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May 23, 1985 (Return to WM, 623-SS) 13

Mr. Hubert J. Miller, Chief
Repository Projects Branch
Division of Waste Management
U.S. NRC, Mail Stop 623-SS
Washington, D. C. 20555

Dear Mr. Miller:

We are sending you the comments of the Yakima Nation on the "Draft Generic Technical Position: Waste Package Reliability", released by your office in October, 1984.

We are somewhat late in preparing these comments due to the need to focus our efforts on the review of the Draft Environmental Assessment. I hope you may understand the extremely limited time allowed to us by the DOE for this purpose.

Sincerely,

Russell Jim

Russell Jim, Manager
Nuclear Waste Program

RJ/skc
cc: J.Hovis
D.Tousley
L.Lehman

SUBJECT: Comments on the "Draft Generic Technical Position: Waste Package Reliability" U.S. NRC, October 1984

DATE: May 20, 1985

The Nuclear Regulatory Commission (NRC) has prepared a draft technical position to provide guidance for an acceptable method for demonstrating reasonable assurance that the waste package designs proposed by DOE will meet the performance objectives of 10 CFR 60.

In this review, we presents possible interpretations of certain NRC statements and proposes some views which could provide stronger support to NRC's technical position.

1. Page 2: "(a) Containment of the HLW...will be substantially complete for a period of 300 to 1000 years after permanent closure".

The substantially complete containment is never clearly quantified. Even if the terminology becomes well defined, the NRC must assure that its requirements are met. In this case, there must be a mechanism by which the assurance can be verified.

2. Page 2: "Demonstration of compliance...will involve the use of data from accelerated tests and predictive models that are supported by such measures and field and laboratory tests, monitoring data and natural analog sudies."

The uncertainties that would result from field and laboratory tests, as well as monitoring data could be difficult to quantify. Therefore, the NRC should develop a rigorous procedure by which the DOE compliance data can be fairly judged. The adoption of such a procedure should allow enough time so that peer review procedures can be conducted, a high degree of assurance from DOE and NRC can be obtained, and concerns of affected tribes can be met.

3. Page 2: "Reasonable assurance is the standard; however, the staff expects that the information...will include probability distribution functions for the consequences of...events which may affect the ability of the repository to meet the performance objectives".

This statement of considerations needs further clarification. First, the mechanism by which reasonable assurance can be quantified must be specified; once this is done, assuring the adequacy of the set "standard" will become possible. Secondly, the form and parameters of a probability distribution function should be established prior to the licensing, in order to eliminate vagueness in the NRC position. Such an outcome will be extremely beneficial for both technical and administrative audiences.

4. Page 3: "at the time DOE applies for a license, (they) must address the following:
(d)...potential sources of uncertainty and their impact on containment and on release of radionuclides from the waste package:"

The listed sources of uncertainty are not consistent with each other. For example, there is not much difference between 'groundwater flow rates' and 'groundwater flux and flow rates' as sources of uncertainty. In addition, 'groundwater chemistry' is not a very precisely defined source of uncertainty; it is much more ambigious than 'pressure and stress fields'. There are many parameters such as Eh, pH, conductivity, radiolysis, etc. which comprise 'groundwater chemistry'; this source of uncertainty should be more clearly defined.

5. Page 4: "The identification process (of potential failure modes) should continue until independent reviews by knowledgeable technical persons fail to reveal new failure modes."

The identification of <u>all</u> waste package system failure modes is extremely important. The NRC should more clearly set the rules by which the full identification process is judged complete or satisfactory.

6. Page 5: "The applicant should identify the most important failure modes and parameters, for example, by sensitivity studies using codes based on the best available models and data."

It is not clear whether this statement implies that codes have built-in failure modes criteria. If they do, thresholds of failure can only be partially determined by sensitivity studies since failure types/criteria are set a priori. In this case, the criteria to be used, and the methods by which sensitivity studies can determine failure are not well defined.

A more reliable mathematical framework which can be used to study the smooth system dynamics and from which onset of failure will naturally emerge is more desirable than the previous one since substantial failure rules can be eliminated.

7. Page 6: "The applicant should describe in detail...the materials specifications...for:

a) The waste form, including the radioactive waste and any associated encapsulation or stabilization media."

The description of this information, especially that pertaining to defense waste, may entail releasing classified materials specifications. If so, how would national security be affected?

8. Page 7: "These material properties may include the original component compositions and the mechanical, chemical and thermal properties..."

Nuclear properties are also required since phenomena at the atomic level are taking place.

9. Page 8: "TABLE 1"

It is believed that the list of generic properties is incomplete. Final generic and complete properties are determined only after extensive testing, and literature and peer reviews are completed.

10. Page 8:
'Nuclear Stability' should be included in the 'Function' coulumn as Nuclear/Mechanical Stability. Many of the material properties associated with a mechanical study are a result of the phenomena occuring at the atomic level.

11. Page 8: "Resistance to Hydrothermal Alteration...T-V-P Points for change of Phase."
For solids, the concept of stress tensor should be used instead of pressure. Pressure implies isotropic and fluid-like conditions, while conditions in the host rock environment are more likely non-isotropic.

12. Pages 12-13: "In assessing the consequences of significant failure modes,...Other probabilistic approaches may also be used."
This paragraph is extremely clear and concise, and reflects an excellent approach of the NRC. Other technical positions should also be as clearly and concisely presented.

13. Page 13: "(b) Uncertainty in constitutive relationships and conceptual models...
(c) Uncertainty in the mathematical models that are used to describe constitutive relationships..."
Differences between these two statements are not clear, nor are their implications on the NRC rules.

14. Page 19: "A mechanical failure able to predict damage to the canister due to stresses."
Thermal, radiation and chemical stresses should also be used to predict damage.