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Chief, Rules Review and Directives Branch
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Dear Sirs:

These are the comments requested in the *Federal Register* May 29, 1997 (Volume 62, Number 103) on pages 29164-29165. These comments are based on the May 1997 Draft Manuscript of the **Branch Technical Position On A Performance Assessment Methodology For Low-Level Radioactive Waste Disposal Facilities-Draft for Public Comment** (NUREG 1573).

This preliminary Draft of the Branch Technical Position (DBTP) is poorly conceived and technically flawed. Furthermore, it is not responsive to comments made on the 1994 Draft Branch Technical Position or to the comments made at the Commission's Workshops on the BTP and Performance Assessment held November 16-17, 1994 and December 13-15, 1994. The NRC has not published a formal response either to comments made on the 1994 draft BTP or to comments provided by participants at the workshops that interested parties took the time and expense to prepare for and attend in 1994. A transcript of the workshop was published, but the resulting comments have yet to be addressed formally by the Commission or staff. It is improper to offer a revised BTP that does not systematically address previous public comments.

Not withstanding the flaws in the process of revising the 1994 Draft Branch Technical Position, the following comments are made to offer constructive improvements in guidance that the Commission offers regarding the performance assessment of developing low-level radioactive waste (LLRW) disposal facilities.

BTP-1 Guidance Manual, D

A significant deficiency that the DBTP does not address properly is its lack of consistency among the dosimetric methods used to calculate compliance with 10 CFR 61.41, 10 CFR 61.43 (10 CFR20.1201) and 10 CFR 20.1301. The current regulations state:

> ***§ 61.41 Protection of the general population from releases of radioactivity.***
>
> *Concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants, or animals must not result in an annual dose exceeding an equivalent of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable*
>
> ***§ 61.42 Protection of individuals from inadvertent intrusion.***
>
> *Design, operation, and closure of the land disposal facility must ensure protection of any individual inadvertently intruding into the disposal site and occupying the site or contacting the waste at any time after active institutional controls over the disposal site are removed.*
>
> ***§ 61.43 Protection of individuals during operations.***
>
> *Operations at the land disposal facility must be conducted in compliance with the standards for radiation protection set out in part 20 of this chapter, except for releases of radioactivity in effluents from the land disposal facility, which shall be governed by §61.41 of this part. Every reasonable effort shall be made to maintain radiation exposures as low as is reasonably achievable.*
>
> ***§ 61.44 Stability of the disposal site after closure.***
>
> *The disposal facility must be sited, designed, used, operated, and closed to achieve long-term stability of the disposal site and to eliminate to the extent practicable the need for ongoing active maintenance of the disposal site following closure so that only surveillance, monitoring, or minor custodial care are required.*

Part 10 CFR 61.41 and 10 CFR 61.43 (10 CFR20.1201) are inconsistent. The method for calculating and accumulating internal dose and adding internal and external dose together has changed. National and international recommending bodies and the Commission have adopted the methods described in International Commission on Radiological Protection (ICRP) publications 26 and 30. These recommendations have been codified in 10 CFR 20.1201 for exposure to workers and 20.1301 for members of the public. The principal public protection standard in 10 CFR 61.41 is still an out-of-date annual-limit standard. An annual dose of 25 millirem to the whole body, 75 millirem to the thyroid, and 25

millirem to any other organ (based on the methodology published in 1959 in ICRP Publication 2) does not readily translate to a CEDE of 25 millirem for internal emitters. Neither is it clear how to add internal and external doses with this older methodology. A re-evaluation of the form and numerical value for 10 CFR 61.41 is required. Further, the standard calls out specific organ doses that are inconsistent with the calculation of CEDE and TEDE for workers. No attempt is made in the DBTP to resolve this problem effectively.

The public dose standard currently in force in 10 CFR 20.1301, applied for a reasonable institutional control period, would be a rational substitute and would resolve this conflict.

> ***§ 20.1301 Dose limits for individual members of the public.***
>
> *(a) Each licensee shall conduct operations so that-*
>
> *(1) The total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 millisievert) in a year, exclusive of the dose contributions from background radiation, any medical administration the individual has received, voluntary participation in medical research programs, and the licensee's disposal of radioactive material into sanitary sewerage in accordance with §20.2003.*

The recommendation on page xi of the executive summary states:

"The central attribute of the process is that it is to be conducted ***iteratively*** *– starting with a combination of generic and limited site-specific information in support of relatively simple conservative models and analyses, and progressing to more site-specific and detailed analyses,* ***as necessary****, to reduce uncertainty in assessing performance of a LLW disposal facility."*

There is a key problem with this approach. It in no way offers an applicant any guidance on how to conduct and CONCLUDE the process of performance assessment. The process of assessment must lead to a conclusion. Unfortunately in both the high level radioactive and low-level radioactive waste management programs, the Commission's regulatory process has lead only to indecision. This DBTP offers no coherent way to make a deterministic decision based on analysis of future events.

It is stated on page xii :

"It is important to emphasize that the goal of the analysis is not to accurately predict the future but to test the robustness of the facility against a reasonable range of possibilities."

What is meant by "robustness of the facility"? How does an applicant assess this? What is the acceptable standard of robustness? How does an applicant determine robustness for the recommended 10,000-year evaluation period? Without clear and extensive definition, the term "robustness" has absolutely no meaning

Further in the same paragraph it is stated:

"The staff recommends the use of conservative assumptions and ranges of parameters that could effectively bound the reference geologic setting of the site. To capture the variability in natural processes and events and bound dynamic site behavior, the range of siting assumptions and data should be sufficient to understand the long-term trends in natural phenomena acting on the site. The staff emphasizes that there should be a limit on the range of possible performance assessment and that unnecessary speculation in the assessment should be eliminated."

This guidance is too vague to be useful. The staff should follow up and provide specific numerical values for the ranges to be evaluated for the technical performance criteria listed in 10 CFR 61 Subpart D below.

§ 61.51 Disposal site design for land disposal.

(a) Disposal site design for near-surface disposal.

(1) Site design features must be directed toward long-term isolation and avoidance of the need for continuing active maintenance after site closure.

(2) The disposal site design and operation must be compatible with the disposal site closure and stabilization plan and lead to disposal site closure that provides reasonable assurance that the performance objectives of subpart C of this part will be met.

(3) The disposal site must be designed to complement and improve, where appropriate, the ability of the disposal site's natural characteristics to assure that the performance objectives of subpart C of this part will be met.

(4) Covers must be designed to minimize to the extent practicable water infiltration, to direct percolating or surface water away from the disposed waste, and to resist degradation by surface geologic processes and biotic activity.

(5) Surface features must direct surface water drainage away from disposal units at velocities and gradients which will not result in erosion that will require ongoing active maintenance in the future.

(6) The disposal site must be designed to minimize to the extent practicable the contact of water with waste during storage, the contact of standing water

with waste during disposal, and the contact of percolating or standing water with wastes after disposal.

The staff and the Commission should provide some leadership and develop a generic set of parameter values and ranges for typical geohydrologic regimes that should be considered by a licensee. If this were done and indexed to each of these technical requirements, much confusion could be avoided.

The recommendation to extend performance assessment over a 10,000-year period is without foundation. It is true that if dose values are calculated for periods of time beyond 1000 years, using typical assessment codes and constant parameter values, the calculated doses increase at long times. This should not be a surprise. In ANY assessment of the near surface behavior where primordial radionuclides from the uranium and thorium decay chains are present this calculational artifact will occur. It is presumptuous and without benefit to public health and safety to attach meaning to these results. There is no basis for the selection of 10,000 years as the time period for assessment for LLW. In fact at 500 years less than 1% of a typical LLW inventory will remain. The currently available assessment tools are not capable of estimating doses in a credible way for a 10,000-year time interval in the near-surface environment. It is not possible, nor is it necessary, to predict behavior or near surface disposal systems for LLW. Calculated doses from assessments of disposed uranium and thorium as LLW are inconsistent with background doses in the vicinity of naturally occurring materials where there are much higher quantities of uranium and thorium in equilibrium with its natural setting. While in geologic time 10,000 years is short, it is inappropriate to assume that natural surface phenomena will remain constant over such a time interval which most models assume. Such estimates are likely to be uncertain by several orders of magnitude, rendering them useless. A realistic time frame for assessment is 500 years. Primordial radionuclides can be assessed by comparison to natural analogs.

The guidance offered on page xiv of the executive summary states:

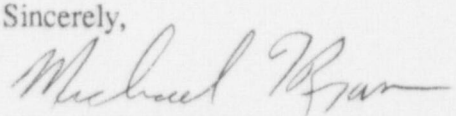
"When compliance, as measured against the 10 CFR 61.41 performance objective, is based on a single (deterministic) estimate of performance, the applicant is relying on the demonstration of the conservative nature of the analysis, rather than a quantitative analysis of uncertainty. Therefore, if it is to be used as a performance measure, a single estimate of performance should be at or below the 10 CFR 61.41 performance objective. In cases where a formal uncertainty analysis is performed and a distribution of potential outcomes for system performance is provided, the staff recommends that the mean of the distribution be less than the performance objective [10 CFR 61.41] and the 95th percentile of the distribution be less than 1 mSv (100 mRem) to consider a facility in compliance."

This recommendation is helpful in its attempt to advise a licensee when performance assessment can be successfully concluded. It is not acceptable in its present form. It suffers from the inconsistent dose standard issue mentioned above. Further, the

recommendation to use uncertainty analysis does not explicitly indicate that doses can be calculated that will exceed the standard, albeit with low probability, and that this outcome is acceptable. Without specific guidance regarding parametric analysis and specific modeling approaches and tools, the argument merely shifts from whether or not the calculated outcome is correct to whether or not the input values used to create the distribution. The staff and Commission have the obligation to develop more specific guidance on the entire performance assessment process.

In its current form the **Branch Technical Position On A Performance Assessment Methodology For Low-Level Radioactive Waste Disposal Facilities-Draft for Public Comment** (NUREG 1573) further confuses the Commission's guidance regarding the process of site performance assessment for a LLW disposal site. The staff has not addressed obvious inconsistencies in the basic dose standards and has created a vague framework for developing performance assessment information to support a license application. This draft needs to be withdrawn and significant work must occur to develop consistent and clear guidance regarding performance assessment necessary to demonstrate the licensability of LLRW disposal sites.

Sincerely,



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