

February 3, 2012

Dr. Said Abdel-Khalik, Chairman  
Advisory Committee on  
Reactor Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

SUBJECT: RESPONSE TO ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
REPORT ON THE REVISED BRANCH TECHNICAL POSITION ON  
CONCENTRATION AVERAGING AND ENCAPSULATION

Dear Dr. Abdel-Khalik:

During the 589th meeting of the Advisory Committee on Reactor Safeguards (ACRS or the Committee) held on December 1, 2011, the ACRS completed its review of a draft revision to the staff's Branch Technical Position (BTP) on Concentration Averaging and Encapsulation. The Radiation Protection and Nuclear Materials Subcommittee of the ACRS also reviewed this document in its meeting on October 4, 2011. The Committee provided the Commission with conclusions and recommendations in a letter dated December 13, 2011.

We appreciate the Committee's in-depth review of the draft revised BTP, as well as the support for a number of the proposed positions in the revised BTP. These positions include the addition of the Alternative Approaches section and the new guidance on blending of certain low-level radioactive waste (LLRW) streams. The Committee has also recommended that the staff's generic positions be replaced by an approach that takes into consideration site-specific analyses performed by licensees. The staff agrees that site-specific analyses may be beneficial, but believes that licensees should continue to have an option to use the generic positions in the BTP, if they so choose. The generic positions in the current and draft revised BTP allow for the classification of LLRW, without the burden of performing a special analysis. Staff responses to the five conclusions and recommendations in your December 13, 2011, letter are provided below.

1. The revised BTP should be issued for public comment after consideration of the Committee's comments.

The staff appreciates the insight and guidance of the ACRS and, as recommended, the BTP will be revised and then issued for public comment, after consideration of the ACRS comments. The staff intends to acknowledge and identify the ACRS's views on the revised BTP in the announcement for the public comment period.

2. The guidance provided in the revised BTP on alternative approaches provides flexibility to LLRW generators and disposal licensees, and is a good first step in improving management of LLRW.

The staff appreciates the ACRS's support of this new section. The Alternative Approaches section was added to the revised BTP to provide licensees and Agreement States with NRC guidance for proposing site- and waste-specific alternatives to the "look-up" positions in the BTP.<sup>1</sup> While these generic positions do not require individual approval, and therefore are easy-to-use and efficient, they are also conservative to compensate for the broad range of site- and waste-specific features that may be encountered. This new section is performance-based in that it enables licensees to use more than one approach to achieve the performance objective of protecting an inadvertent intruder.

The BTP's generic positions and the Alternative Approaches are different and intended to complement each other. The Alternative Approaches specifically allow consideration of site- and waste-specific features, such as depth of burial, waste characteristics and engineered disposal features, to demonstrate that an inadvertent intruder can be protected. For example, the BTP generic guidance for encapsulation and disposal of Cs-137 sealed radioactive sources is that sources less than 130 Ci can be disposed of without further review. If a source's activity exceeds the generic limits (130 Ci for Class C disposal of Cs-137 sources), alternative approaches are available for licensees to use. The use of site- or waste-specific factors would require a licensee to develop a technical justification and to seek regulatory approval of higher activity limits.

3. The guidance provided in the revised BTP for blending is also a good approach for managing LLRW. However, the staff should continue to develop appropriate guidance to ensure that constituents in blended wastes are compatible and will result in satisfactory waste forms.

The staff continues to improve the bases for the blending positions while continuing to work to ensure there are no unintended consequences. The staff appreciates the ACRS's comment and agrees that the waste constituents and their effect on final waste forms is an important issue that requires further consideration for the revisions to the BTP.

4. The staff's approach to protect an inadvertent intruder from exposure to disposed LLRW uses generic, stylized bounding calculations that assume a fixed set of conditions to judge the acceptability of disposal of LLRW. This approach does not consider site specific physical or design features that would impact the likelihood of inadvertent intrusion. The use of stylized scenarios should be replaced with an approach that takes into consideration site specific geohydrological features, depth of burial, waste characteristics, engineered disposal features, and their degradation over time.

The staff agrees with the ACRS's recommendation that site- and waste-specific features (such as depth of burial and waste characteristics) should be taken into

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<sup>1</sup> "Look-up" positions are methods that licensees may generally use to demonstrate that the averaging provisions in 10 CFR 61.55(a)(8) have been met, without having to prepare a special analysis to justify an alternative approach or receive specific approval by the regulator.

account in protecting the inadvertent intruder and defining positions for averaging of LLRW for waste classification, where necessary. However, the staff believes that the look-up provisions that are based on generic, stylized scenarios should continue to be included in the BTP to offer licensees a choice in how they demonstrate protection of an inadvertent intruder and use of appropriate concentration averaging techniques. If a disposal facility licensee wishes to use site- or waste-specific information to justify averaging methods different from the generic guidance in the BTP, as the ACRS has suggested, the Alternative Approaches section of the revised BTP explicitly acknowledges that possibility and provides guidance for site-specific approaches. The staff believes that the BTP should give licensees a choice, because both approaches can provide for the necessary protection of an inadvertent intruder.

In preparing this revised BTP, the staff has focused on improving the existing guidance contained in the 1995 BTP. The positions in the 1995 BTP and the revised draft are based on generic radiation exposure scenarios that are different from those used in developing the 10 CFR 61.55 waste classification tables. The staff believes that additional scenarios, beyond those considered in the development of the 10 CFR 61.55 tables, should be considered to ensure protection of intruders from hot spots in the waste. In the staff's proposed revisions, the staff has made the scenarios more realistic than those used in the 1995 BTP. These revisions will enable the safe disposal of, for example, larger activity sealed sources that are not now recommended for Part 61 disposal because the 1995 BTP is more conservative.

5. If the staff believes that 10 CFR Part 61 constrains the use of a more risk-informed, performance-based treatment of intruder scenarios, then we recommend using the same scenarios used to develop 10 CFR Part 61 without creating additional unrealistic scenarios to determine allowable concentrations or amounts of LLRW to be disposed.

The staff believes that the proposed scenarios are appropriate to set generic limits for specific waste streams that were not fully evaluated in developing 10 CFR Part 61, such as encapsulated small gamma-emitting items. These scenarios are not unlike design basis accidents used in the nuclear reactor program. The scenarios used to set the 10 Part 61.55 disposal concentration limits are based on the assumption that waste is either: (1) soil-like and unrecognizable; or (2) intact and recognizable as being hazardous within 6 hours of discovery.

The consequences of accidents involving small gamma-emitting sealed radioactive sources were a factor leading to the development of another scenario for the 1995 BTP, in which a small piece of gamma-emitting material is intact, but not recognizable as being hazardous. The staff believes this approach is needed to protect "a person who might occupy the disposal site after closure and engage in normal activities ... or other pursuits in which the person might be unknowingly exposed to radiation from the waste" (10 CFR 61.2). Another factor in the use of the additional generic scenarios is that they provide a basis for constraining the amount of averaging that is performed for hot spots, which enhances regulatory stability by limiting the amount of waste that could change waste classification under a revised BTP.

The Committee's December 13, 2011, letter also contained a discussion of other issues related to intruder protection, such as reliance on funding for perpetual control of sites and the relative importance of intruder protection in comparison with other 10 CFR Part 61 performance objectives. As discussed with the Committee on July 13, 2011, the Commission has directed the staff to consider a comprehensive revision to 10 CFR Part 61. SECY-10-0165, "Staff's Approach to Comprehensive Revision to 10 CFR Part 61," outlines the staff's plan for responding to the Commission. This plan will be revised in response to recent Commission direction on the Part 61 rulemaking in the Staff Requirements Memorandum for COMWDM-11-0002/COMGEA-11-0002, "Revision to 10 CFR Part 61." In developing the staff's analysis of alternatives and issues associated with revising 10 CFR Part 61, the staff will consider these other issues raised by the ACRS in its December 13, 2011, letter.

The staff appreciates the ACRS's thorough review of the proposed revisions to the BTP on Concentration Averaging and Encapsulation, and looks forward to continued interactions on the proposed final version.

Sincerely,

***/RA Michael Weber for/***

R. W. Borchardt  
Executive Director  
for Operations

cc: Chairman Jaczko  
Commissioner Svinicki  
Commissioner Apostolakis  
Commissioner Magwood  
Commissioner Ostendorff  
SECY

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