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January 19, 2000

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Subject: NRC, Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Possession Licenses for Manufacturing and Distribution. NUREG-1556, Vol. 12, July, 1999

These comments on the above referenced subject are submitted on behalf of the Council on Radionuclides and Radiopharmaceuticals (CORAR)¹.

CORAR members manufacture and distribute radioactive materials and are therefore interested in this new guide. CORAR perceives NUREG-1556, Vol. 12 to contain much program information that is useful to both the licensee and the regulator.

Attached is a minor technical comment concerning shielding of high-energy beta emitters.

CORAR appreciates the opportunity to comment on this NUREG guide and would be glad to provide further comments or clarification if needed.

Yours sincerely

Leonard R. Smith
Chairman, CORAR Committee on Regulatory and Legislative Issues

¹ CORAR members include the major manufacturers and distributors of radiopharmaceuticals, radioactive sources and research radionuclides used in the U.S. for therapeutic and diagnostic medical applications and for industrial, environmental and biomedical research and quality control.

CORAR COMMENTS ON NUREG-1556 VOL. 12, CONSOLIDATED GUIDANCE ABOUT MATERIAL LICENSES. PROGRAM-SPECIFIC GUIDANCE ABOUT POSSESSION LICENSES FOR MANUFACTURING AND DISTRIBUTION

1. Page 8-49 Fig. 8.13

"This worker is using a high density plastic shielding, which is appropriate for radioisotopes that emit high energy beta radiation."

Page J-2, Paragraph 3

"Shielding of low atomic number material, such as high-density plastic, may be used to reduce exposure from high-energy beta-emitting materials".

Page P-3, paragraph 2

"The use of low-density plastic in order to keep bremsstrahlung radiation to a minimum".

- a. In the above sentences recommendations could be confusing to licensees for three reasons:
 - i) Both high-density and low-density plastics are recommended. Which one is intended?
 - ii) The density of the plastic is not really the most relevant parameter.
 - iii) Optimal shielding requirements will depend on the intensity and energy of the beta radiation, the type quality and configuration of local shielding in place and the duration of personnel exposure in conducting the operation with a high energy beta emitting radionuclide.
- b. Generally, when the exposure is likely to be small, shielding containing materials (usually plastic) of low atomic number in sufficient thickness to absorb all the beta radiation shall be all that is needed to eliminate direct exposure to betas and minimize the generation of secondary bremsstrahlung.
- c. In operations using large quantities (i.e. multi mCi quantities) of high-energy beta emitting radionuclides and/or longer exposure times, it maybe necessary to also reduce the bremsstrahlung by adding shielding containing high atomic number material such as lead. The most effective arrangement is to have a two-layered shield. The layer closest to the radiation source should be the same as in b. above. An outer layer should use sufficient lead loaded plastic to absorb the bremsstrahlung. In practice, it is often more cost effective to simply use a single thicker shield of lead loaded plastic.
- d. For greater than 100 mCi quantities of high-energy beta emitting radionuclides, the need to apply more shielding may require an impractically thick lead loaded plastic shield. The alternative to use other materials, such as lead loaded glass, might be necessary. Usually it is more practical to use just pure lead for the outer shield layer and use mirrors or other indirect methods to view the source.