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Submitter Information

Name: John LePere
Address:
16 Bank Street
Peekskill, NY, 10566
Organization: WMG Inc.

General Comment

WMG Inc. comments on Blending of Low Level Radioactive Waste

Attachments

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Add: J. Kennedy (JEK1)

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16 Bank Street • Peekskill, NY 10566
914-736-7100 • Fax: 914-736-7170
www.wmginc.com

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Chief, Rulemaking and Directives Branch
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Subject: **WMG Inc. Comments to the NRC on the Blending of Low Level Radioactive Waste**

WMG Inc. is a Nuclear Services organization specializing in Low Level Radioactive Waste Characterization services. WMG has successfully applied the regulatory requirements of 10 CFR Part 61 and 10 CFR 20 as well as the associated regulatory guidance since inception. This guidance is contained in the May 11, 1983 "Final Waste Classification and Waste Form technical position papers", the January 24, 1991 "Waste Form Technical Position" Revision 1 and the January 17 ,1995 Final Branch Technical Position on Concentration Averaging and Encapsulation with Revision in Part to the Waste Classification Technical Position.

The activity concentration limits for shallow land disposal of low level radioactive waste established in 10 CFR Part 61 were based on consideration of exposure pathways under various postulated inadvertent intruder scenarios. By establishing concentration limits on a nuclide specific basis, the regulations effectively limit the amount of activity, per nuclide, which can be present in a given geometric and geographic location within the disposal environment.

It is important to note that the differences in the three levels of NRC waste classification specified in 10 CFR 61 (Class A, B and C) are not a function of more toxic or hazardous nuclides being allowed in the higher classes but merely the total activity of the Table 1 or 2 nuclides which can be present in a given package as a function of the individual nuclide concentration limits.

That being said, the concept of blending or mixing of low level radioactive materials is a practice that is appropriately controlled by the current regulations and technical positions. Mixing or blending of LLRW waste streams has been undertaken at licensed facilities as a matter of design and/or physical limitations of the systems in which the waste is generated and collected. This was recognized in the two clarifying Branch Technical positions issued by the NRC subsequent to the initial 1983 position. The January 1991 position on waste form focused on the specific performance criteria necessary to provide additional stability for class B and C wastes and also captured the fact that Class A concentrations of waste do not require the same level of stabilization in the disposal environment to meet the disposal site performance criteria. That is the basis for Class A solidified materials only needing to be a free standing monolith (section C.1.) as opposed to Class B and C waste which must meet the Waste form qualification testing (specified in section C.2). Segregation of the Class A waste from the Class B/C waste in the disposal environment serves to prevent failure of the engineered systems for disposal of the B/C waste. Stability is allowed but not required for Class A waste.

The January 17, 1995 Branch Technical Position clarified the concept of mixing for the full spectrum of generated and collected wastes of differing nuclide distributions and/or concentrations. This technical position specifically excluded from the definition of mixing, that collection of waste which occurs in various plant systems and tanks for purposes of operational efficiency and dose reduction. It provided a limitation of a maximum factor of ten difference between the maximum or minimum concentrations and the average concentration for a given batch of waste. This effectively limits the extent to which a generator could utilize the mixing rule to reduce concentrations. Although not specifically stated in the position, the intent was to provide a means to address potentially stranded wastes that fell outside the individual waste class concentration limits. In practice this provided a means to adequately control disposal of potentially greater than Class C wastes by mixing with material of similar but slightly lesser concentrations. Although this has been historically applied for the higher concentration (Class C) wastes it is conceptually the same regardless of ultimate waste class. So long as the final package/waste form meets the concentration limits and waste form criteria for a given class, then the waste can be appropriately disposed of as that class regardless of how or where the mixing occurs.

In order to better control the concept of mixing, additional criteria which further limits the extent to which blending can occur is specified in the 1995 Technical Position in situations where primary gamma nuclides are classification controlling (i.e. Co-60, Nb-94 or Cs-137 / Ba-137m). In these cases, the maximum to average/average to minimum concentrations must be within a factor of 1.5 rather than 10.

In summary, the following comments are provided regarding regulatory guidance on the practice of blending/mixing and concentration averaging.

- DAW has clearly been recognized as a "homogeneous" waste stream that can be centrally collected and combined in disposal containers without regard to any limitations on mixing. This is necessary for operational efficiency and dose reduction at virtually all licensed facilities and the guidance on this practice should remain unchanged.

- We believe that blending and mixing are synonymous in terms of materials such as soils, ion exchange resins and filter medias such charcoal, diatomaceous earth etc. All can achieve relative homogeneity within the limitations of material densities and physical properties. Concentration averaging of materials that are blended without regard to the factor of 10 limitations will not reasonably result in a waste package that challenges the engineered controls in the disposal environment so long as the average concentration of the package meets the individual waste class concentration limits, regardless of ultimate class. This occurs routinely in collection tanks in many licensed facilities.

- Filters are identified as being potentially homogeneous or discrete wastes. Concentration averaging of discrete materials (filter cartridges / irradiated hardware) should be bound by the appropriate limitation of either a factor of 10 or 1.5 as currently specified in the Regulatory position papers. Co-location in a single disposal package of discrete batches of waste that individually meet the concentration limits for a given waste class, can be reasonably concentration averaged over the entire volume of waste in the individual package. When filters are solidified in an approved matrix the resultant waste form should be considered homogeneous for purposes of classification regardless of the degree of preprocessing or physical distribution of activity that may occur within the envelope of the solidified mass.

- Appendix C of the 1995 position discusses encapsulation or solidification of discrete sources. The example provided relates to encapsulation of a single source in a typical 55 gallon drum as the basis for the maximum volume over which concentration averaging would occur. Although we agree with the limitation, historical data and industry practice since issuance of the position indicates that larger disposal containers provide the operational efficiencies and dose reductions desired and the NRC Branch Technical position should be modified to clearly recognize the acceptability of solidification of multiple sources in a larger container while holding the binder to waste ratio as specified in the current guidance (i.e. 7 to 1). Concentration Averaging over the entire solidified volume should continue to be the basis for determination of final disposal waste class.

The discussions conducted at the January 14th public meeting revolved around stakeholder input and potential paths forward for the NRC regarding blending. Although the industry can continue to function without any changes to the existing regulations and technical guidance, a re-issuance of the technical guidance in a single document that collects the requirements from the existing three documents and which clarifies the acceptability of blending , the requirements for classification based on average concentrations in the final waste package and a clear differentiation of the waste form requirements for Class A waste versus Class B/C wastes would be useful to all generators. Any proposed revision to the individual nuclide concentration limit values specified in 10 CFR Part 61 should be handled by the full rulemaking process at some future date and should be separate and distinct from clarifications on the current blending requirements and limitations.

Respectfully,

John LePere
Nuclear Services General Manager
WMG Inc.
16 Bank Street
Peekskill, NY 10566

JL/dd/