



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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October 10, 1996

MEMORANDUM TO: Bill M. Morris, Director  
Division of Regulatory Applications  
Office of Nuclear Regulatory Research

FROM: Margaret V. Federline, Acting Director *m v Federline*  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: REVIEW AND COMMENT ON IAEA CONSULTANT'S DRAFT:  
"CRITERIA FOR CLEAN-UP OF CONTAMINATED AREAS"

In response to your memorandum dated September 6, 1996, the Division of Waste Management has reviewed the subject document that was prepared for the Division of Radiation and Waste Safety of the International Atomic Energy Agency (IAEA) at a meeting of its consultants between June 24-28, 1996. In addition to both the general and specific comments listed below, we have attached a mark-up on the subject document.

GENERAL COMMENTS

The document appears to be focused on a discussion of related issues rather than a presentation of criteria. If the document is intended to support criteria, the paper should include a proposed resolution of the pertinent issues.

We found the concepts of "practices" and "interventions" as applied to clean-up situations to be very "confusing." Paragraph 224 is an example of the logical complexity and possible confusion that is possible when these definitions are applied to the residual contamination that remains after an "intervention."

We believe that exposures from residual contamination must be treated the same for routine decommissioning cases as for intervention cases. As an example, for the intervention situations described in sub-sections (b) and (c) of Paragraph 227, we would apply dose objectives for unrestricted use (unless some institutional control program is applied for restricted use of the site).

The analyses should also address the impacts of radiological decay and the variation of exposure with time on the clean-up situation. One example of a situation of this type might be where a relatively high exposure from short-lived radionuclide might be considered tolerable if institutional controls were to ensure public safety within the complete decay period.

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#### SPECIFIC COMMENTS

Paragraph 207:

If the need for clean-up operations at the end of a practice has real significance, the text needs to expand the discussion.

Paragraph 209:

We could not find Figure 2.2 in the text.

Paragraph 228:

The text indicates that for some interventions (e.g., "constrained interventions") criteria similar to those for practices might be employed. This latter term should be more clearly defined at this point in the text, and also in the Glossary.

Paragraph 401:

The analysis of potential multiple sources of contamination should also be addressed. The draft criteria assume only one area as a single source of radiological contamination, but it is not uncommon to find human exposure associated with several areas that have multiple sources of contamination.

Paragraph 406:

The level of human exposure to background natural radiation is cited as one of the justifications for the tolerable risk. The presence of natural background radiation could also be used as justification to reduce excess risk from any other sources.

Paragraph 423 and Figure 4.1:

In Band 3, Paragraph 423, the recommendation to perform clean-up "rarely unless constrained" at contaminated sites with annual dose rates in the range of 100  $\mu\text{Sv/y}$  to 1  $\text{mSv/y}$  (10-100  $\text{mrem/year}$ ) is inconsistent with NRC's proposed rule. This rule would require cleanup to 150  $\mu\text{Sv/y}$  (15  $\text{mrem/year}$ ) plus additional ALARA measures for release for unrestricted use.

It may be necessary to demonstrate that the generic criteria apply to the variety of contaminated sites that are to be cleaned up. Typically, a generic and prudently-conservative analysis is used to develop generic criteria, whereas a more detailed, site-specific analysis is used to develop alternate criteria. Additional analyses, which are based on site-specific exposure scenarios, might also be necessary to demonstrate that these clean-up criteria will result in negligible risk to the health of the public.

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## Appendix B:

The results of the example calculations for generic action levels described in Appendix B are not applicable to the USA since most of the concepts and parameters used in the analysis are quite different for the USA. For example, the costs of remediation, which are considered most significant for the cost/benefit analyses in Appendix B, may not be perceived by the American public as the most important factor in optimization. While in the USA the value cost per person-rem averted is currently \$1000, the values listed in Appendix B range from around \$80 to \$400 per person-rem. The use of fixed costs of remediation to justify the derivation of generic criteria may also not be appropriate because these costs depend on variety of factors that depend on the technology and economics which vary for each site-specific clean-up situation.

We believe that the cost-benefit analyses in appendix B did not properly address long-term, future use of decommissioned land. The analysis was based on parameters that apply only to the present situation rather than on potential future use of the land assuming no institutional controls. An analysis of potential land use and potential migration of contamination should also be performed to establish the criteria.

## Appendix D:

The use of 10 mSv/y (1000 mrem/y) as the upper bound of the tolerable exposure for individual members of the public is inconsistent with current international and national value of 1 mSv/y (100 mrem/y).

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Attachment: As stated

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The results of the example calculations for generic action levels described in Appendix B are not applicable to the USA because most of the concepts and parameters used in the analysis are quite different for the USA. For example, the costs of remediation, which are considered most significant for the cost/benefit analyses in Appendix B, may not be perceived by the American public as the most important factor in optimization. While in the USA the value cost per person-rem averted is currently \$2000, the values listed in Appendix B range from around \$80 to \$400 per person-rem. The use of fixed costs of remediation to justify the derivation of generic criteria may also not be appropriate because these costs depend on variety of factors that depend on the technology and economics which vary for each site-specific clean-up situation. In addition, such evaluations should consider risk-risk tradeoffs, as well (risk reduction to future inhabitants vs. worker injuries on transportation accidents).

We believe that the cost-benefit analyses in appendix B did not properly address long-term, future use of decommissioned land. The analysis was based on parameters that apply only to the present situation rather than on potential future use of the land assuming no institutional controls. Therefore, analysis of potential long-term land use and potential migration of contamination should be performed to establish the criteria.

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We believe that the cost-benefit analyses in appendix B did not properly address long-term, future use of decommissioned land. The analysis was based on parameters that apply only to the present situation rather than on potential future use of the land assuming no institutional controls. An analysis of potential land use and potential migration of contamination should also be performed to establish the criteria.

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