal action without providing for the environmental considerations mandated by the National Environmental Policy Act, 42 U.S.C. § 4321, *et. seq.* [NEPA] until very, very long after the project is a foregone conclusion. *See CAN v. NRC*, 59 F.3d 284 (1<sup>st</sup> Cir. 1995) (failure to conduct an EA and/or EIS prior to approval of decommissioning plan violates NEPA). The NRC's application of its regulations to permit a licensee such as YAEC to construct an Independent Fuel Storage Facility under a Part 50 license without the environmental considerations mandated under 10 CFR Part 72 license amounts to impermissible segmentation under NEPA. Under the NRC current application of its regulations to licensees such as YAEC in this matter, NEPA mandated environmental considerations, as well as Atomic Energy Act mandated hearings, will be deferred for many years until the licensee is ready to relinquish its Part 50 license. Only at that point in time would the licensee need to convert to a Part 72 license, triggering the hearing opportunities and environmental consideration available under that licensing application process. In this way, the NRC current application of its regulations under Part 50 violates NEPA and the Atomic Energy Act, 42 U.S.C. § 2239

Hence, if this Hearing Panel does not see fit to take these issues up at this time, it is appropriate to submit them directly to the Commission for clarification pursuant to 10

CFR 2.714(e).

**Contention C. YAEC's Site Remediation Plans are Inadequate.**

Contrary to the requirement of 10 CFR 50.82(a)(9)(ii), YAEC's site remediation plans are based upon inadequate data and will not protect public health and safety.

**Basis:**

Except for a few specific, isolated locations, YAEC only plans to conduct surface soil sampling to a depth of 15 cm. This practice is consistent with YAEC's understanding of the depth of soil contamination: "Results of surface sampling to-date indicate that most contamination is limited to approximately the top 150 mm of soil."<sup>25</sup> Such a shallow approach quickly becomes a self-fulfilling prophecy. As YAEC will not be testing below 15 cm during site characterization, it will find no contamination below 15 cm. The same holds true for the final status survey: YAEC does not plan to survey soil below 15 cm.<sup>26</sup> Thus, the LTP and the Final Site Survey Plan leave open the possibility of areas of the site contaminated below the 15 cm depth. Below ground contamination could thereby lead to contaminated ground water under the site, contaminated earth brought to the surface during excavations for completion of decommissioning activities, ISFSI construction, or during some future site construction. In order to properly estimate potential ground water contamination, the DandD<sup>27</sup> computer program model YAEC uses to determine Guideline Values for specific

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<sup>25</sup> YAEC, LTP at 2-4.

<sup>26</sup> YAEC, LTP Final Site Survey Plan at A-26.

<sup>27</sup> DandD, Interim Release 1.0 (July 1996).

radionuclides requires a complete inventory of the site. YAEC uses NUREG 1500 and the DandD computer program. Both rely upon a model which specifically assumes that the licensee has ascertained that no contamination is present below 15 cm. In fact, NUREG 1500 warns that, "Licensees using these tables should verify that the assumptions of the scenarios are appropriate to the site, including no residual radioactivity below 15 cm in soil..."<sup>28</sup>

As seen in Table 2, Appendix to Contentions at APP-2, the preliminary borings YAEC took several years ago near the PCA Warehouse and the S Decon Pad are far above Guideline Values for cobalt-60 and cesium-137. More troubling yet, the cesium and cobalt concentrations appear to be increasing with depth in boring at SF-3A. This means that YAEC has not determined the full volume extent of radioactive contamination on the site. NECNP contends that NRC regulations require that YAEC *fully* characterize the site. This means that YAEC cannot be allowed to rely upon what it has done--i.e., not rely on just a few samples near these two structures and the fuel pool--but must ascertain the full extent of contamination underneath all distinct locations that have any surface contamination concentrations above Guideline Values. Significantly, in order to make a complete characterization of the site, YAEC must take core borings to a depth where soil concentrations are no greater than background at each and every location that has surface contamination concentrations above Guideline Values.

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<sup>28</sup> NUREG-1500 at 17.

**Contention D. Inadequacy of YAEC's Plans for Final Site Survey.**

1) Contrary to the requirements of 10 CFR 50.82(a)(9)(ii) and 50.82(a)(3), YAEC cannot specify when irradiated fuel [IF], all structures, and contamination will be removed from the site, and when a final site survey will be conducted. Until these details are finalized, the NRC cannot approve the LTP or the Final Site Survey Plan.

2) Contrary to the requirements of 10 CFR 50.82(a)(3) and (a)(9)(ii), YAEC has not specified the type of IF storage casks it proposes to use, whether these casks have been licensed, and how the IF will be moved from these storage casks to the proposed high-level waste repository. Until YAEC finalizes these details, the NRC cannot approve the plan.

**Basis:**

1) According to the LTP, the license termination phase will take place after someone has removed all IF and GTCC waste from the site, either from the fuel pool or from an on-site dry storage facility. The date YAEC has chosen for planning purposes is the year 2018.<sup>29</sup> NECNP contends that YAEC's chosen date for removing all irradiated fuel and shipping to a federal repository is not credible.

Various actors in the high level waste removal process have suggested different dates for opening the repository. Because of federal cutbacks, DOE now says it will not have an operational high-level waste repository until the year 2015.<sup>30</sup> The GAO stated

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<sup>29</sup> YAEC, LTP at 6-2.

<sup>30</sup> Hazel O'Leary, Statement before the Committee on Energy and Natural Resources, U.S. Senate, December 14, 1995.

that a high-level waste repository might not be available until the year 2023.<sup>31</sup> It is also possible that the proposed Yucca Mountain, Nevada, repository will not be licensed, setting off a nationwide search for an alternative. Assuming the earliest date, i.e., 2010, the fact remains that YAEC cannot ship more than 225 out of 533 total IF assemblies (or approximately only 40% of the Yankee Rowe inventory) to the proposed repository during the first decade of operation.<sup>32</sup> The Department of Energy (DOE) has a queuing system, that is, a prioritization schedule for irradiated fuel acceptance. The schedule for the second decade of repository operation has not yet been established. Every nuclear utility wishes to ship irradiated fuel as soon as possible. In terms of priority of shipments, YAEC is in competition with all the other nuclear utilities and the DOE itself. NECNP contends that it is likely that it will be 2050 (i.e., within the full forty years of repository operation) before all IF and GTCC waste is removed from the Yankee Rowe site. Thus, for planning purposes, YAEC's LTP must assume (and adequately plan for security, maintenance, monitoring, and financing) two additional cases: (i) removal of all IF and GTCC waste by the year 2050; and (ii) indefinite, very long-term storage at Yankee Rowe.

The NRC regulations require that decommissioning be completed "within 60 years of permanent cessation of operations." 10 CFR §50.82(a)(3). YAEC's LTP has not shown that decommissioning--removal of all structures and return to a "green field"

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<sup>31</sup> Statement of Jim Wells in, "Yucca Mountain Project Management and Funding Issues," GAO/T-RCED-93-58.

<sup>32</sup> U.S. Department of Energy, "Acceptance Priority Ranking and Annual Capacity Report,"

condition--will be completed before the year 2052. Therefore, the NRC cannot approve the LTP.

2) YAEC's plans in this regard are so vague as to be non-existent. The intended transport/storage cask, the NAC-MPC, has not yet been licensed. Hence, the LTP rests upon an immense void. Use of the NAC-MPC will be a daunting venture. The NAC-MPC is heavy, weighing more than 125 tons fully-loaded as a transport cask. At present, the NRC has approved Spent Fuel Pool crane capacity at only 75 tons. YAEC has not shown that its crane has the requisite strength to handle the casks. Moreover, YAEC has not shown that the heavy-haul trailer (needed to transport a cask on local roads to the nearest railhead) can actually maneuver local roads because of the large turning radius. This is a serious consideration given the narrow dirt roads and narrow paved roads in and about Yankee Rowe. For example, to move a cask similar to the NAC-MPC, the HI-STAR 100, Holtec plans to employ a trailer 150' long, with ten axles, and a weight greater than 225 tons, including the trailer, tie-downs, and the cask itself<sup>33</sup>. Furthermore, YAEC has not shown that the NAC-MPC cask will be acceptable to the DOE at the proposed repository. Thus, in this regard, YAEC has filed an incomplete application, and further consideration of the LTP should be tabled until YAEC submits finalized plans.

#### **Contention E. Inadequacy of YAEC's Site Remediation Plans**

Contrary to NRC requirements, YAEC has not shown that the LTP is adequate and

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OCRWM (March 1995).

<sup>33</sup> Letter from Edward Boon, Aspen Trailer Company, to Wayne Lewis, Stone & Webster Engineering Corporation (March 25, 1997), in Appendix to Contentions at APP-5 and 6.



will protect the health and safety of the public in that: (1) the Guideline Values are not protective of full-time residents or children, and (2) the soil concentration release criteria are not supported by YAEAC's analysis and are, in any case, too high. 10 CFR §§50.82(a)(9)(ii) and (a)(10).

**Basis:**

1. **YAEAC's LTP is designed only to maintain doses to an adult male below 15 mrem per year; doses to children will likely be higher.**

Based on the DandD computer model<sup>34</sup> and a specific future residential scenario, NRC staff has determined the allowable soil concentrations or Guideline Values. The scenario takes into account all radiation pathways to an adult male, including inhalation of radioactive particulates, and plant, water and incidental soil ingestion. The results are listed in Table B-2, NUREG-1500, which YAEAC adopted in the LTP.<sup>35</sup> The model, thus, assumes a certain inhalation rate and food, soil and water ingestion rate, then converts radionuclide intakes into radiation exposures (using dose conversion factors), all for an adult male only. Depending on the age of a child, proper calculations require reducing the inhalation and ingestion rates (but, increase the amount of milk consumption and incidental soil ingestion), and increasing the dose conversion factors, reflecting organ size, age and other parameters. The net effect is an increase in a child's exposure. A spreadsheet calculation that illustrates the point, taking as an

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<sup>34</sup> Dr. Marvin Resnikoff, Senior Associate, Radioactive Waste Management Associates, NECNP's expert in preparing and reviewing these contentions and related materials, has both the DandD and RESRAD5.782 computer programs. He did not run them as part of his analysis of the LTP. Dr. Resnikoff reviewed YAEAC's input and modeling assumptions. He assumed that they were correctly translated into the computer models, and correctly run for the intended scenarios.

<sup>35</sup> YAEAC, LTP at Table 2-1.

example inhalation of iodine-131, is attached hereto as Table 3, Appendix to Contentions at APP-2. As can be seen from the table, for the same I-131 air concentration, the effective dose equivalent to a 1-year old child can be more than twice as great as that of an adult male. A similar result holds for other radionuclides and other radiation pathways. Thus, to maintain doses to children below 15 mrem/year, the soil concentrations remaining at the site (hence, the Guideline Values) will have to be reduced more than the projections in NUREG-1500 which YAEC adopted for the LTP. The exact amount should be developed in the course of the hearing process.

It is important to note that NECNP's contention in this instance does not challenge the NRC's existing 10 CFR Part 20 regulations. Rather, NECNP challenges the way that the NRC is applying (and YAEC proposes to interpret) the existing regulations in this matter. NECNP contends that YAEC's Guideline Values, which maintain adult male doses less than 15 mrem/year, will lead to child doses that exceed regulatory requirements. Moreover, in this regard, the assumption that a child resides at the former Yankee Rowe site 24 hours a day is a credible scenario under general release of the site for unrestricted use.<sup>36</sup>

The basic issue here is that the NRC staff have employed dose conversion factors from ICRP-30, while the ICRP has adopted new dose conversion factors, ICRP-60, that take into account a receptor's age and have an improved lung model. The NRC staff, behind the curve as usual, have not yet come to terms with these new dose conversion factors, though the Federal Register notice promulgating the new radiological criteria for license termination does

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<sup>36</sup> NUREG/CR-5512, vol. 1 at Section 6.7.4.

make mention of ICRP-60. In fact, both the initial and final rulemaking for 10 CFR Part 20 mention ICRP-60 when discussing the appropriate choice of exposure “scenario” for the average member of the most exposed population. Plainly, NRC staff has read ICRP-60. Current NRC Part 20 regs are based upon it. The NRC Staff just don’t want to apply it. The ICRP-60 standards have been adopted by regulatory bodies in numerous countries around the world and represent the best scientific judgment on the effective dose due to radionuclide intake. They have been so adopted for good reason. They provide protection standards geared to the most exposed population (without a “worst case scenario”): children, women, shorter persons, and wheelchair bound persons. Moreover, the rulemaking documents underlying the current Part 20 regulations appear to require that licensees (and, one would think, NRC staff) take ICRP-60 into account in choosing an appropriate scenario for a conservative level of radiation exposure to the average member of the “most exposed” group.

Thus, in this regard, the NRC Staff’s has failed to implement NRC radiation protection standards in a way that equally protects children, women, and other persons. NECNP realleges and incorporates herein the legal points raised *supra* at A.3.

**2. YAEC’s Guideline Values are not supported and, in any case, are too high:**

(a) Under the residential scenario, specific soil guideline values are set for specific radionuclides. Specifically, cobalt-60 (2.97 pCi/g) and cesium-137 (10.7 pCi/g) (Table B-2, NUREG-1500). YAEC adopts these values for the LTP<sup>37</sup>. YAEC also adopts therein a

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<sup>37</sup> YAEC, LTP at Table 2-1.

guideline for silver-108m (3.78 pCi/g).<sup>38</sup> YAEC's basis for adopting the soil guidance value for silver-108m does not appear in the LTP. Moreover, YAEC has adopted a guideline value for silver-108m that is not listed in Table B-2, NUREG-1500. In the LTP, YAEC states that the computer model RESRAD will be used if specific radionuclides are not listed in NUREG-1500.<sup>39</sup> But, silver-108m is not one of the radionuclides considered by RESRAD either.<sup>40</sup> Therefore, there is no basis for YAEC's adopting its LTP Guideline Value for silver-108m.

(b) Each radionuclide standing alone would provide a TEDE of 15 mrem/year. YAEC assumes that each radionuclide is present in isolation, not as a mixture. With a mix of radionuclides, one has to take the sum of the ratios, which must be less than one. For example, considering a single radionuclide, the ratio of cobalt-60 (actually present in surface soil) to the soil guideline must be less than one. Considering a mixture of radionuclides, however, the ratios calculated for each individual radionuclide present in the mixture must then be added together, and the sum must be less than one. Hence, with a mixture, the allowable soil concentrations will be less than the values YAEC cites.

#### **Contention F. Inadequacy and Insufficiency of YAEC's LTP ALARA Analysis.**

Contrary to NRC regulations, the YAEC LTP does not show that the "residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA)." 10 CFR 20.1402.

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<sup>38</sup> *Id.*

<sup>39</sup> YAEC, LTP at Table 2-3.

<sup>40</sup> Radioactive Waste Management Associates uses RESRAD program version 5.782. This is a

**Basis:**

YAEC conducts a mini cost-benefit analysis in Section 4.4 of the LTP. Therein, YAEC attempts to prove that removal of contaminated soil to obtain TEDE doses below 15 mrem/year is not cost effective. NECNP contends that the analysis is entirely *ad hoc* and flawed.

YAEC attempts to show that the dollar cost of remediation (cost per rem reduced) is high compared to the NRC calculation of the limits to licensee expenditures to achieve health effects. YAEC estimates the cost of removing 100 m<sup>2</sup> of soil to a depth of 15 cm is \$61,400 for a benefit of 0.2 rem saved. The NRC quantifies health effects spending at \$2,000 per rem.<sup>41</sup> NECNP contends that YAEC's analysis artificially inflates the cost of soil removal while artificially deflating resultant health effects savings. In particular, YAEC inflates the clean-up costs by assuming that contaminated soil would be buried in Barnwell at a cost of \$3,030 per cubic meter. The cost of such disposal would be lower by a factor of 30 if YAEC's calculations were based upon using the Envirocare facility in Utah. Thus, the dollar cost for soil clean-up YAEC cites in the LTP is much too high, skewing the cost-benefit equation.

At the same time, YAEC's calculation of the savings, in terms of reduced ill-health effects, is artificially deflated through an assumption that the effective half-life of

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more recent version than the one YAEC uses.

<sup>41</sup> In 1995, the Commission adopted a conversion factor of \$2000 as the monetary value of the health consequences associated with radiological exposure. NUREG/BR-0058, *Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission* at 22 (November 1995). See also NUREG-1530, *Reassessment of NRC's Dollar Per Person-Rem Conversion Factor Policy*

contaminants is 26 years and taking into consideration only a single half-life. NECNP contends that YAEC should have taken 10 half-lives as the time for radioactivity to be reduced to *de minimus* levels. Further, YAEC does not account for all of the radionuclides that may be present at Yankee Rowe. For example, YAEC should have also considered Silver-108m, Cesium-134 and  $\alpha$ -emitters. Finally, YAEC assumes only  $\frac{1}{2}$  person would be affected by remedial soil removal, when in fact it is credible that an entire family grouping could be exposed to radiation.

Underlying these ALARA considerations is the fact that YAEC has not established an ALARA protocol or methodology for decommissioning and site clean-up. Thus, YAEC is developing an "ad hoc" approach rather than "going by the book." *See also*, in this regard, Contention H and basis H.5, *infra*.

#### **Contention G. Inadequacy of YAEC's Remaining Decommissioning Cost Estimate.**

Contrary to NRC regulations, YAEC's LTP underestimates the full cost of irradiated fuel [IF] management and license termination, resulting in an inadequate estimation of remaining decommissioning costs as required under 10 CFR 50.82(a)(9)(ii).

#### **Basis:**

According to NRC regulations, YAEC must provide "an updated site-specific estimate of remaining decommissioning costs." 10 CFR §50.82(a)(9)(ii). NECNP

contends that these costs are underestimated due to YAEC's assumption of an unrealistically optimistic date for IF removal from the site, and the fact that the YAEC has not determined the full extent of subsurface contamination.

First, YEAC has underestimated the time required to remove all IF from the site. YAEC has also, therefore, underestimated the full cost of irradiated fuel management and license termination. As discussed under Contention E, a large number of utilities wish to send their IF to a permanent repository as soon as one is available. The Department of Energy has established a queuing schedule for the first ten years, during which approximately 40% of the fuel inventory at Yankee Rowe would be removed. The DOE has not issued the remaining repository fuel acceptance. NECNP contends that it is likely that IF will be shipped to the repository over the full 40 years of repository operation, or by the year 2050. It is also possible that IF will remain at the Yankee Rowe site indefinitely. YAEC needs to plan for this contingency. YAEC needs to set aside sufficient funds for irradiated fuel management, monitoring, security, and final decommissioning of the site after the fuel has been removed. Such financial planning YAEC has neither engaged in nor demonstrated to the NRC. Without it, YAEC cannot possibly determine the full decommissioning cost as required under 10 CFR § 50.82.

Second, YAEC has not estimated the full extent of subsurface contamination on the site. Meter surveys over the site cannot determine the contamination depth. NECNP contends that YAEC needs to take core samples, particularly near the PCA warehouse and the decon pad. YAEC's preliminary borings near the PCA warehouse showed

increasing concentrations of cobalt-60 and cesium-137 with depth. There is high subsurface contamination near the IX pit and reactor buildings. *See* Table 2, Appendix to Contentions at APP-2. Without knowing the full extent of site contamination, YAEAC cannot determine the full decommissioning cost as required under 10 CFR § 50.82.

Thus, the LTP fails to provide an adequate estimate of the remaining cost of decommissioning and it cannot be approved as submitted.

**Contention H. Inadequacy of YAEAC's Final Status Survey Plan**

Under existing NRC regulations, YAEAC's plans for the final status survey are inadequate and will not protect the health and safety of the public. 10 CFR 50.82 (a)(9)(ii) and (a)(10)

**Basis:**

According to NRC regulations, the LTP must include, in pertinent part, "detailed plans for the final radiation survey." 10 CFR §50.82(a)(9)(ii). Before the NRC may approve the plan, the final status survey must demonstrate that remaining contamination on the site must not be inimical to the health and safety of the public. *Id.* at § 50.82(a)(9) and (a)(10). NECNP contends that YAEAC has not made the requisite showing and, therefore, the NRC cannot approve the plan.

NECNP contends that YAEAC's proposed final status survey is inadequate for the following reasons:

1. YAEAC's proposed final status survey would not determine the full extent of



on-site subsurface contamination,

2. YAEC will not have surveyed all  $\alpha$ -emitters likely to be present at the Yankee Rowe site,
3. YAEC's methodology for determining Guideline Values is vague and in any case, leads to Guideline Values that are too high,
4. The resultant TEDE exposures will be much greater than 15 mr/y, and
5. The ALARA analysis is completely *ad hoc* and vague.

**Discussion of points listed above**

**1. On-site subsurface contamination not surveyed.**

YAEC will not survey for the full extent of on-site subsurface contamination under the proposed final status survey plan in the LTP. YAEC cannot be permitted to rely upon meter surveys over the site to determine the contamination depth. YAEC needs to take core samples, particularly near the PCA warehouse and the decon pad. YAEC's preliminary boring samples near the PCA warehouse show increasing concentrations of cobalt-60 and cesium-137 with increasing depth. See Table 2, Appendix to Contentions at APP-2. YAEC has never determined the full extent of soil contamination on the site. Under the LTP, YAEC intends to "follow up" its inadequate characterization of the site with final status survey plan soil samples. These, however, will only go to a depth of 15

cm<sup>42</sup>). NECNP contends that, in order to comply with NRC regulations, YAEC's final site survey must determine the full extent of subsurface contamination. There are at least two reasons for this requirement: i.) In order to determine the full extent of ground water contamination using the computer model DandD (which the NRC uses in NUREG-1500), the program must have, as input, a total radioactive inventory; ii.) YAEC cannot use the Guideline Values in NUREG-1500 unless it definitively shows no residual radioactivity below 15 cm in soil.<sup>43</sup> Plainly, the final status survey YAEC has proposed in the LTP fails to take into account these two crucial points.

**2. YAEC must survey all  $\alpha$ -emitters likely to be present at Yankee Rowe site.**

The final status survey plan YAEC proposes in the LTP does not include a survey for the full extent of  $\alpha$ -emitters present on the Yankee Rowe site. In order to maintain the total effective dose equivalents (TEDE) less than 15 mr/y, YAEC must determine the concentrations of all radioactive materials on the site. That determination must include all  $\alpha$ -emitters. Significantly,  $\alpha$ -emitters contribute to the TEDE when either ingested or inhaled. According to YAEC's LTP and final site survey plan, YAEC does not plan to survey for  $\alpha$ -emitters, such as plutonium isotopes and americium-241. NECNP contends that YAEC must take soil samples and specifically measure for gross  $\alpha$ . Further, YAEC should carry out an  $\alpha$ -spec for all  $\alpha$ -emitters on soil samples it takes over the entire

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<sup>42</sup> YAEC, Final Status Survey Plan [FSSP] at A-29 (December 1997).

<sup>43</sup> NUREG-1500 at 17. NUREG-1500 cautions, "Licensees using these tables should verify that the assumptions of the scenarios are appropriate to the site, including no residual radioactivity

2000-acre site. In this regard, it is important to recall that researchers have reported detecting  $\alpha$ -emitters, such as plutonium-241, in Yankee Rowe piping.<sup>44</sup> Thus, such  $\alpha$ -emitters are likely to be present elsewhere on the Yankee Rowe site. According to YAEC's final status survey plan, YAEC will measure soil and water samples solely for  $\gamma$ -emitting radionuclides.<sup>45</sup>

### 3. YAEC's FSSP method for determining Guideline Values is vague.

According to YAEC, the Guideline Values (GLVs) are determined by Eq. (3.1).<sup>46</sup> YAEC plans to determine the GLVs by using its previously characterized radionuclide distributions in specific areas of the site. In the event that YAEC's final survey finds different concentrations of radionuclides than previously determined, YAEC's FSSP is vague as to how YAEC would consider this information. The plan states, "If new radionuclide distribution data is obtained during the completion of decommissioning, and determined to be more appropriate for use, the GLVs may be re-evaluated and altered during the course of the final status survey."<sup>47</sup> NECNP contends that YAEC has not defined "more appropriate for use," nor detailed how exactly the GLVs will be "re-evaluated and altered." Without specific criteria, YAEC will make ad hoc decisions that will likely be determined by economics rather than health and safety.

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below 15 cm in soil."

<sup>44</sup> A. Mancini and R. Applebaum, *supra*, fn. 17.

<sup>45</sup> FSSP at A-30.

<sup>46</sup> FSSP at A-10.

**4. YAEC's FSSP permits radiation exposures to exceed 15 mr/y.**

Under YAEC's proposed plan, if the direct gamma doses are 5  $\mu$ R/h, likely radiation exposures will exceed 15 mr/yr. YAEC intends to survey the site to ensure that direct  $\gamma$  readings are less than 5  $\mu$ R/h above background.<sup>48</sup> For a full-time resident, present on the site 365 days a year, the direct gamma doses will already exceed 15 mr/y, not taking into account additional radiation pathways, such as water and incidental soil ingestion, inhalation of radioactive particulates and crops grown in contaminated earth. This basis was discussed under Contention A above. NECNP realleges and incorporates by reference herein the legal points raised *supra* at A.3.

**5. YAEC's ALARA analysis in the FSSP is completely *ad hoc* and vague.**

According to YAEC, in pertinent part, the ALARA analysis will take into account:

[r]adiation doses and environmental impacts from the decommissioning process and from the residual radiation remaining on the site after completion of decommissioning, other costs and risks associated with the decontamination and decommissioning of the site.

YAEC's LTP, (Appendix) FSSP at A-46. This is YAEC's entire ALARA analysis in the Final Status Survey Plan. NECNP contends that, as such, ALARA analysis in the FSSP

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<sup>47</sup> *Id.*

<sup>48</sup> FSSP at A-33.

vague, inadequate, and, essentially, non-existent. In this regard, YAEC's ALARA statement makes a mockery of the NRC's ALARA regulations and should not be approved as submitted.

**Additional Bases:**

NECNP contends that the full extent of site contamination has not been determined.

Recent NRC inspection reports provide additional support for this contention:

1. YAEC halted the removal of contaminated piping from under the primary auxiliary because of the high water table. NRC Inspection Report 50-29/98-03 at 2. It is therefore not clear whether YAEC completed this removal later, and took subsurface soil samples for contamination at this location. *See generally, id.* The clear inference of this revelation is that the below building contaminated piping is sitting within the water table ( and allowing contamination to seep into the water table?).

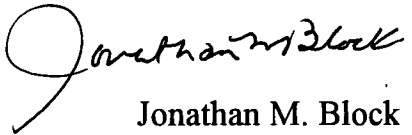
2. To determine background, YAEC prepared a study of background soil at off-site locations to obtain background readings for cesium-137. This report (cited by the Inspector but not publicly available) was supplemented with a technical basis document for Sr-90 (RP 98-72) (which is also cited by the Inspector but not publicly available). YAEC found the mean Sr-90 concentration to be 0.274 pCi/g, with a standard deviation of 0.310 pCi/g. NRC Inspection Report 50-29/98-03 at A2-4. (Note: this includes the value 0 pCi/g; because of the measurement uncertainty, Sr-90 background concentrations

could also be zero.) For affected areas of the site, YAEC states that it will apply a zero Cs-137 background. NRC Inspection Report 50-29/98-01/02 at 11. This means that no values will be subtracted from measured soil concentrations. NECNP applauds this determination, however, NECNP contends that the estimated background Cs-137 soil concentration of zero pCi/g should be memorialized in the FSSP. As it stands, it is nowhere in the FSSP or the LTP.

### **CONCLUSION**

For the reasons presented above, YAEC's LTP should not be approved, and the ASLB Panel in this case should accept NECNP's Contentions as submitted. Moreover, the Panel should schedule a discovery period during which the Panel and Intervenor may obtain of NRC and YAEC additional factual material to be used in the Panel's adjudicatory hearing on the matters raised herein and any others the Panel finds germane .

Respectfully submitted:

  
Jonathan M. Block  
Attorney for NECNP

FILED: January 2, 1999

cc: Service List

**Table 1. TLD  
Measurements 1995**

<b>Sta. No.</b>	<b>Annual Average Fence Post (<math>\mu</math>R/h)</b>	<b>Sta. No.</b>	<b>Annual Average Off-Site (<math>\mu</math>R/h)</b>
GM-01	7	GM-13	11.9
GM-02	6.4	GM-14	9.9
GM-03	5.4	GM-15	9.4
GM-04	5.9	GM-16	9.2
GM-05	7.4	GM-17	10.9
GM-06	6.9	GM-18	14.5
GM-07	7.5	GM-19	17.1
GM-08	6.3	GM-20	13.3
GM-09	6.9	GM-21	16.6
GM-10	6.6	<b>Average</b>	<b>12.53</b>
GM-11	7.4		
GM-12	8.2		
GM-22	7		
GM-23	7.7		
GM-24	7.8		
GM-25	6.3		
GM-26	6.5		
GM-27	6		
GM-28	7		
GM-29	5		
GM-30	6		
GM-31	6.3		
GM-32	6.4		
GM-33	6.9		
GM-34	8.9		
GM-35	7.4		
GM-36	7.2		
GM-37	7.5		
GM-38	8.2		
GM-39	8.6		
GM-40	6.9		
<b>Average</b>	<b>6.95</b>		

Source: YAE, "Annual Radiological Environmental Operating Report, January - December 1995," April 1996, Table 5.3.

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**Table 2. Subfoundation Samples**

Location	Hole No.	Media	Depth (inches)	Co-60 (pCi/g)	Cs-137 (pCi/g)	Dose* (mR/h)	Dose (mr/y)
PCA Warehouse	SF-3A	soil	9-21	695.39	20.67	1.08	9483.69
		soil	21-29	917.53	67.97	1.44	12643.22
S Decon Pad	SF-5A	soil	17-29	271.6	19.4	0.43	3740.25
	SF-5H	soil	17-25	5700	91	8.85	77485.78
	IX Pit	soil	24-36	19.18	30.59	0.04	357.47

\* Assumes 6 inch depth of contaminated soil and infinite plane surface

Source: Memo from P Hollenbeck to K Heider, RP 96-56, August 20, 1996

**Table 3. I-131 Inhalation Dose**

Age	Air <sup>a</sup> (m <sup>3</sup> /d)	Dose Conversion	
		Factors <sup>b</sup> (Sv/Bq)	Dose <sup>c</sup> (mSv/y)
1	5.2	7.20E-08	0.58
5	8.8	3.70E-08	0.51
10	15.3	1.90E-08	0.45
15	20.1	1.10E-08	0.34
50	22.2	7.40E-09	0.25

Notes:

a Air inhalation rate from table B.16A, ICRP 66.

b Dose conversion factors from ICRP 72.

c Assumes iodine concentration in air 4.25 Bq/cu m.



**Federal Guidance Report No. 13  
Part I – Interim Version**

**HEALTH RISKS FROM LOW-LEVEL  
ENVIRONMENTAL EXPOSURE  
TO RADIONUCLIDES**

Radionuclide-Specific Lifetime Radiogenic Cancer  
Risk Coefficients for the U.S. Population, Based on  
Age-Dependent Intake, Dosimetry, and Risk Models

Keith F. Eckerman  
Richard W. Leggett  
Christopher B. Nelson  
Jerome S. Puskin  
Allan C. B. Richardson

Oak Ridge National Laboratory  
Oak Ridge, Tennessee 37831

Office of Radiation and Indoor Air  
United States Environmental Protection Agency  
Washington, DC 20460

1998

Table 3.1. Age- and gender-specific usage rates of environmental media, for selected ages.<sup>a</sup>

Age (y)	Air <sup>b</sup> (m <sup>3</sup> d <sup>-1</sup> )		Tap water <sup>c</sup> (L d <sup>-1</sup> )		Food energy <sup>d</sup> (kcal d <sup>-1</sup> )		Cow's milk <sup>e</sup> (L d <sup>-1</sup> )	
	M	F	M	F	M	F	M	F
0	2.9	2.9	0.191	0.188	478	470	0.339	0.350
1	5.2	5.2	0.223	0.216	791	752	0.349	0.358
5	8.8	8.8	0.542	0.499	1566	1431	0.413	0.409
10	15.3	15.3	0.725	0.649	1919	1684	0.486	0.428
15	20.1	15.7	0.900	0.712	2425	1828	0.519	0.356
20	22.2	17.7	1.137	0.754	2952	1927	0.414	0.249
50	22.2	17.7	1.643	1.119	2570	1758	0.192	0.139
75	22.2	17.7	1.564	1.179	1990	1508	0.192	0.139
Lifetime average	19.2	16.5	1.29	0.93	2418	1695	0.282	0.207
Combined lifetime average <sup>f</sup>	17.8		1.11		2048 <sup>g</sup>		0.243	

<sup>a</sup>All values are based on estimated averages for the U.S. population for the indicated age. Ages refer to birthdays; e.g., a given rate at age 5 y indicates the rate on the fifth birthday. Data reported for age intervals were converted to point estimates by preserving the total intake in each interval using a cubic spline fitting method (Fritsch and Carlson, 1980). Fitted curves were smoothed using a 3-point moving average. The listed usage rates are the values used in the calculation and are generally more precise than the data would support.

<sup>b</sup>From Tables B.16A and B.16B of ICRP Publication 66, 1994a.

<sup>c</sup>Based on survey data of the U.S. Department of Agriculture (Ershow and Cantor, 1989). Includes drinking water, water added to beverages, and water added to foods during preparation, but not water intrinsic in food as purchased.

<sup>d</sup>Based on data from the Third National Health and Nutrition Examination Survey (McDowell et al., 1994).

<sup>e</sup>Used in one of two scenarios for ingestion of radioisotopes of iodine in diet. The other scenario assumes that iodine intake is proportional to food energy usage. Milk usage is based on data from EPA report 520/1-84-021 (1984b).

<sup>f</sup>Based on the male-to-female ratio at birth, the gender-specific survival function, and the gender-specific usage function.

<sup>g</sup>For a typical U.S. diet, equivalent to a lifetime average intake of about 1.2 kg food d<sup>-1</sup> (see text).



ASPEN TRAILER COMPANY LTD.

19414 Enterprise Way,  
Surrey, British Columbia, Canada V3S 6J9  
Phone: (604) 533-8771 • Fax: (604) 533-8772

J.C. 0599601

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08-24

March 25, 1997

Wayne Lewis  
Stone and Webster Engineering Corporation  
P.O. Box 5406  
Denver, Colorado, 80217

Dear Wayne,

Drawing D13690S shows a possible combination for your requirement and D13691S the turn around at the loading yard. The requirements outlined in your letter introduce restraints that are severe but manageable.

First the weight, you ask for "Utah legal". A normal 18 wheeler in Utah would gross 80000 pounds and have axle loads of 34000 pounds per 8 wheel tandem. Single axle loads may be up to 20,000 pounds and these figures are typical for most states. Practically all heavy haul, including on rural roads is at weights higher than that, typically 20000 pounds to 25000 pounds per axle.

Considering the 142 ton payload we would expect a gross of about 450,000 pounds. You have no bridges to cross so we assume that the main requirement would be to minimize axle load, or more simply, tire load. The combination shown, including the tractor steering axle, has 94 tires. Assuming 18000 pounds for the steering axle, axle loading would be about 18,782 pounds or 4695 pounds per tire.


These are so called 16 wheel groups which are needed at this weight, to keep the length compact. Components shown are parts of our modular design so more or less axles and tires are possible although this is one of the optimum combinations. A normal form for this design is as a "double lane loader" where the axles can be expanded from 12 ft out to 20 ft to reduce bridge loadings. With no bridges to cross you would seek permits without this extra complexity, to help minimize tare weight.

Turning in the restricted loading yard is manageable. We have built this class with not only double lane loading but also with all groups steering. Drawing D13690S shows steering of the wing dollies (rear of each set) which allows for really tight turning but this also might not be necessary. D13691S indicates a steady state turn in 150 ft (151 ft at the bumper) without steering the wing dollies. In practice steering input by the driver is more complex and this particular combination would be able to U-turn in the yard by steering just the lead group of the dolly.

The first stage of such a project, would to get an approval in principle from the state for the axle loadings and configuration type. In the mean time I trust this satisfies your immediate needs. Murray is away at the moment so you may phone me if you have any questions.

Sincerely

The Aspen Trailer Group



Ed Boon  
Engineering

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
Before the  
ATOMIC SAFETY AND LICENSING BOARD

DOCKETED  
USNRC

'99 JAN -5 P3:41

Administrative Judges:

Charles Bechhoefer, Chariman  
Dr. Thomas S. Ellman  
Thomas D. Murphy

OFFICE OF SECRETARY  
RULEMAKING AND  
ADJUDICATION STAFF

In the Matter of

YANKEE ATOMIC ELECTRIC COMPANY  
(Yankee Nuclear Power Station)

License Termination Plan

Docket No. 50-029-LA

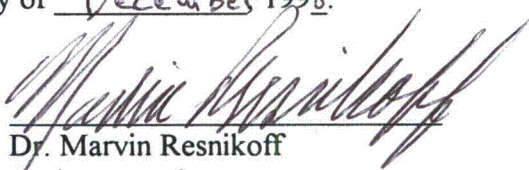
ASLBP No. 99-754-01-LA-R

DECLARATION OF DR. MARVIN RESNIKOFF

I, Dr. Marvin Resnikoff, declare under penalty of perjury that:

1. I am the Senior Associate at Radioactive Waste Management Associates, a private consulting firm based in New York City. A statement of my qualifications is attached hereto as Exhibit A.
2. I am familiar with the License Termination Plan application. I am also familiar with and have reviewed the documents in this case listed as Exhibit B.
3. I assisted in the preparation of, and have reviewed the New England Coalition on Nuclear Pollution's contentions submitted in this proceeding. The technical facts presented in the contentions are true and correct to the best of my knowledge, and the conclusions drawn from those facts are based on my best professional judgment.

DATED: This 31<sup>st</sup> day of December 1998.

  
Dr. Marvin Resnikoff  
Senior Associate

Radioactive Waste Management Associates  
526 W. 26<sup>th</sup> Street Room 517  
New York, NY 10001

## Exhibit A. Resume of Marvin Resnikoff, Ph.D.

**Dr. Marvin Resnikoff** is Senior Associate at Radioactive Waste Management Associates and is an international consultant on radioactive waste management issues. He is Principal Manager at Associates and is Project Director for risk assessment studies on radioactive waste facilities and transportation of radioactive materials. Dr. Resnikoff has concentrated exclusively on radioactive waste issues since 1974. He has conducted studies on the remediation and closure of the leaking Maxey Flats, Kentucky radioactive landfill for Maxey Flats Concerned Citizens, Inc. under a grant from the Environmental Protection Agency, the Wayne and Maywood, New Jersey thorium Superfund sites and on proposed low-level radioactive waste facilities at Martinsville (Illinois), Boyd County (Nebraska), Wake County (North Carolina), Ward Valley (California) and Hudspeth County (Texas). He has conducted studies on transportation accident risks and probabilities for the State of Nevada and dose reconstruction studies of oil pipe cleaners in Mississippi and Louisiana, residents of Canon City, Colorado near a former uranium mill, residents of West Chicago, Illinois near a former thorium processing plant, and residents and former workers at a thorium processing facility in Maywood, New Jersey. In West Chicago he calculated exposures and risks due to thorium contamination and served as an expert witness for plaintiffs A Muzzey, S Bryan, D Schroeder and assisted counsel for plaintiffs KL West and KA West. He is presently serving as an expert witness for a separate group of plaintiffs in West Chicago, including R Dassion. He also evaluated radiation exposures and risks in worker compensation cases involving G Boeni and M Talitsch, former workers at Maywood Chemical Works thorium processing plant.

Under a contract with the State of Utah, Dr. Resnikoff is a technical consultant to DEQ on the proposed dry cask storage facility for high-level waste at Skull Valley, Utah and proposed storage/transportation casks. He is assisting the State on licensing proceedings before the Nuclear Regulatory Commission. In addition, at hearings before state commissions and in federal court, he has investigated proposed dry storage facilities at the Point Beach (WI), Prairie Island (MN) and Palisades (MI) reactors.

In Canada, he has conducted studies on behalf of the Coalition of Environmental Groups and Northwatch for hearings before the Ontario Environmental Assessment Board on issues involving radioactive waste in the nuclear fuel cycle and Elliot Lake tailings and the Interchurch Uranium Coalition in Environmental Impact Statement hearings before a Federal panel regarding the environmental impact of uranium mining in Northern Saskatchewan. He has also worked on behalf of the Morningside Heights Consortium regarding radium-contaminated soil in Malvern and on behalf of Northwatch regarding decommissioning the Elliot Lake tailings area before a FEARO panel. More recently he completed a study for Concerned Citizens of Manitoba regarding transportation of irradiated fuel to a Canadian high-level waste repository.

He was formerly Research Director of the Radioactive Waste Campaign, a public interest organization conducting research and public education on the radioactive waste issue. His duties with the Campaign included directing the research program on low-level commercial and military waste and irradiated nuclear fuel transportation, writing articles, fact sheets and reports, formulating policy and networking with numerous environmental and public interest organizations and the media. He is author of the Campaign's book on "low-level" waste, *Living Without Landfills*, and co-author of the Campaign's book, *Deadly Defense, A Citizen Guide to Military Landfills*.

Between 1981 and 1983, Dr. Resnikoff was a Project Director at the Council on Economic Priorities, a New York-based non-profit research organization, where he authored the 390-page study, *The Next Nuclear Gamble, Transportation and Storage of Nuclear Waste*. The CEP study details the hazard of transporting irradiated nuclear fuel and outlines safer options.

In February 1976, assisted by four engineering students at State University of New York at Buffalo, Dr. Resnikoff authored a paper which changed the direction of power reactor decommissioning in the United States. His paper showed that power reactors could not be entombed for long enough periods to allow the radioactivity to decay to safe enough levels for unrestricted release. The presence of long-lived radionuclides meant that large volumes of dismantled reactors would still have to go to low-level waste disposal facilities. He has assisted public interest groups NECNP and CAN on the decommissioning of the Yankee-Rowe reactor.

Dr. Resnikoff is an international expert in nuclear waste management, and has testified often before State Legislatures and the U.S. Congress. He has extensively investigated the safety of the West Valley, New York and Barnwell, South Carolina nuclear fuel reprocessing facilities. His paper on reprocessing economics (Environment, July/August, 1975) was the first to show the marginal economics of recycling plutonium. He completed a more detailed study on the same subject for the Environmental Protection Agency, "Cost/Benefits of U/Pu Recycle," in 1983. His paper on decommissioning nuclear reactors (Environment, December, 1976) was the first to show that reactors would remain radioactive for hundreds of thousands of years.

Dr. Resnikoff has prepared reports on incineration of radioactive materials, transportation of irradiated fuel and plutonium, reprocessing, and management of low-level radioactive waste. He has served as an expert witness in state and federal court cases and agency proceedings. He has served as a consultant to the State of Kansas on low-level waste management, to the Town of Wayne, New Jersey, in reviewing the cleanup of a local thorium waste dump, to WARD on disposal of radium wastes in Vernon, New Jersey, to the Southwest Research and Information Center and New Mexico Attorney General on shipments of plutonium-contaminated waste to the WIPP facility in New Mexico and the State of Utah on nuclear fuel transport. He has served as a consultant to the New York Attorney General on air shipments of plutonium through New York's Kennedy Airport, and transport of irradiated fuel through New York City, and to the Illinois Attorney General on the expansion of the spent fuel pools at the Morris Operation and the Zion reactor, to the Idaho Attorney General on the transportation of irradiated submarine fuel to the INEL facility in Idaho and to the Alaska Attorney General on shipments of plutonium through Alaska. He was an invited speaker at the 1976 Canadian meeting of the American Nuclear Society to discuss the risk of transporting plutonium by air. As part of an international team of experts for the State of Lower Saxony, the Gorleben International Review, he reviewed the plans of the nuclear industry to locate a reprocessing and waste disposal operation at Gorleben, West Germany. He presented evidence at the Sizewell B Inquiry on behalf of the Town and Country Planning Association (England) on transporting nuclear fuel through London. In July and August 1989, he was an invited guest of Japanese public interest groups, Fishermen's Cooperatives and the Japanese Congress Against A- and H- Bombs (Gensuikin).

Between 1974 and 1981, he was a lecturer at Rachel Carson College, an undergraduate environmental studies division of the State University of New York at Buffalo, where he taught energy and environmental courses. The years 1975-1977 he also worked for the New York Public Interest Group (NYPIRG).

In 1973, Dr. Resnikoff was a Fulbright lecturer in particle physics at the Universidad de Chile in Santiago, Chile. From 1967 to 1973, he was an Assistant Professor of Physics at the State University of New York at Buffalo. He has written numerous papers in particle physics, under grants from the National Science Foundation. He is a 1965 graduate of the University of Michigan with a Doctor of Philosophy in Theoretical Physics, specializing in group theory and particle physics.

**Dr. Marvin Resnikoff**

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(212) 663-7117

**EXPERIENCE:**

- April 1989 - present **Senior Associate**, Radioactive Waste Management Associates, management of consulting firm focused on radioactive waste issues, evaluation of nuclear transportation and military and commercial radioactive waste disposal facilities.
- 1978 - 1981; **Research Director**, Radioactive Waste Campaign, directed research program for Campaign, including research for all fact sheets and the two books, *Living Without Landfills*, and *Deadly Defense*. The fact sheets dealt with low-level radioactive waste landfills, incineration of radioactive waste, transportation of high-level waste and decommissioning of nuclear reactors. Responsible for fund-raising, budget preparation and project management.
- April 1989
- 1981 - 1983 **Project Director**, Council on Economic Priorities, directed project which produced the report *The Next Nuclear Gamble*, on transportation and storage of high-level waste.
- 1974 - 1981 **Instructor**, Rachel Carson College, State University of New York at Buffalo, taught classes on energy and the environment, and conducted research into the economics of recycling of plutonium from irradiated fuel under a grant from the Environmental Protection Agency.
- 1975 - 1976 **Project Coordinator**, SUNY at Buffalo, New York Public Interest Research Group, assisted students on research projects, including project on waste from decommissioning nuclear reactor.
- 1973 **Fulbright Fellowship** at the Universidad de Chile, conducting research in elementary particle physics.
- 1967 - 1972 **Assistant Professor of Physics**, SUNY at Buffalo, conducted research in elementary particle physics and taught range of graduate and undergraduate physics courses.
- 1965 - 1967 **Research Associate**, Department of Physics, University of Maryland, conducted research into elementary particle physics.

**EDUCATION**

University of Michigan  
Ann Arbor, Michigan

Ph.D. in Physics, June 1965  
M.S. in Physics, Jan 1962  
B.A. in Physics/Math, June 1959



## Publications 1985-1998

January 1985 "U.S. Radioactive Landfill Experience," paper, presented to the Annual Institute of British Geographers in Leeds, England. Incorporated into A. Blowers and D. Pepper, (eds.), *Nuclear Power in Crisis: Politics and Planning for the Nuclear State*, Nichols Publishing Co., 1987.

February 1985 "Comments on the transportation sections of the draft Environmental Assessment for a high level waste repository in Utah," prepared for the State of Utah.

March 1985 Testimony before the House Committee on Interior and Insular Affairs on the long-lived hazard of "low-level" radioactive waste.

May 1985 "Radioactive Waste Incineration in Bladen County, What's Coming Out of the Stack?" Campaign report on the environmental impact of incinerating radioactive waste in Bladen County, North Carolina, 33 pages.

August 1985 Paper submitted to the House Energy and Commerce Committee, on the hazard of long-lived low-level waste.

September 1985 "Radioactive Waste Incineration in Parks Township, Pennsylvania, What's Coming Out of the Stack?" Campaign report on the environmental impact of incinerating radioactive waste in Parks Township, Pennsylvania, 32 pages.

September 2, 1985 "Critique of Submission by Dr. John Till to the House Committee on Interior and Insular Affairs."

February 1986 "Alternatives to Radioactive Landfills, An Environmental Perspective," paper presented at the International Symposium on Alternatives to Radioactive Landfills, Chicago, Ill. Paper incorporated in symposium *Proceedings*, published by the Illinois Dept of Nuclear Safety and the Central Midwest Compact Commission.

June 1986 "Feed Materials Production Center, Uranium Contamination of Off-site Wells," Campaign report prepared with Dana Coyle on the health impact of uranium contamination of off-site wells, 35 pages.

June 1986 Testimony for the Northwest Inland Waters Coalition, a public interest organization, for the Federal District Court, State of Washington, on the need for an Environmental Impact Statement to evaluate the import of irradiated nuclear fuel from Taiwan through the Port of Seattle.

July 1986 Paper on the Kerr-McGee uranium conversion facility near Salisaw, Oklahoma presented to conference organized by Native Americans for a Clean Environment.

September 1986 Affidavit in Federal Court in New York City for a Warwick, New York public interest group (WARD), and in New Jersey State Courts for the New York-New Jersey Trails Conference, opposing plans by the New Jersey Department of Environmental Protection to move radium residues from Montclair to Vernon, New Jersey.

August, 1986 Supplement to June 1986 Campaign report on the Feed Materials Production Center discussing contamination of public water supplies, 20 pages.

- September 1986 "Disposal of high-level waste in Canada," paper presented at high-level waste conference, Winnipeg, Manitoba. Workshop on the transportation of irradiated fuel in Canada. Incorporated into A. Weiser (ed.), *Challenges to Nuclear Waste, Proceedings of Nuclear Waste Issues Conference, Sept 12-14, 1986*, Concerned Citizens of Manitoba, Winnipeg, Manitoba, 1987.
- November 1986 Associates report to the State of Kansas on draft Request for Proposal for contractor to the Central States Compact, 10 pages.
- November 1986 "Transportation of irradiated fuel," paper presented to a subcommittee of the National Association of Attorneys General, Las Vegas, Nevada.
- December 1986 Associates affidavit prepared for the Coalition on West Valley Nuclear Wastes and the Radioactive Waste Campaign in a successful U.S. District Court action on the need for a federal Environmental Impact Statement before disposing of low-level waste at West Valley.
- February 1987 "Off-site radioactive contamination at DOE's Oak Ridge, Tennessee facility," Campaign report prepared with Dana Coyle on radioactive leakage from the Oak Ridge Reservation, 65 pages.
- May 1987 "At-reactor storage of irradiated fuel," paper presented at conference sponsored by Blue Ridge Environmental Defense League and other citizen organizations at Maryville, Tennessee.
- June 1987 Associates affidavit prepared for the Sierra Club Legal Defense Fund on the need for an Environmental Impact Statement before incinerating plutonium-contaminated waste at the Rocky Flats Plant.
- September 1987 *Living Without Landfills*, Campaign book on the hazard of radioactive landfills, and safer alternatives, 119 pages.
- September 1987 Associates affidavit prepared for the Alaska Attorney General in a U.S. District Court action on the need for a federal Environmental Impact Statement for air shipments of plutonium in Alaska.
- November 1987 "Low-level waste in Michigan," talk before a joint session of the Michigan Legislature, East Lansing, Michigan.
- February 1988 Testimony before the Vermont House Committee on Natural Resources and the Environment, Montpelier, Vermont.
- May 1988 Talks at Chadron State College (Chadron, Neb), Alliance, and Scottsbluff, on "low-level" waste in the Central States.
- June 1988 Co-authored the Radioactive Waste Campaign's *Deadly Defense*, 170 page book on radioactive waste at nuclear weapons facilities. Released at a national press conference in Washington, D.C.
- June 1988 Wayne and Clark counties, Illinois; public meetings near proposed LLRW dump sites; jointly-sponsored with local groups (Individuals for a Clean Environment)

- July 1988 Briefing before Congressional Legislative Assistants on the findings of *Deadly Defense*, jointly conducted with the Sierra Club and sponsored by Representative Don Bonker.
- September 1988 Reno, NV; talk before Northern Colorado Gaming Executives re. transportation of irradiated fuel to a proposed high-level waste repository; jointly sponsored by Citizens Alert and State of Nevada
- September 1988 "Rebuttal of NRC Critique of *Living Without Landfills*," 12 pages.
- October 1988 Boulder, Colorado; talk, participation in conference and chapter of book, *Environmental Impacts of Warfare*; sponsored by the Sierra Club.
- November 1988 Nucla, Colorado; prepared testimony before Colorado Department of Health re. suitability of proposed "low-level" waste disposal site in Uravan, Colorado for Western Colorado Congress.
- November 1988 Augusta, Maine; participation in debate sponsored by the Maine Low-Level Radioactive Waste Authority
- December 1988 Preparation of court affidavit re. proposed irradiated fuel shipments from Taiwan through Portsmouth, Virginia, before the United States District Court, District Of Columbia, for the Sierra Club Legal Defense Fund.
- February 1989 "Uranium Releases at Fernald, Radiation Doses to Nearby Residents," report released by the Radioactive Waste Campaign at Cincinnati, Ohio press conference.
- April 1989 "Risks of Low-Level Radioactive Waste Transportation," 8-page fact sheet, prepared for the Radioactive Waste Campaign.
- May 12, 1989, "Preliminary Report on RI/FS Study," prepared for Maxey Flats Concerned Citizens, Flemingsburg, Kentucky.
- August 30, 1989, "Analysis of RADTRAN Computer Model," paper presented at meeting of the American Nuclear Society Meeting, Las Vegas, Nevada.
- October 1989 "Report on Maxey Flats Remediation Program," 75-page report, prepared for Maxey Flats Concerned Citizens, Inc.
- November 1989 "RADTRAN Analysis," 60-page report on the probability and consequences of accidents in transporting high-level waste to the proposed Yucca Mountain repository, prepared for the University of Nevada, Las Vegas.
- February 1990 "Radioactive Waste Mismanagement at Nine Mile Point 1."
- April 9, 1990 "Comments on the Final Supplemental Environmental Impact Statement, Waste Isolation Pilot Plant," for Concerned Citizens for Nuclear Safety, Santa Fe, New Mexico.
- April 25, 1990, talk before the Hazardous Materials/Nuclear Symposium on nuclear transportation issues, Ely, Nevada.

- April 26, 1990, Statement before the Nevada Commission on Nuclear Projects on nuclear transportation issues, Las Vegas, Nevada.
- July 19, 1990, "Report on Feasibility Study, Risk Assessment, App. D, iodine hazard," prepared for Maxey Flats Concerned Citizens, Flemingsburg, Kentucky.
- August 1, 1990, "Report on the State of Kentucky, Maxey Flats Closure Plan," prepared for Maxey Flats Concerned Citizens, Flemingsburg, Kentucky.
- August 1990 Preparation of second court affidavit re. proposed irradiated fuel shipments from Taiwan through Portsmouth, Virginia, before the United States District Court, District Of Columbia, for the Sierra Club Legal Defense Fund.
- September 1990 "The Generation Time-Bomb: Radioactive and Chemical Defense Wastes," in A.H. Ehrlich and J.W. Birks (eds.), *Hidden Dangers, Environmental Consequences of Preparing for War*, Sierra Club Books, San Francisco
- October 22, 1990, "Review of Environmental Report for the Central Interstate Compact Low-level Radioactive Waste Facility," for Heartland Operation to Protect the Environment, Auburn, Nebraska.
- December 1990 Declaration re. the constitutionality of the Low-Level Radioactive Waste Policy Act before the U.S. District Court, District of Nebraska for Concerned Citizens of Nebraska.
- December 1990 Preparation of third court affidavit re: proposed irradiated fuel shipments from Taiwan through Portsmouth, Virginia, before the United States District Court, District Of Columbia, for the Sierra Club Legal Defense Fund.
- February 8, 1991, "Review of 'Risk Assessment and Safety Analysis, University of Michigan Waste Handling Facility,' for North Campus Residents Council, Ann Arbor, Michigan.
- April 1, 1991, "Health and Safety Impact of NMI," for Citizens Concerned About NMI, Concord, Massachusetts.
- May 6, 1991, "Comments on Final Environmental Impact Statement, Prairie Island Independent Spent Fuel Storage Installation," for the Sioux Tribal Council, Red Wing, Minnesota.
- May 16, 1991, "Managing Low-Level Radioactive Waste," talk at Future Options Symposium, International Institute for Low Level Radioactive Waste, East Lansing, Michigan.
- May 23, 1991, "Radiac Accident Analysis," prepared for the Radioactive Waste Campaign, Brooklyn, New York.
- May 30, 1991, "Nuclear Power in the United States," talk sponsored by the Green Party, Rikstag, Green Party Group Room, Stockholm, Sweden.
- June 20, 1991, "Comments on the Department of Energy Environmental Assessment on Off-Site Fuels Policy," prepared for the Sierra Club Legal Defense Fund, Washington, D.C.

July 1, 1991, "Comments on the Final Environmental Impact Statement for the Proposed Ward Valley Low-level Waste Landfill," submitted to the California Department of Health Services, for Don't Waste California.

July 12, 1991, "Comments on EPA Proposed Plan," prepared for Maxey Flats Concerned Citizens, Flemingsburg, Kentucky.

September 8, 1991 Preparation of fourth court affidavit re. proposed irradiated fuel shipments from Taiwan through Portsmouth, Virginia, before the United States District Court, District Of Columbia, for the Sierra Club Legal Defense Fund.

September 20, 1991 "Consequences of a Severe HEU Ship Accident," memo to Greenpeace

September 30, 1991 "Prairie Island Independent Spent Fuel Storage Facility, Cost and Radiation Analysis," before the Minnesota Public Utility Commission for the Prairie Island Mdewakanton Sioux Indian Community.

October 23, 1991 "Health and Safety Impacts of NMI, 2nd Report," prepared for Concerned Citizens about NMI, Concord, Mass.

October 31, 1991 Preparation of fifth court affidavit re. proposed irradiated fuel shipments from Taiwan through Portsmouth, Virginia, before the United States District Court, District Of Columbia, for the Sierra Club Legal Defense Fund.

November 4, 1991 Statement before the City of Albuquerque Common Council regarding disposal of radioactive waste into the city sewer system.

November 9, 1991 Affidavit re. shipments of Pu-contaminated waste to the proposed WIPP facility, before the US District Court, District of Columbia, for the New Mexico Attorney General.

November 1991 "Prairie Island Independent Spent Fuel Storage Facility, Prefiled Reply Testimony," before the Minnesota Public Utility Commission for the Prairie Island Mdewakanton Sioux Indian Community.

Radioactive Waste Management Associates [RWMA], White Paper #1, *Sources of Low-Level Waste in Connecticut*, prepared for the Towns of East Windsor, Ellington and South Windsor, September 30, 1991.

RWMA, White Paper #2, *Low-Level Waste Transportation in Connecticut*, prepared for the Towns of East Windsor, Ellington and South Windsor, October 2, 1991.

RWMA, White Paper #3, *Statement by Dr. Marvin Resnikoff on Chem-Nuclear*, prepared for the Towns of East Windsor, Ellington and South Windsor, October 29, 1991.

RWMA, White Paper #4, *Leakage From Existing 'Low-Level' Waste Disposal Facilities*, prepared for the Towns of East Windsor, Ellington and South Windsor, January 6, 1992.

Resnikoff, M., and Anne Vanrenterghem, *Preliminary Review of US Ecology Safety Analysis Report, Proposed Boyd County, Nebraska Low-Level Waste Facility*, prepared for the Boyd County Local Monitoring Committee, February 2, 1992.

Resnikoff, M., *Radon Releases from Uranium Tailings and Projected Health Effects*, prepared for Northwatch Coalition, February 17, 1992.

RWMA, White Paper #5, *Storage of Low-Level Radioactive Waste*, prepared for the Towns of East Windsor, Ellington and South Windsor, February 19, 1992.

Resnikoff, M., *Scope: McArthur River and Cigar Lake Projects*, Memo to Inter Church Uranium Council, February 27, 1992.

Resnikoff, M., Leigh, R. L., and Anne Vanrenterghem, *Environmental Impacts of Elliot Lake Mill Tailings*, prepared for Northwatch Coalition, March 30, 1992.

Resnikoff, M., *Canadian High-Level Waste Repository Costs*, Memo to David Poch and David Argue, Coalition of Environmental Groups, April 2, 1992.

Resnikoff, M., *Comment on Midwest Joint Venture EIS*, Memo to Inter Church Uranium Council, April 23, 1992.

Resnikoff, M., and Lee DiTullio, *Review of Safety Analysis Report Part 1: Geology, Hydrology Proposed Low-Level Waste Facility Butte, Nebraska*, prepared for the Boyd County Local Monitoring Committee, June 29, 1992.

Resnikoff, M., Mythbuster#8, *"Low-Level" Radioactive Waste*, for Safe Energy Communications Council, Summer 1992.

Resnikoff, M., *Comments on Final Guidelines for the Preparation of an Environmental Impact Statement on the Nuclear Fuel Waste Management and Disposal Concept*, July 22, 1992.

Resnikoff, M., *NMI's Proposed Hydromet Project*, Memo to Judy Scotnicki, Concerned Citizens of Concord, July 29, 1992.

Resnikoff, M., and Lee DiTullio, *Review of Safety Analysis Report Part 2: Risk Assessment Proposed Low-Level Waste Facility Butte, Nebraska*, prepared for the Boyd County Local Monitoring Committee, August 7, 1992.

RWMA, *Comments on McClean Lake Project EIS*, prepared for the Inter-Uranium Coalition, June 30, 1992.

Resnikoff, M., *Plutonium Ship Akatsuki Maru Consequences of Fire at the Pearl Harbor Naval Shipyard*, prepared for Greenpeace, August 24, 1992.

Resnikoff, M., *Waste Impacts of the Nuclear Fuel Cycle*, prepared for Coalition of Environmental Groups, November 1992.

Resnikoff, M., Declarations on the safety of shipping naval fuel from shipyards to Idaho before the Federal District Court, prepared for the Idaho Attorney General, March 1993.

Resnikoff, M., Declaration on the safety of the VSC-24 storage cask before the Federal District Court for the Lake Michigan Federation, May 1993.

Resnikoff, M., Talk at a Town Meeting in Grand Rapids, Michigan, June 22, regarding the safety of the VSC-24 storage container at the Palisades reactor.

Resnikoff, M., Reports to two environmental assessment panels reviewing the environmental impact of proposed mining operations in Northern Saskatchewan, prepared for the Interchurch Uranium Coalition, May 12 and June 14, 1993.

Resnikoff, M., Presentation before the Ohio Governor's Blue Ribbon Committee on siting a low-level waste facility in Ohio for the Midwest Compact, July 1993.

Resnikoff, M., Report on the safety of processing and storing radium-contaminated wastes in the Tapscott district of Scarborough, Toronto, prepared for the Coalition Against Radioactive Tapscott, November 1, 1993.

Resnikoff, M., Remarks before the Department of Energy meeting on the Multi-Purpose Canister, Washington, D.C., November 16, 1993.

Resnikoff, M., Report on the scoping guidelines for production of an Environmental Impact Statement (EIS) for decommissioning of the Elliot Lake uranium tailings and report on the draft EIS by Rio Algom for the decommissioning of Quirk and Panel tailings, Elliot Lake, prepared for Algoma-Manitoulin Nuclear Awareness, December 15, 1993.

Resnikoff, M., and R. Haaker, "Estimated Radiation Dose received by James E Case, et al, during Pipe De-scaling Operations at Brookhaven, Mississippi," report prepared in the case *Case v. Chevron*, January 23, 1994.

Radioactive Waste Management Associates, "Soil Separation: What It Means For Wayne," report prepared for the Town of Wayne, New Jersey, May 24, 1994.

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
Before the  
ATOMIC SAFETY AND LICENSING BOARD

DOCKETED  
USNRC

'99 JAN -5 P3:42

Administrative Judges:  
Charles Bechhoefer, Chariman  
Dr. Thomas S. Ellman  
Thomas D. Murphy

OFFICE OF SECRETARY  
RULEMAKING AND  
ADJUDICATION STAFF

In the Matter of

YANKEE ATOMIC ELECTRIC COMPANY  
(Yankee Nuclear Power Station)

License Termination Plan

Docket No. 50-029-LA

ASLBP No. 99-754-01-LA-R

Served: January 2, 1999

**CERTIFICATE OF SERVICE FOR NEW ENGLAND COALITION ON  
NUCLEAR POLLUTION'S CONTENTIONS AND EXPERT'S DECLARATION**

I, Jonathan M. Block, counsel for New England Coalition on Nuclear Pollution, Inc., certify, under penalty of perjury, that on this 2d day of January, 1999, copies of the within materials were served upon the parties below by mailing them U.S. Postal Service, Express Mail, postage pre-paid (except for party denoted by '\*' served First Class mail at direction of Chairman Bechhoefer):

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One copy each to:

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Thomas Murphy, Administrative Judge  
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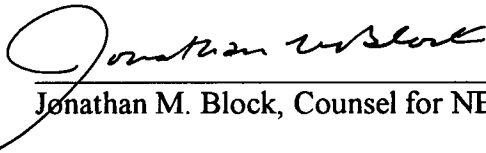
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