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In re: Docket PRM-61-1

Docketing and Service Branch
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, DC 20555

To whom it may concern:

The North Carolina Sierra Club has petitioned the Commission to make fundamental changes in the phi[illegible]ophy of low-level radioactive waste disposal, to be reflected in relative[illegible]sic changes in the regulations themselves. While some of the [illegible]nformation and insights presented in the petition have considerable [illegible]ew England Coalition on Nuclear Pollution does not accept the bas[illegible] philosophical premises on which this petition is based.

In essence, Sierra Club's petition implies that it is morally proper to risk everything in [illegible] to build a "perfect" facility. If the facility succeeds, it will s[illegible]ceed completely. Conversely, although this is not stated clearly in the petition, if the facility fails, its failure could well be absolute. This position mirrors the advice in Pudd'nhead Wilson's Calendar: "Put all your eggs in one basket and -- WATCH THAT BASKET." We respectfully disagree.

It seems to us that this position can be inferred only from a postulate which has proved itself false throughout human history: namely that human beings are able to design and build technologically infallible machines or structures. Theologians have a term for such postulates. They call it hubris: the sin of overreaching pride.

Our premise is radically different, and considerably humbler. We believe that all technology can and will fail when confronted with the numerous unforeseen risks and events which will befall it. In a word, we are firm believers in Murphy's law with all of its corollaries. Our faith in this position stems not only from the historical record of mankind as a species, but more theoretically from our basic knowledge and respect for the paucity of human knowledge and the overwhelming complexity of the natural and social universes.

Even the very best designer can plan only for those events which fall within the ambit of his or her knowledge and imagination. No one can design a structure to withstand a risk which he or she does not imagine possible, or which he or she feels is beyond rational credibility. Yet the capability of imagining all possible events is not given to human beings. This is theoretically obvious: the universe of logically possible events is infinite. But it is also totally practical: the history of man's encounter with technology in general and with atomic energy in particular is replete with accidents which were "beyond design basis," "impossible," "not credible," or more simply, unimagined.

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So far, our discussion has been limited to the problems of designing structures and machines in the face of our very human ignorance of the physical and social world. We must also note, at least in passing, that even with perfect designs, the implementation of our plans is not perfect: "the best laid schemes o' mice and men gang aft a-gley" as the poet Burns said. Even a perfectly designed structure may not be perfectly built or maintained. In fact, the greatest probability is that it will not be. In construction and maintenance, as in design, failure is the rule; perfection, the exception.

An obvious implication, we believe, can be derived from this premise. Designers should plan for every credible eventuality, but their designs should also allow for the unplanned, unimagined happenings which befall us so frequently. This is especially so when, as the Sierra Club has amply demonstrated, the designs in question must endure over geological periods of time: namely, millions of years.

Human beings are far from completely understanding the structure and mechanisms of the physical world, still farther from understanding the basic geological mechanisms of our planet, and farther still from comprehending the interrelations between our limited spheres of knowledge in physics, geology, hydrology, etc. We are perhaps farthest from grasping the relationship between all of these phenomena and our own social and political systems. Since our knowledge of all these areas is so incomplete, and yet so vitally important to properly storing low-level radioactive waste over long periods of time, the New England Coalition on Nuclear Pollution believes that whatever methodology is adopted should be correctable over time.

We therefore categorically reject the notion that the best way to handle the possibility of intrusion into a facility is to hide the waste, stop monitoring it, and hope that no one will chance upon it. (cf. Petition page 5) On the other hand, we fully agree that intrusion is an important problem, and that the possibility of intentional intrusion cannot be ruled out. ("Stainless steel, neutron activated, may have great interest and be put to harmful uses.")(Petition, pp. 4-5)[1]

We further reject the notion that "there must be no visual indication that it [the llrw facility] once existed." Quite to the contrary, it is essential that the existence and location of any facility containing hazardous materials be known and that access be at least within the realm of practical possibility. In sum, we believe that only options which allow for the retriev-

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1. We therefore strongly disagree with the Commission's sociological postulate that all intrusion will be inadvertent (as elaborated in the DEIS and FEIS on low-level radioactive waste regulations). Nor do we believe that it is impossible or impractical to design low-level radioactive waste facilities against the possibility of willful intrusions. We have argued these positions elsewhere at some length, and assume that it would be inappropriate to rehearse those arguments here.

ability of waste should be adopted. [2] Whatever technology is eventually chosen to handle radioactive materials, official consciousness of their existence, location and toxicity must be maintained until the hazard has fully and unequivocally passed. In the case of the federally defined category of low-level radioactive waste taken as a whole, this means, for all practical purposes, forever.

In fact, the Sierra Club's own reasoning leads to this very conclusion. On page 3, the petition argues: "It is the view of the Sierra Club that society is still on the learning curve in disposing of llrw." This is, in fact, precisely the point that we have elaborated above. The Club goes on to state: "Climatic changes will occur in the extremely long period in which the SECC llrw remains potentially hazardous. ... It is quite possible that a facility ... will find itself in the region of a fluctuating water table while still hazardous. Over a long time span, the other extreme, drought, is also possible." Ideally, then, "the disposal facility should be constructed to meet performance objectives whether it is in the saturated zone or the unsaturated zone." (all on p. 4)

But we are not willing to take the argument one step further, as the Sierra Club attempts to do. While we agree that it is wise to plan for any eventuality, including the possibility that a presently unsaturated zone may become saturated, we cannot endorse the conclusion that anyone would choose to site waste in a presently saturated zone, thus risking migration of nuclides through the water table and the eventual contamination of surface water and/or aquifers. It is wise to make oneself ready for disasters by preparing contingency plans. But it is foolish to conclude that, once those plans are in place, we should go out of our way to select the worst possible conditions. We believe this to be true regardless of the type or nature of the disaster for which one is planning. Accordingly, to go out of our way to site a low-level radioactive waste disposal facility in saturated zones strikes us as folly.

There is one more argument in the petition which will not withstand close examination. The Sierra Club contends that "There are a plethora of familiar zero-release containers: beer cans, milk cartons, wine bottles, ampoules, fuel tanks, water towers, etc. Each of these, in an ordinary environment, given reasonable protection, can hold a stable liquid for an indefi-

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2. This does not, however, imply that only above-ground options are available. The question of whether above or below grade technologies should be chosen is quite distinct from that of retrievability, and should be considered in a separate discussion. Also, there will often be questions as to how to balance enhancing safety against diminishing retrievability. Again, these comments are not the appropriate place for that discussion. Suffice it to say here that we do not believe that it is wise to opt 100% for either side of the spectrum. We do not believe that any design is so safe that we should abandon retrievability entirely (for this is, yet again, to fall into the trap of technological hubris). Nor do we believe in opting for easy retrievability in the face of obviously diminished safety. We are seeking a compromise, the details of which can await another day.

nitely long time." (p. 9)

None of the containers mentioned has been tested over periods of hundreds of years, much less the millions of years required for the complete decay of low-level radioactive waste. Additionally, there is nothing "ordinary" about the environment in which low-level radioactive waste is to be stored. Remember please that we have not subjected soda bottles and the like to thousands (or millions as the case may be) of curies of radioactivity under saturated soil conditions. As suggested by the arguments just rehearsed, low-level radioactive waste facilities should be designed to meet all kinds of environments if possible, precisely because the particular environment will not be totally predictable over geological periods of time. But currently designed zero release containers are far from meeting this range of conditions. Moreover, the Sierra Club's notion that low-level radioactive waste should be hidden and eventually forgotten effectively prevents any possible of "reasonable protection." Finally, there is nothing to assure that low-level radioactive waste contains only "stable" materials. By definition, they are radiologically unstable. In fact, many are also chemically unstable. In sum, we do not believe that the analogy proposed here bears any reasonable or useful resemblance to the situation which confronts us in attempting to store low-level radioactive waste.

The philosophical underpinnings of the Sierra Club petition are clearly unacceptable to us. But the practical outcome towards which the petition aims is even less defensible. If the petition were accepted, the result would be siting of waste in saturated zones where the slightest fissure in the waste containment would cause essentially free migration of radionuclides. Mankind knows very little about the geological processes which could, over periods of millions of years, cause just such fissures. But we do know that the forces of nature are more than adequate to do so under circumstances which have repeatedly occurred in the past. We therefore totally reject this proposed solution to the problem of low-level radioactive waste storage.

Nevertheless, we do not view this petition in a wholly negative light. Many important points are raised here with which we wish to express our strong agreement. Since we are far from believing that the Part 61 regulations are perfect, we would be delighted to see changes made which follow logically from these points.

First, we strongly agree with the petition's contention that "a credible, long-term, zero-release system for the containment and disposal of llrw will ... be a critical step in gaining public acceptance of the siting of such facilities." In fact, we believe that only a facility designed to meet a zero-release standard, and credibly engineered to that end is likely to quiet public opposition to the disposal of nuclear (or any hazardous) waste. And quite frankly, <u>that is as it should be.</u> We therefore believe that such planning for zero release is suitable not only for North Carolina, but for the nation as a whole. Accordingly, we strongly endorse the Sierra Club's call for zero-release <u>design</u>, and would be still happier to see a zero-release <u>standard</u> (replacing the Part 61 performance standards of 25-75-25 mrems) for low-level radioactive waste facilities nationwide. While we believe that we will surely fail in achieving zero release, we have no doubt that our aim

should be to dispose of radioactive materials in a way which really and truly does isolate them from the environment entirely. Thus, clearly, zero release should be the goal of this effort.

We also agree that the zero-release concept should apply to "each component of the disposal system:" namely, the containers, the vault, and, we would add, the site geology and hydrology. We also agree with Sierra Club that it is a reasonable "requirement to specify and construct systems which give reasonable promise of zero release in perpetuity." We do not think this is a "modest," requirement, however. In fact, we are not at all certain that it is even plausibly achievable with currently available technology. Still, given the toxicity of radiation, this seems to us the only reasonable goal of a humane society.

In making these statements, we are thus also endorsing two key points raised in the petition. First, while we are unwilling to endorse the particular technology outlined in the petition, we strongly agree with the notion of "levels of containment," which is, after all, nothing more than a restatement of the concept of "defense in depth," which the nuclear industry has long considered one of its strongest selling points. By layering levels of containment, each of which is hoped to be adequate in itself for complete waste isolation, the probability of actually achieving waste isolation increases. Or to put it the other way around, the likelihood of leakage is diminished (but never totally eliminated) with multi-layered zero-release containments.

Second, the petition correctly demonstrates that "the 500 year, possibly plus, target is inadequate," (Petition, p. 4) since the materials to be contained will remain hazardous over literally millions of years. Thus, "the best we can do is design for perpetuity." (same) That is the clear upshot of the reasoning on pages 3 and 4 and the accompanying tables,[3] and we are in hearty agreement with that deduction.

Finally, while we do not claim to have adequately analyzed the details of the discussions of concrete, bitumen, and polymerized concrete with appropriate technical experts, they seem to present evidence and reasoning that is of considerable importance for the low-level radioactive waste disposal efforts currently underway throughout the United States. We hope that this data will be thoroughly and appropriately researched before any of these materials is put into service in low-level radioactive waste facilities throughout the country.

Sincerely,

John Greenberg

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3. Please note that the total curies in the 100,000 years B&W table presented in the appendix add up to substantially more than the 8731.7 figure stated in the table, and therefore also to a higher percentage figure than presented. We have not attempted to verify the rest of the figures on these tables.