UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

WM DOCKET CONTROL CENTER

July 18, 1986

'86 JUL 21 P12:49

Mr. Everett A. Wick
Division of Waste Management
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Re: NBS Review of Final Environmental Assessments for Yucca Mountain (NNWSI), Hanford Reservation (BWIP), and Deaf Smith (SRP).

Dear Mr. Wick:

On Monday, July 14, we informally transmitted to you the NBS Review of of DOE's Final Environmental Assessments for the three sites noted above. Attached is an additional comment for the Hanford Reservation site. There are no changes in our reviews for the other two sites.

If you have any questions please call me at 921-2997.

Sincerely,

Charles G. Interrante

Charles G. Interrante
Program Manager
Corrosion Group
Metallurgy Division

1 Enclosure

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Additional Comment - Hanford Reservation Site - 7/18/86

The present BWIP design calls for the use of a carbon steel overpack 3.3 inches thick. This paragraph expresses the concern that gamma radiation will be transmitted through this overpack and be present outside the waste container to effect radiolysis of the groundwater. A subsequent contribution to the general corrosion of the waste container will result. For any material, the transmission of radiation is described by the following well known relation:

$$I_x^\gamma = I_o^\gamma \exp[-\mu_\gamma \rho x]$$

where I_x^γ is the intensity of radiation (with energy γ) after traversing a distance, x (cm), through a medium with a mass absorption coefficient, μ_γ (cm^2/gm), and a density ρ (gm/cm^3). I_o^γ is the initial intensity of the radiation with energy γ. During its interaction with matter, gamma radiation "absorption" is not complete; some of the energy of the initial γ_o radiation is truly absorbed while the remainder of the energy is scattered. The scattered electromagnetic γ wave (now at a lower energy than γ_o) continues through the material (to be subsequently absorbed, scattered, or transmitted). Consequently, the intensity (I_x^γ) calculated above (which gives the amount of radiation of specific energy γ traversing a medium without being either scattered or absorbed) will underestimate the actual intensity present (the degree of underestimation being reduced as the radiation energy increases).

For the case in point, steel, the mass absorption coefficient for a medium γ radiation energy, 1 MeV, is .06 cm^2/gm and the density of pure iron (7.86 q/cm^3) is used. For a reduction of I_o^γ (at 1 MeV) by a factor of 100, the above equation is solved to give a value of x (thickness) equal to 9.9 cm (i.e. ≈ 4"). A reduction to 1% is not a large reduction. For 3.3" of steel the reduction is only to 2%. Consequently, even by use of a conservative equation (such as given above) the γ radiation intensity is calculated to still be significant after going through 3.3" of steel.