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E. O'Donnell

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HEALTH PHYSICS SOCIETY

Specialists in Radiation Safety

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RAYMOND H. JOHNSON, JR., C.H.P., P.E.
481 N. Frederick Avenue
Suite 302
Gaithersburg, MD 20877
Telephone: (301) 990-6006
FAX: (301) 990-9878
E-Mail: rjohnson@radtrain.com

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United States Nuclear Regulatory Commission
Office of Administration
ATTN: Rulemakings and Directives Branch
Washington, DC 20555-0001

SUBJECT: The Health Physics Society's Comments on Draft Regulatory Guide, DG-4006; Demonstrating Compliance with the Radiological Criteria for License Termination

Dear Sir or Madam:

On behalf of the Health Physics Society (HPS), of which I am President, I am writing with comments and recommendations regarding Draft Regulatory Guidance DG-4006 "Demonstrating Compliance with the Radiological Criteria for License Termination" issued for public comment in August 1998. These comments and recommendations were jointly prepared by the Society's Legislation and Regulation Committee and the Decommissioning Section, led by the Chair Kevin Nelson and President Dave Fauver, respectively.

The Health Physics Society is a professional organization of approximately 6,000 scientists, educators, engineers and operational health physicists who are dedicated to developing, disseminating, and applying scientific knowledge of, and the practical means for, radiation safety. The primary objective of the Society is to protect people and the environment from potentially harmful exposure to ionizing radiation. The Society concerns itself with understanding, evaluating and controlling the potential risks from radiation exposure relative to the benefits derived.

Comments and Recommendations

The HPS commends the Nuclear Regulatory Commission (NRC) for its efforts in the development of Draft Regulatory Guidance DG-4006 "Demonstrating Compliance with the Radiological Criteria for License Termination" and related guidance documents. This guidance provides regulatory positions on dose modeling, final status surveys, ALARA and restricted use. This regulatory guidance provides licensees with useful information to plan for decommissioning activities until issuance of final guidance. The HPS has developed the following recommendations and technical comments concerning DG-4006 and related documents for consideration in development of final regulatory guidance and the Standard Review Plan (SRP).

General Comment: Conservatism in Dose Models with Respect to Dose Standard Preferences

The HPS continues to support the NRC approach for adopting an all pathway summed, 25 millirem annual dose standard to support the License Termination Rule (10 CFR 20 Subpart E). The HPS believes that this standard is adequately protective of public health and commensurate with recommendations for other national and international scientific organizations. The HPS also concurs with the NRC that use of the Environmental Protection Agency's (EPA's) National Primary Drinking Water Regulations to establish a separate standard for protecting groundwater is not technically justified.

The HPS recommends that the level of conservatism inherent in dose modeling be discussed with respect to establishing an acceptable dose standard. The current approach to dose modeling supported by the NRC and EPA is germane to the current disagreement between these agencies regarding establishing an acceptable dose standard that is protective of public health. The levels of conservatism inherit in the NRC's dose models and recommended input parameters differ substantially from those used by EPA and the Department of Energy (DOE). Consequently, equivalent Derived Concentration Guideline Levels (DCGLs) may be derived regardless of the dose standard preferred by EPA or the NRC. The HPS believes that resolution of these issues is paramount to ensure that public health and safety concerns will adequately be addressed and that finality of decommissioning of contaminated sites is achieved.

Regulatory Guidance During the Interim Period

As stated in the guidance, the purpose of issuing DG-4006 was to provide acceptable methodologies to licensees that are currently involved in developing Decommissioning Plans (DP) and to solicit stakeholders comments for development of final guidance. For licensees that are currently awaiting NRC approval of DP and dose assessments prepared using DG-4006 methodologies, the HPS is concerned that some of these licensees may

experience significant delays in NRC approval of DP currently under review. If licensees are subject to regulatory inaction, changes in "mid-stream" review methodologies, or reversal/changes in policy decisions, significant increases in cost, loss of momentum of environmental clean-ups, and reduction in the effectiveness of the Timeliness Rule will occur. Grand-fathering of regulations/guidance is a way of recognizing that changes in regulatory requirements and guidance are neither proper nor effective. It is inappropriate to subject licensees at complex sites, who are moving toward decommissioning, to documents that are subject to change. Therefore, the HPS recommends that the NRC approval process for DP submitted during this interim period be limited to consideration of the current guidance provided to licensees. The HPS believes that implementation of this recommendation will facilitate decommissioning of sites that have been awaiting NRC approval of DP at permissible doses prescribed in 10 CFR 20 Subpart E.

Generic Screening and Site-Specific Dose Assessments

The HPS believes that the graded dose modeling methodology described in DG-4006, Section C.1, provides licensees with the flexibility to demonstrate compliance with the Subpart E dose standard, considering the variability and complexity of sites. Use of generic screening dose models, described in Section C.1.2, is well suited for the majority of licensees that are not required to assess complex physical, geological and radiological site characteristics. For these sites, generic screening codes, such as DandD, are adequate for use by licensees. The HPS believes use of generic screening codes for sites lacking complex characteristics provides a cost effective method for assessing compliance with the Subpart E requirements. However, limitations of the DandD model and permissible revisions to the code's input parameters (NUREG/CR- 5512) should be provided to NRC staff in the SRP.

The HPS commends the NRC for providing licensees with guidance when using site-specific information (Section C.1.3) to assume that current land uses practiced at the site will continue for the period of the dose assessment (1000 years). Defining appropriate land use scenarios for future site uses over the next 1000 years is a challenging task for licensees. Projection of future land use trends to characterize the "average member of the critical group" is dependent not only upon current land use (e.g., residential farmers, suburban resident or industrial), but also current available technology, physical characteristics, and social/legal customs practiced.

The NRC has repeatedly stressed the validity and usefulness of site-specific parameters in the dose modeling process to improve the accuracy of final release criteria. The HPS strongly recommends that the same approach be taken with other components of the dose modeling process including land use options and scenario application to the conceptual dose model. Site-specific trends on land use, local habits, physical limitations that affect

local behavior, and the customs and laws applicable to a site are as valid as the hydro-geologic parameters that apply to the site.

Land Use Scenarios and Exposure Pathways

Current land uses in regions with large populations are more easily defined than in regional areas with lower population densities. Data complied by the U.S. Department of Commerce[1] are available to licensees to project future land use trends in low population density regions. These data are readily available for sites to compare land use trends locally, regionally and nationally. The HPS recommends that use of these data be considered in future guidance and the SRP in a manner similar to those used in conducting environmental impact statements (i.e., land use trends within 50 square miles of the site). This recommendation allows sites with low population densities to characterize land use trends in a manner currently used to support regulatory decisions and is compatible with guidance cited in DG-4006.

The NRC has stated in several recent workshops that they were exploring development of regulatory policies regarding exclusion of potential exposure pathways that may not apply based upon the land use scenarios applicable to the site. Currently, only physical limitations to prevent future site residents from receiving pathway dependent doses are considered an appropriate mechanism to eliminate specific pathways. The HPS believes that there are other acceptable physical limitations that would allow exclusion of a pathway, such as insufficient yield of groundwater or non-potable drinking water sources. Consideration of groundwater yields should be included in the future NRC policy and the SRP as acceptable criteria to exclude some water dependent pathways (e.g., crop irrigation and drinking water). However, a definition of "potable water" or description of acceptable water quality parameters (e.g., turbidity, salinity, total coliform) are site specific and vary from state to state, locality to locality. This should be reflected in future NRC policy and the SRP.

The HPS recommends that use of current engineering practices and readily available technology also be considered in evaluating site-specific land use scenarios and exposure pathways. Inclusion of these considerations in future NRC policy and the SRP are compatible with DG-4006 guidance allowing licensees to assume current land uses over the period of the dose assessment (1000 years). The SRP should require licensees to evaluate regional civil engineering and domestic well installation practices. Geological formations, lithologies and typical domestic well installation depths should be considered when determining whether water dependent exposure pathways are appropriate for licensees conducting a site-specific dose assessment. Licensees may have shallow

[1] U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census. County and City Data Books

groundwater contamination not expected to impact drinking water at locations where drinking water is typically obtained. For example, shallow groundwater would only be tapped for drinking water supplies if an uncased, dug well were installed by a future site resident. Civil engineering and public health practices would preclude installation of such a domestic well when readily available technology is employed as a regional practice and in some cases required by state environmental regulations. These technologies and well-siting criteria are intended to reduce toxic substances, such as gasoline, pesticides, human and animal microbial pathogens from contaminating both municipal and private drinking water supplies. The HPS believes this recommendation is a common sense approach (compatible with DG-4006) because these practices are designed to prevent transmission of waterborne toxins and pathogens which may be significantly more harmful than the dose incurred from radioactive contamination.

Methods for Conducting Final Status Surveys

The regulatory position on dose modeling references NUREG-1549, "Decision Methods for Dose Assessment to Comply with Radiological Criteria for License Termination", and the regulatory position on final status surveys references NUREG-1575, "Multiagency Radiation Survey and Site Investigation Manual (MARSSIM)". The MARSSIM is the Federal agency consensus document that provides guidance to regulated parties on an acceptable approach for designing and performing surveys to demonstrate compliance with a dose or risk-based release limit. The Federal agencies represented on the MARSSIM committee are EPA, NRC, DOE, and DOD.

Upon closer inspection of NUREG-1549 and the MARSSIM, it appears that the NRC is providing two separate tracks for demonstrating compliance with the unrestricted release criteria. Specifically, the MARSSIM approach for demonstrating compliance is based on a final status survey for each survey unit at the site. Cleanup criteria (DCGLs), based on dose assessment modeling, are necessary inputs to proceed with the MARSSIM survey design. Therefore, an obvious connection between these two documents is that NUREG-1549 can be used to generate the DCGLs to be used in the MARSSIM survey design. In fact, this use is indeed recognized in NUREG-1549.

However, NUREG-1549 also provides an approach for demonstrating compliance with unrestricted release criteria that apparently does not require the performance of a final status survey. The Decommissioning and License Termination Framework described in NUREG-1549, and illustrated on Figure 1, provides for site release following the performance of a dose assessment. It is unclear how much data would be required to sufficiently characterize contaminant distributions for the dose assessment, and how other conditions, such as the existence of small areas of elevated activity that could exceed the dose criterion, would be satisfied following this guidance. Not withstanding the details

for the NUREG-1549 framework, it seems questionable to offer an approach for demonstrating compliance with release criteria that does not require final status surveys.

Additional Guidance Needed for Survey Units Failing Hypothesis Tests

Draft Regulatory Guide DG-4006 provides limited guidance on how to handle survey units that fail the release criterion at the conclusion of the final status survey. For some cases it may be apparent that the failure was due to the presence of residual radioactivity in excess of the release criterion for which remediation and resurvey are warranted. However, as stated in DG-4006, some failures may not be the result of residual radioactivity in excess of the release criterion. In these situations, DG-4006 offers, "If it can be determined that this is the case, the survey unit may be released." While this seems to be reasonable guidance, it is necessary to provide additional detail for how one would be able to demonstrate that the survey unit complies with release criteria even though it failed the statistical compliance test. For example, would it be necessary to collect and analyze additional samples from the failed survey unit?

ALARA Analysis

Based on the current understanding of the ALARA analysis methodology outlined in DG-4006, Section 3, the HPS has identified several issues that require further clarification in future versions of the guide. While the guidance states the generic parameters listed in Table 3.1 are acceptable, it is not clearly stated in the text whether it is preferable to use site specific data in the present worth equation. Based on the NRC's related efforts to stress the need for site specific data in modeling, the HPS believes that it is also preferable to utilize site specific data similar to that in Table 3.1 in conducting the ALARA analysis.

DG 4006 states that the present worth equation is used for "relatively simple situations." Complex situations and sites are neither discussed nor described. In addition, the utility of equation 18 versus the present worth equation is unclear. The HPS recommends that the appropriate complex site methodology be presented and clearly discussed in the guide as well as in what instance one would use either or both equations.

Another issue that requires clarification is the application of a monetary discount rate for averted dose, including a monetary discount rate for doses averted in 1000 years and another for 100 years. The HPS requests that NRC define the appropriate methodology to calculate the averted dose. It may, in fact, be appropriate to use a new equation that combines the doses averted in the first 100 years and the dose averted in the remaining 900 years.

The HPS has noted that the DG-4006 appears to focus primarily on the unrestricted release scenario and discuss the restricted release case as an afterthought. In the case of the ALARA analysis, little discussion is provided, the section is mislabeled and no examples are provided describing a restricted release case. The HPS believes that the NRC should modify DG-4006 to include a more comprehensive discussion of restricted release and the application of the guide in this case.

Finally, several omissions appear to have occurred in DG-4006. The HPS recommends that the cost of long-term care be included in the total cost equation (for restricted release), the definition of the decay constant be identified in the present worth equation, and that Section 3.1.6 should be titled "Additional Considerations for Restricted Release" in lieu of "Additional Considerations for Groundwater".

Restricted Releases

The HPS again commends the NRC for its efforts to provide flexibility to licensees in selecting a site release option that accurately reflects site conditions and constraints. The option for the restricted release of a site offers the opportunity to release sites across the entire spectrum of contamination scenarios. It will effectively provide both an attainable goal and the hope that even the most complex site can indeed be released.

To better support the users of DG-4006, however, the HPS would like to see several modifications made to assist licensees in completing the Restricted Release process. Clear and specific guidance on the format and content of Restricted Release DP and their required attachments should be provided. Furthermore, a description of the required dose assessment scenarios should also be provided. Licensees to date have had to provide their "best estimate" regarding these submittals. DG-4006 is essentially silent on this issue.

With regard to DG-4006 Section 4, and its application in the proposed SRP, the HPS is aware of NRC requests for dose assessments that include modeling soil dose in the unrestricted release portion of a site surrounding a restricted release area. The HPS feels that this request is unnecessary. Dose modeling a residential farmer in the center of the restricted release area should, by its very nature, result in the worst case analysis and be more than sufficient to obtain regulatory acceptance. Evaluating dose from an area released for unrestricted release adjacent to an area that will be released for restricted release implies inadequacy in the release of the unrestricted portion. The SRP should be specific and clear on this issue.

Conclusion:

The HPS commends the NRC for issuing DG-4006 to support the radiological criteria for license termination. We believe that this document provides adequate instruction to NRC licensees to proceed in addressing the task of decommissioning radioactively contaminated sites and protecting public health and safety.

We appreciate the opportunity to comment on this proposed draft Guidance. Please feel free to contact me should you have any questions or concerns about our comments and recommendations. You may also wish to contact the Legislation and Regulation Committee Chair, Kevin Nelson [Director of Occupational Health & Safety, Mayo Clinic, Jacksonville FL, 32224, Tel: (904) 953-8978, e-mail: nelson.kevin2@mayo.edu] or the Society' Decommissioning Section President, Dave Fauver [Vice President, Decommissioning and Technical Services, Radiological Services, Inc., New London, CT, 06320, Tel: (240) 694-0167, e-mail: dave.fauver@radiologicalservices.com]

Sincerely,

Ray Johnson

Raymond Johnson, C.H.P., P.E.
HPS President