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CT-1299

November 21, 1980

TO: Dr. Stephen Lawroski, Chairman (c/o Gary Young)
Sub Committee on Radioactive Waste Management
NRC-ACRS
Washington DC 20555

FROM: Richard F. Foster, Consultant

SUBJECT: Comments on Proposed Rulemaking on the Storage and Disposal of Nuclear Waste (Waste Confidence-PR-50,51)

Consultants have been asked for their views on:

1) Confidence that safe off-site disposed of radioactive waste from licensed facilities will be available;

2) When any such disposal or off-site storage will be available; and

3) If disposal or off-site storage will not be available until after the expiration of certain operating licenses, whether the wastes from those facilities can be safely stored on-site until disposal is available.

We are also asked to identify those issues which need further attention by NRC staff or by DOE.

Relative to Item 1 - Confidence that safe off-site disposal will be available: In my view, there is no question that this can be accomplished. The current direction of deep geologic disposal at environmentally favorable sites combined with high intregity packages is undoubtedly "safe". An alternative that I believe will also be shown to be "safe" is sea bed implacement.

A key element in a determination of confidence is the term "safe". This has not been defined -- and it is probably in the jurisdiction of EPA to make such a determination. What is needed is a pronouncement that some dose rate (e.g. x mrem per individual during his life span) from a waste repository is sufficiently low to be accepted as

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"safe" by the public, or (and perhaps better in this situation) that the probability of a serious health risk is sufficiently low (dose x probability of receiving it x probability of a cancer resulting) that is is acceptable to society. In the absence of such a determination of what is "safe", the engineers and those who establish performance criteria have little choice but to go all out for perfection -- or as close to zero release (and subsequent dose) as can be achieved.

Once the sites have been selected, the depository designs completed and the waste form and packaging established, the complex dose models can be exercised to produce (with great uncertainty) an estimate of dose to people -- which from preliminary calculations has already been shown to be trivial. The expectation is that the dose will be so trivial that all reasonable people will agree that the disposal is "safe". But there will still be no reference base of what is safe enough, no determination of how super safe the repository is, no yardstick to gauge how much uncertainty can be tolerated in the complex system as a whole, and thus no solid reference for "confidence" that "safe" disposal can be achieved.

An alternative direction that I believe would provide a much better perception of confidence would involve:

(a) A definition of "safe" -- at least for the purposes of this rulemaking. If EPA will not produce one, then NRC should offer its own.

(b) The adoption of a source term for release of radionuclides based on only the waste form and/or package. I would expect that this feature is already well enough established and that the degree of uncertainty is relatively small so that confidence is high and vulnerability to intervention is limited.

(c) The postulation of people consuming water directly from the repository with no credit for clean up in the surrounding geologic media or for radioactive decay after leaching from the package.

(d) If needed to reach the defined "safe" concentration, adjustments could be made for density of packages in the depository, and water flow (or dilution).

If "safe" disposal can be demonstrated by a scheme similar to that proposed, then there need be no concern for uncertainties associated with such things as rock fracturing, ion exchange and geochemistry in the surrounding media, and travel times back to the biosphere. All of these features would just add additional factors of "safety" that would enhance the confidence -- not reduce it. Further, there would be no need for delay in starting construction of a facility until multiple agencies, laboratories, and field tests had completed their work (if ever).

In summary, I have confidence that safe off-site disposal can be made available, but I do not believe that this confidence can be shared with a major segment of the public until there is some agreement on what is meant by "safe". The present approach to developing a safe repository focuses on ALARA-type performance criteria for multiple barriers and side steps the issue of how good is good enough. Inherently, the approach avoids a basis for quantifying any degree of confidence for safety.

Relative to Item 2 - When such disposal or off-site storage will be available: From the aspect of technical/engineering capability I see no reason why an ultimate disposal facility could not be sited, designed and constructed well in advance of 2007-2009, the expiration dates of the licenses of the nuclear plants of special interest in this regard. However, I am not fully confident that the political problems of siting within specific states will be resolved early enough to accomodate final detailed design, proof of site characteristics, and construction by the year 2000. Nor am I fully confident that the technical staffs of NRC, EPA and possibly the states will agree that enough laboratory and field data of impeccable quality has been accumulated to justify approval to proceed. Although the acquisition of technical information is involved, it is the attitudes of people, including the citizens and representatives of specific states and of Congress, as well as the Administration and its regulatory agencies that most heavily impact the time schedule. We can do little more than provide a judgement on whether the required technical information can reasonably be developed within the time frame required.

my view, there is ample time to develop the required technical information. However, this does not include all of the information that is now contained in the DOE and NRC Waste Programs. A substantial part of the problem is associated with the current approach that involves performance criteria for each of the several media and barriers involved. In order to proceed with the system as a whole, each step must be fully characterized, evaluation criteria and methodology developed for it, and adequate proof of performance demonstrated by the applicant -- in many cases for a time span of at least a thousand years. Any substantial uncertainty can be viewed as a challenge to the confidence for "safety". There are so many elements (barriers) involved, and thus soft-spots that can be challenged that potential research and questioning is virtually endless. In the section above I have proposed a streamlined approach that would allow a finding of confidence of safe disposal in a matter of a couple of years. Subsequently, design and construction could proceed on the basis of probable superior performance -- rather than the elaborate proof that each feature could forever meet ALARA-type criteria that had to be chosen somewhat arbitrarily early in the game.

I note with interest that the proposed rule includes a consideration of off-site storage as well as disposal in relation to the time when waste (fuel?) stored at a licensed facility might have to be moved. I would certainly agree that continued storage of spent fuel in conventionally designed facilities, either at new commercial sites or on an existing federal reservation could be accomplished safely and economically. Further, such storage should be quite safe for at least several decades, until any remaining problems (such as siting) of ultimate disposal facilities are resolved. The experience of some European countries who are following this plan should be available in the needed time frame.

Relative to Item 3 - Interim storage on-site until disposal is available: In my view, this question becomes somewhat moot if our contention is correct that off-site storage (if not ultimate disposal) can be provided by the year 2007-2009. If for some reason off-site storage is not available when needed, I do not view continued on-site storage as a substantial technical or political problem.

If the shut-down site as a whole is to be decommissioned, then the relocation of the stored waste (fuel) will obviously need to be a part of the operation. Such decommissioning probably could not proceed unless some off-site facility was available to receive high level waste of several types. In the absence of an off-site waste storage facility, continued tending and maintenance of the on-site facilities would be mandatory and some small scale problems would probably develop from time to time. It seems very unlikely that a problem would develop with on-site stored waste that approaches that of the current TMI-2 waste water situation. If TMI-2 can be decontaminated satisfactorily I would have no qualms about prolonged on-site storage.

Sincerely,

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