



Schneider

STATE OF WASHINGTON

DEPARTMENT OF SOCIAL AND HEALTH SERVICES

Olympia, Washington 98504

July 26, 1985

Donald A. Nussbaumer
Assistant Director for
States Agreements Program
Office of State Programs
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Nussbaumer:

By letter dated March 4, 1985, you requested our comments on the (Envirostone Gypsum Cement Topical Report). First we would like to compliment the NRC on their thorough review of the report and the excellent comments that were generated. In fact, it was difficult for us to find additional deficiencies to comment on.

The report forwarded to us was apparently less complete than the Topical Report reviewed by the NRC. The NRC review included references to information on pages up to and including 113. The document we reviewed had only 84 pages, about 30 to 40 pages less than the NRC reviewed report. In the future, we request that the same material which the NRC reviews be submitted to the State, whether it is proprietary or not.

The state of Washington by License Condition 15 of US Ecology's License Number WN-1019-2, Amendment 16, dated December 23, 1983, authorizes the use of Envirostone as a stabilizing agent. Since that date, several hundred containers of Envirostone cement have been received and disposed at the Richland commercial low-level radioactive waste burial site. Our inspections at the site have not detected any improperly solidified container contents with the use of Envirostone. So far, we have no reason to discourage the use of Envirostone for those waste generators using the solidification material.

While attempting to correlate the data given in the report, we found anomalies and omissions. For example: Page 19 under "Waste Stream: Neat" the density of the material is reported as 92.7 pounds per cubic foot and the compression strength as 1550 psi. At the bottom of the page for a slurry sample, presumably of the same formulation, density is reported as 84.8 pounds per cubic foot and compression strength as 913 psi.

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Donald A. Nussbaumer
July 26, 1985
Page Two

Also, there appears to be no given equivalent specific gravity for Envirostone cement, so attempts were made to calculate on the basis of data given. On page 18, that same neat mixture, for a 55-gallon drum the formula is 300 pounds Envirostone cement and 38.5 gallons of water. From these data, the report infers that 300 pounds of cement has an absolute bulk of 16.5 gallons or an equivalent specific gravity of 2.18 grams per cubic centimeter. On page 26, with a different but nonetheless aqueous solution, the equivalent specific gravity is 1.31 grams per cubic centimeter. Granted, a simple comparison of the two cases is not possible, but a 40 percent difference is difficult to understand. I would suspect that this difference has large implications for the recipe used. Are various recipes (proportions) given for each waste stream or is there a methodology given which must be followed?

There was no mention of the percent of entrained air in the final solid. Different modes and different speeds of mixing will result in different amounts of entrained air and different densities of the final product. It may be that the mixes are thin enough that air entrained by the mixing escapes before the material sets up, but this is not mentioned either.

We have reviewed the "Envirostone Topical Report" against criteria established for stabilization of radioactive waste as outlined in the NRC Branch Technical Position (BTP). From the BTP we developed a "stability checklist for the acceptance of Class B and C Wastes". This checklist will be used to evaluate requests for disposal of these specific types of wastes. A completed checklist used in this review is attached as Appendix A. We conclude that continued use of Envirostone does not appear to be in violation of any criteria for producing a stable package for Class B or Class C wastes. Please advise if and when the NRC review should find Envirostone no longer an acceptable stabilizing agent.

Sincerely,


Nancy P. Kirner, Supervisor
Radioactive Materials Unit

NPK:sm

STABILITY CHECKLIST FOR ACCEPTANCE OF CLASS B & C WASTES

	Yes	Don't Know	No
1. Compressive strength \geq 50 psi (in accordance with ASTM C39, C472 or D1074 for bituminous products).	✓		
2. Does the waste form have a compressive strength \geq 50 psi after exposure to 10^6 rads per ASTM D1672 (or at the expected maximum dose if 10^6 rads is exceeded)?	✓		
3. Are process control parameters developed to maximize practical compressive strengths?	✓		
4. Does the waste form have a compressive strength \geq 50 psi after testing for biodegradation (in accordance with ASTM G21 and G22 and ASTM C39 or D1074)?	✓		
5. Are polymeric or bitumen products involved? If so additional testing should be performed on samples with visible culture growths.			✓
6. Is the leachability index greater than 6 after a 90 day leach period (per ANS 16.1)?	✓ *		
7. Does the waste form have a compressive strength \geq 50 psi after a 90 day immersion period?	✓		
8. Does the waste form have a compressive strength \geq 50 psi after thermal cycling (30 cycles of - 40 C to 60 C; sections 5.4.1 through 5.4.4 of ASTM B553)?	✓ *		
9. Does the waste form have less than 0.5% free standing liquid by volume. Is the pH of any liquid between 4 and 11? (Reference: ANS 55.1)	✓		
10. Will the waste form maintain its gross physical properties for a period of 300 years?		✓	
11. Are the void spaces minimized (less than 10% void space)?	n/a		
12. Is the waste classified properly?	n/a		

Ra-226 and TRU sources with concentrations of 10 to 100 nCi/g averaged over and stabilized in a structural concrete matrix will pass items 1-9. The checklist for packaging requirements should be checked as well as the following items for these Ra-226 and TRU sealed sources.

	Yes	Don't Know	No
A. Is the matrix of structural concrete (compressive strength greater than 2000 psi).	n/a		
B. Was the concrete protected from temperature extremes (below 40 F or above 100 F) for a 28 day cure period?	n/a		
C. If a source, is it geometrically centered in the concrete matrix (the sealed source should also be inside another container, 2 R or pig etc.)?	n/a		
D. Does the package meet the DOT test criteria at the gross weight of the package (Mound report or other test data)?	n/a		

* per NRC approved modification to suggested testing procedures