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July 2, 1982

To: Office of Nuclear Reactor Regulation

From: Donald L. Herzberg, M.D.
Commenting on Behalf of the Seacoast
Anti-Pollution League

Subject: Draft Environmental Statement Related
to the Operation of Seabrook Station,
Units 1 and 2, Docket Nos. 50-443 and
50-444

I am a physician trained and certified in Diagnostic Radiology and also in Nuclear Medicine. Since graduating medical school in 1968, I have had five years of post-graduate training and ten years of clinical experience, as an officer in the United States Air Force and also as a staff member of two different University Hospitals. Because of the nature of my work, particularly in Nuclear Medicine, I had extensive training and experience with the use of radioactive materials and their relationship to human beings and other living organisms. Because of this background, I have been asked to comment by the Seacoast Anti-Pollution League on the Draft Environmental Statement regarding to Seabrook Station.

First let me say that my area of expertise is obviously not in the structural and other physical aspects of Nuclear Power Plants. Rather, my expertise includes knowledge of radioactivity and specifically how it interacts in people, and beyond that how people relate to radioactivity and radiation. Probably the outstanding feature that has come to my attention in regard to how people relate to radioactivity, is the general overwhelming amount of ignorance throughout the population. Certainly this has been changing to some degree in the recent past with increased public interest in nuclear technologies and the dangers of radiation. Nevertheless, it is apparent that not only the lay public, but also all of us who work with the various nuclear technologies, have huge areas of ignorance regarding the effects of radiation and radioactivity when used in the immense quantities as occurs with the operation of Nuclear Power Plants and some of the other large scale nuclear technologies. Much public concern has been generated regarding the potential for the catastrophic effects of radiation out of control, such as might be seen following nuclear reactor accidents; however, it is difficult for anyone to give appropriate attention to the less dramatic but probably equally important effects of the large scale use of radioactive materials.

One of my responsibilities as a physician using radioactive materials for the diagnosis and treatment of illnesses, is to explain to patients the nature of the test or treatment they are to receive, including all inherent risks, both common and rare. As decided by an international group of physicians and non-physicians addressing the question of "informed consent",

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the explanation to the patient must be in language that they can easily understand. The purpose of the informed consent procedure is to make certain that the patient understands to the best of his ability what the nature of the test is and what its risks are, and on the basis of this, make a decision regarding whether or not he wants to subject himself to the test. Specifically, the physician is warned against explanations laden with jargon and incomprehensible technical terms which would merely represent an exercise for the physician and not a true explanation to the patient. Similarly, the physician is prohibited from deleting any information which may be pertinent to the risk the patient undertakes by agreeing to the test. It would, in my opinion, be a good idea for the Nuclear Power Industry and the US Nuclear Regulatory Commission to keep this approach of informed consent in mind when attempting to gain our approval for the building and operation of Nuclear Power Plants. Excluding the detonation of nuclear bombs, there is no more likely source of radioactive contamination for the public than nuclear power reactors. In this context, both the lay public and those of us more familiar with nuclear technology should be approached with information regarding the building and functioning of nuclear power reactors within the context of these reactors being potential sources of radiation exposure. That is to say, the complete nature of the potential radiation hazards from nuclear power reactors should be explained to all of us in language designed to make these facts understandable and meaningful. After such an explanation, the public can then decide whether or not it wishes to grant "informed consent." I realize this is no easy task. In my position, explaining single procedures to individual patients can be very difficult. Obviously, explaining the complexities of nuclear power production to the population at large is a considerably greater undertaking, and I do not mean to dismiss those efforts already made. However, the magnitude of our current endeavors to develop nuclear power is so great, and the potential consequences so grave, that no amount of effort should be spared in explaining to the public both the positive and negative aspects of nuclear power. Only in that way will the public be able to enjoy the benefit of this supply of energy while simultaneously understanding the price they must be willing to pay when problems and even catstrophies develop.

With these ideas in mind, I have reviewed a portion of the Draft Environmental Statement related to the operation of Seabrook. My attention has been directed specifically to Section 5.9 "Radiological Impacts", since this is the area that I am able to best evaluate. There are a number of points I would like to make, and I will simply list these.

Section 5.9.2 describes "the development of a program that will be implemented at the facility to contain and control all radioactive emissions and effluents." However, when Table 5.6 is examined, and I believe this table represents a portion of this program, the monitoring program appears quite sketchy. For example, detection of airborne radioiodine consists of taking three samples from off-site locations once a week or more, but then only one sample from a control location and one from the vicinity of a population center having the highest calculated annual ground level D/Q. These latter two tests are performed once every 92 days, possibly more frequently. Similarly throughout the rest of the monitoring program, single samples sometimes two, at most three samples are obtained from various locations such as, for the waterborne sources of radioactivity, and again, these are sampled only two to four times a year, although it does note that more frequent samples might be obtained. A similar pattern is present for radioactive contaminates which might be ingested. I emphasize that a frequent site identified for sampling

is characterized by the wording "samples from sources likely to be affected", and "samples from locations ... having the highest dose potential". Basically, this describes a very limited sampling system directed towards detecting obvious areas of contamination. Experience with radioactive materials teaches us that it is frequently the unexpected areas becoming contaminated create some of our more significant problems. If this does not seem particularly pertinent, please put this in the context of the following.

Table 57 indicates that the radioactive inventory of Iodine 131 will be 91 million curies. I-131 is used clinically for the treatment of a condition called hyperthyroidism, a situation in which the thyroid gland is over-active, creating a disease state in the patient. I-131 in this condition is used to ablate the thyroid gland, and this can be accomplished with a dose of I-131 between 5 and 10 millicuries. A similar dose would destroy the average normal thyroid gland. It is apparent therefore, that a relatively minute amount of I-131, particularly in comparison to the 91 million curies (not millicuries) could result in a significant radiation burden to the exposed population. It follows, that a very small percentage of the I-131 inventory in the reactor core reaching unmonitored locations would produce a significant radiation exposure to any people in that area. I am also surprised, that in all the monitoring systems described in the Draft Environmental Statement, there is no mention of the routine monitoring of thyroid glands in the population at risk to determine if their background thyroid radiation is greater than average. I would also point out that the predicted patterns of exposure, particularly by airborne radioactivity cannot accurately predict the effect of changing meteorological conditions at the time of isotope release into the atmosphere.

In Section 5.9.3.2 in discussing radiologic impact, there is a discussion of the potential risk of cancer in the population at risk. I fault this section in particular in the manner in which it minimizes risks of cancer and genetic disorders. It seems to me an example of using numbers to create misleading impressions. The statement is made "these risks (of cancer) are very small in comparison to the natural cancer incidence from causes unrelated to the operation of the Seabrook facility". One is almost led to believe by this statement and the general thrust of this section that the risk of cancer and genetic disorder is in fact less in the population surrounding nuclear reactors.

In Section 5.9.4.2 (3) health effects are again discussed. Again, the possibility of cancer and genetic changes are noted as possible dangers. It seems to me appropriate that some statement be made of the unknown health effects of wide spread exposure to radiation levels which are low, but nevertheless definitely greater than normal background. We have no experience in this area. Is it possible for changes to occur which will make micro-organisms more pathogenic, to make some lower forms of animal or plant life more or less susceptible to various diseases, is it possible that primitive organisms will have their ability to digest food increased or decreased or changed in some way which will dramatically affect the entire food chain of which they are a part. Surely if anything, this list is too brief, since it seems unlikely that the effects of wide spread raised radiation levels will have an affect so relatively simple as to increase the expected incidence of cancer and genetic change. And if it seems improper to try to identify as yet unrecognized dangers, certainly this is no more improper than attempting to develop occurrence rates of such things as mortality, cancer and genetic damage, on the basis of experience that has in fact never occurred.

Table 5.4 lists the incidence of job related mortalities for various workers, including nuclear plant workers. The nuclear plant worker mortality rate, expressed as premature deaths per 100,000 person years is given as 23. But then in the footnote to this table, it is stated that 12 of these premature deaths are not related to radiation, and that the eleven radiation related premature deaths are from cancer, and that this figure represents a "potential risk rather than an observed statistic". Similarly, in Table 5.5, describing the radiologic effects of an accident in transporting fuel and waste to and from the Nuclear Power Plant, the environmental risk is stated as "small", but when the footnote is read beneath this, one reads "although the environmental risk of radiologic effects stemming from transporation accidents is currently incapable of being numerically quantified, the risk remains small regardless of whether it is being applied to a single reactor or a multireactor site". This obviously represents more of a value judgment than an estimate based on an adequate number of previous experiences.

One of the most difficult areas to assess in relation to nuclear power reactors is the effect of large accidents. It is in this sphere, I believe, that the direct environmental statement most dramatically oversteps the boundaries of unbiased reporting. Although there has been a fairly large number of relatively minor accidents in Nuclear Power Plants, there is no concrete evidence that nuclear plant workers have improved their ability to deal with these accidents when they occur, and there is no concrete evidence to indicate that definitive steps have been taken to prevent the occurrence of the most common accidents. Section 5.9.4.3 states that of the accidents which have occurred, none have caused any significant radiation injury, and that there has not been "any significant individual or collective public radiation exposure, nor any significant contamination of the environment." This is an assumption. The statement then goes on to say that the "experience base is not large enough to permit a reliable quantitative statistical inference. It does, however, suggest that significant environmental impacts caused by accidents are very unlikely to occur over time periods of a few decades." It is disturbing that the Draft Statement claims in one sentence that the experience is not large enough to permit statistical evaluation, and in the next sentence is willing to finish the matter with the statement that this same inadequate data is enough to suggest that we need not worry about the environmental impact of these accidents. Further on in the report in Section 5.9.4.5 (1), the following statements are made. "The results shown in the table reflect the expectation that engineered safety and operating features designed to mitigate the consequences of the postulated accident would function as intended." I find this statement particularly interesting in view of the fact that most of the documented nuclear power station accidents in the past have occurred precisely because the "engineered safety and operating features" do not "function as intended."

I realize that the building and operation of a nuclear power reactor is an immense and complex project. Similarly, I understand how difficult it is to explain the workings and dangers involved in such a project. Nevertheless, the public has been aware for some time now that the nuclear power industry and associated government regulatory agencies have almost routinely underestimated the difficulty and cost of making nuclear power safe power. It is with this history behind us that those of us concerned with the proliferation of nuclear power view much of the current effort at Seabrook. In all sincerity, the Draft Environmental Statement related to operation at Seabrook does not put these fears to rest. One of the most glaring omissions in the Draft Environmental

Statement is the difficulty, or perhaps the impossibility, of assessing the human factor in the construction, operation, and maintenance of these power plants. All of us who work with radioactive materials are familiar with how much more complicated our jobs are, because of our having to spend time and energy in the effort to prevent and detect accidents involving radioactive material. Every facility using radioactive material have very detailed programs which they must follow. We have these programs because people make mistakes. Errors both of omission and commission must be expected, for they will happen. And until some program is developed to evaluate nuclear power technology without placing large segments of population at risk, I find this form of power generation unacceptable. I am opposed to making the people of the Northern Atlantic Seacoast and adjoining areas the experimental animals in our attempts to perfect the use of nuclear power for the generation of electricity. It is our obligation to approach the problems of nuclear power in the same way that we would approach any potentially useful but obviously dangerous technique that we hope to use to our advantage. It is as a physician that I say to the commission that our major responsibility to the people is not to inflict harm upon them. That responsibility must take priority over providing them with inexpensive electrical power.

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