ENERGYSOLUTIONS

June 10, 2010 CD10-0176

Annette Vietti-Cook
Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: Presentation for Commission Briefing on Blending of Low-Level Radioactive Waste

Dear Ms. Vietti-Cook:

Energy*Solutions* appreciates the opportunity to participate in the Commission briefing on the blending of low-level radioactive waste. The slides that I will use are attached hereunto.

On January 29, 2010, Energy*Solutions* provided comments to the Commission in response to the *Notice of Public Meeting and Request for Comment on Blending of Low-Level Radioactive Waste*, 74 FR 62606. That letter, our December 2009 presentation to staff, and my comments in the January 2010 public workshop comprise Energy*Solutions'* views on a broad range of topics related to the issue of blending. In addition to addressing the thirteen questions posed in the *Federal Register* notice, we also have addressed several more peripheral issues, e.g., the availability of disposal capacity.

My comments to the Commission during the briefing, outlined in the attached slides, will focus on the key issue, which we consider to be health and safety implications of blending and the disposal of blended waste. I also will address the recommendations in the staff paper, *Blending of Low-Level Radioactive Waste*, SECY-10-0043. Our views, including our response to the staff recommendation can be summarized as follows:

The blending of low-level radioactive waste (LLW) is one component of a comprehensive LLW management strategy. Blending is one of several processing alternatives that are available to manage LLW. It is widely practiced by waste generators and independent waste processors not only in the nuclear power industry but other industries that generate LLW. NRC has acknowledged as much for many years in its promulgation of guidance. We do not believe that there is anything about blending or the disposal of blended wasted that creates a unique, inherent threat to health and safety.

We are in general agreement with the assessment contained in SECY-10-0043. We find it to be a thorough and thoughtful analysis of the issues. We concur with the staff's recommendation and fully agree that the Commission should adopt a position that is risk-informed and performance-based. We do not agree, however, that blending leads to the generation of a "unique" waste stream. Staff acknowledges this point in SECY-10-0043:

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> Blended wastes are not unique in their potential to have radionuclide concentrations at or just below the Class A disposal limits. For example, it is possible that resins in an operating nuclear power plant could be removed when they get close to the Class A limits for waste disposal rather than remaining in service longer and reaching Class B or C concentrations.

The conclusions of staff regarding the potential safety issues with disposal of waste at the Class A limits would be equally true of any waste at those limits. The health and safety issue identified in SECY-10-0043 is that blending may result in the disposal of significant quantities of (blended) waste at or near the Class A limits in close proximity such that they would exceed the waste analyzed in order to generate the limits in 10 CFR 61.55. This could potentially pose a future hazard to an inadvertent intruder. However, there is nothing today that prohibits the disposal of large quantities of waste at or near the Class A limits in close proximity. This does not undermine the credibility or protectiveness of the regulations; however, because they are very conservative. The limits in 10 CFR 61.55 are based on deterministic analyses of non-representative disposal techniques at a generic, humid, non-representative site, using outdated methodology for calculating potential radiation exposure.

Energy*Solutions* proposes an approach that we believe would accomplish the objective sought by staff, but which would be more streamlined and defensible. We propose that the Commission not define blended waste as unique. In fact, we propose that the Commission abandon completely the label of unique waste. In the workshops held in support of the unique waste stream rulemaking, it was broadly agreed that there was no clear definition of a unique waste. Creating and defining this category of waste is not necessary to accomplish the desired objective of making the regulations in Part 61 more risk-informed.

A more straight-forward approach would be to specify in Part 61 that a site-specific analysis is required to demonstrate conformance with the performance objectives in Subpart C. This would require an analysis that demonstrates protection of the public, workers, and the inadvertent intruder for all waste disposed. This requirement would not hinge on the uniqueness of any given waste, and also would address future, unknown waste streams. This could be done via the ongoing rulemaking as proposed by staff. It also should be accompanied by updates to relevant guidance as described in SECY-10-0043.

Thank you again for the opportunity to participate in the briefing. I look forward to discussing our comments with the Commissioners. Questions regarding these comments may be directed to me at (240) 565-6148 or temagette@energysolutions.com.

Sincerely,

Thomas E. Magette, P.E.
Senior Vice President
Nuclear Regulatory Strategy

Blending of Low-Level Radioactive Waste

June 17, 2010

Thomas E. Magette, P.E.
Senior Vice President, Nuclear Regulatory Strategy
Energy*Solutions*

Key Issues

- Protecting
  - Public Health & Safety
  - Worker Health & Safety
  - Environment
- Satisfy Performance Objectives of 10 CFR 61, Subpart C
- Optimizing management of LLW

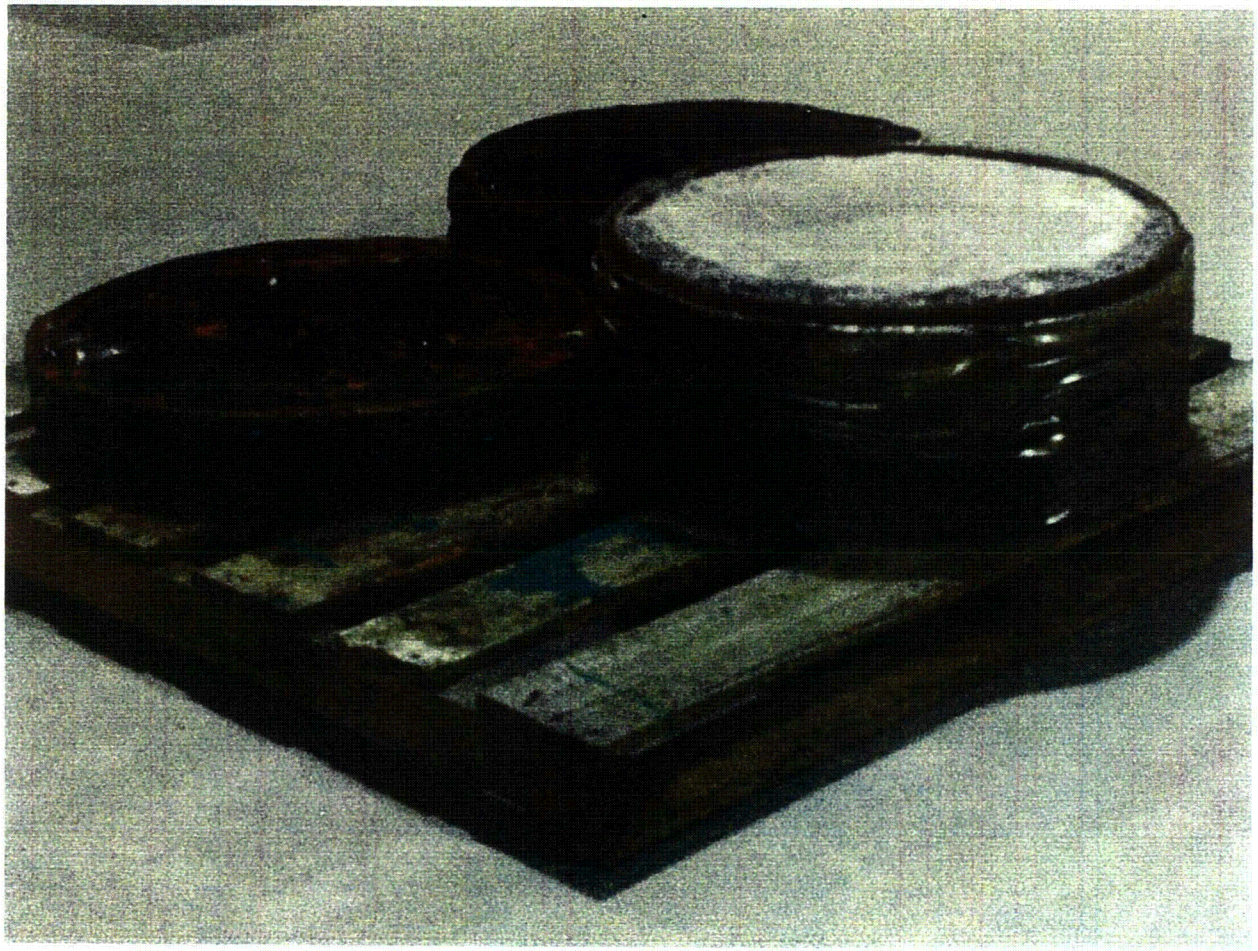
Why blend?

- Element of waste management strategy
- Dose reduction (ALARA)
- Improve operational efficiency
- Provide disposal pathway options
- Optimize life cycle cost
- Address lack of disposal for B/C waste
- Reduce interim storage of LLW

Waste Classification

- What's important is not what the waste *was*, but what the waste *is*
- Waste is classified for the purposes of ensuring its safe disposal
- Waste cannot be classified until the waste is in final form and in the final burial container
- Processing, including blending, changes isotopic concentration
- Treatment and preparation for disposal may modify original concentrations
  - Dewatering, compaction, thermal processing
  - Remove mass and volume which can change waste class

Post-Processing Waste



Energy*Solutions*' Initial Comments

- Existing guidance is adequate
  - Permits blending
  - Protects human health and safety
- Clarified by NRC letters in 2009
- Summarize, formalize, and extend guidance from 2009 letters
  - Consolidate position in RIS
  - Focus on homogeneous media
  - Blending for any purpose is allowed
  - Revise Branch Technical Position

Energy*Solutions*' Position

- Generally agree with SECY-10-0043
- Support risk-informed assessment of blending
- Inclusion in ongoing rulemaking reasonable
- Don't agree that blended waste is "unique"
- Existing regulations protect health and safety
- 10 CFR 61.55 is conservative
  - Deterministic analysis
  - Use of outdated dose methodology
  - Analysis of non-representative disposal techniques
  - Assumption of generic non-representative site

Proposed Approach

- Eliminate label of "unique"
  - Difficult to define
  - Ever changing
- Revise Part 61 to require site-specific analysis
  - Demonstrate compliance with performance objectives in 10 CFR Subpart C
  - Applies to all waste disposed
  - Addresses blended waste, depleted uranium, tomorrow's "unique" waste stream
  - Focuses on ensuring safe disposal
- Revise Branch Technical Position and Volume Reduction Policy Statement

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Briefing on Blending of Low-Level Waste

Larry W. Camper, Director

Division of Waste Management and Environmental Protection/FSME

June 17, 2010

Presenters & Topics

- Larry Camper: Overview
- Jim Kennedy: Summary of SECY-10-0043
- Christianne Ridge: Analysis of safety issues in SECY-10-0043

Overview of LLW Blending

- Key messages
- Significant actions
- Options

Key Messages

- Limited access to Barnwell disposal facility
- Blending as a generator option
- Large-scale blending proposal
- NRC requirements and guidance
- Vote paper

Waste Classification
10 CFR 61.55, Table 2

Radionuclide	Concentration, Ci/m^3		
	Col. 1 (Class A limit)	Col. 2 (Class B limit)	Col. 3 (Class C limit)
Total of all radionuclides with < 5 yr half-life	700	n/a	n/a
H-3	40	n/a	n/a
Co-60	700	n/a	n/a
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

n/a—practical considerations such as the effect of external radiation or internal heat generation limit concentrations of these wastes.

Significant Actions

- Letters and meetings with commercial stakeholders
- Site visits
- Public meeting
- Federal Register Notice
- Independent staff analysis
- SECY-10-0043

Options

- Maintain status quo
- Implement risk-informed, performance-based position
- Further constrain blending
- Prohibit large-scale, off-site blending

Staff Analysis of Blending

James Kennedy, Sr. Project Manager

Stakeholder Concerns

- Wide variety of views on blending
- Example—Volume Reduction Policy Statement
- Addressed in SECY paper

Policy Issues

- Past agency statements on reducing waste class
- Facilitate safe waste disposal
- Impact on existing low-level waste management program
- Disposal capacity

Policy Issues (cont.)

- Unintended consequences
- Greater than Class C waste
- Volume reduction

Staff Recommendation

- Risk-informed, performance based approach
- Consistent with Strategic Plan definitions (RIPB)
- Four agency actions

Staff Recommendation (cont.)

- Piggyback onto "unique waste streams" rulemaking
- Update guidance
- Issue interim guidance
- Revise Volume Reduction Policy Statement

Staff Analysis of Safety Issues Related to Blending

A. Christianne Ridge, Sr. Systems Performance Analyst

Background

- 10 CFR Part 61 Subpart C performance objectives
- Basis for waste classification tables
- Assumptions underlying waste classification tables

Homogeneity

- Classification demonstration
- Need for additional guidance
- Consistency with provisions for mathematical averaging
- Intruder dose

Staff Observations

- Meeting waste classification requirements alone may not demonstrate intruder protection
- A site-specific dose analysis could explicitly demonstrate intruder protection
- Modern disposal sites are likely to accommodate disposal of blended waste safely

Staff Recommendation

- Address blending as part of ongoing unique waste streams rulemaking
- Follow current plan that revised rule explicitly require site-specific intruder dose analysis
- Generalize language to include blended waste

Conclusions

- Large scale blending timely and real
- Stakeholder questions, concerns and issues
- Status quo not explicitly clear
- Risk-informed, performance-based approach
- Four significant actions
- Communication with stakeholders

List of Acronyms

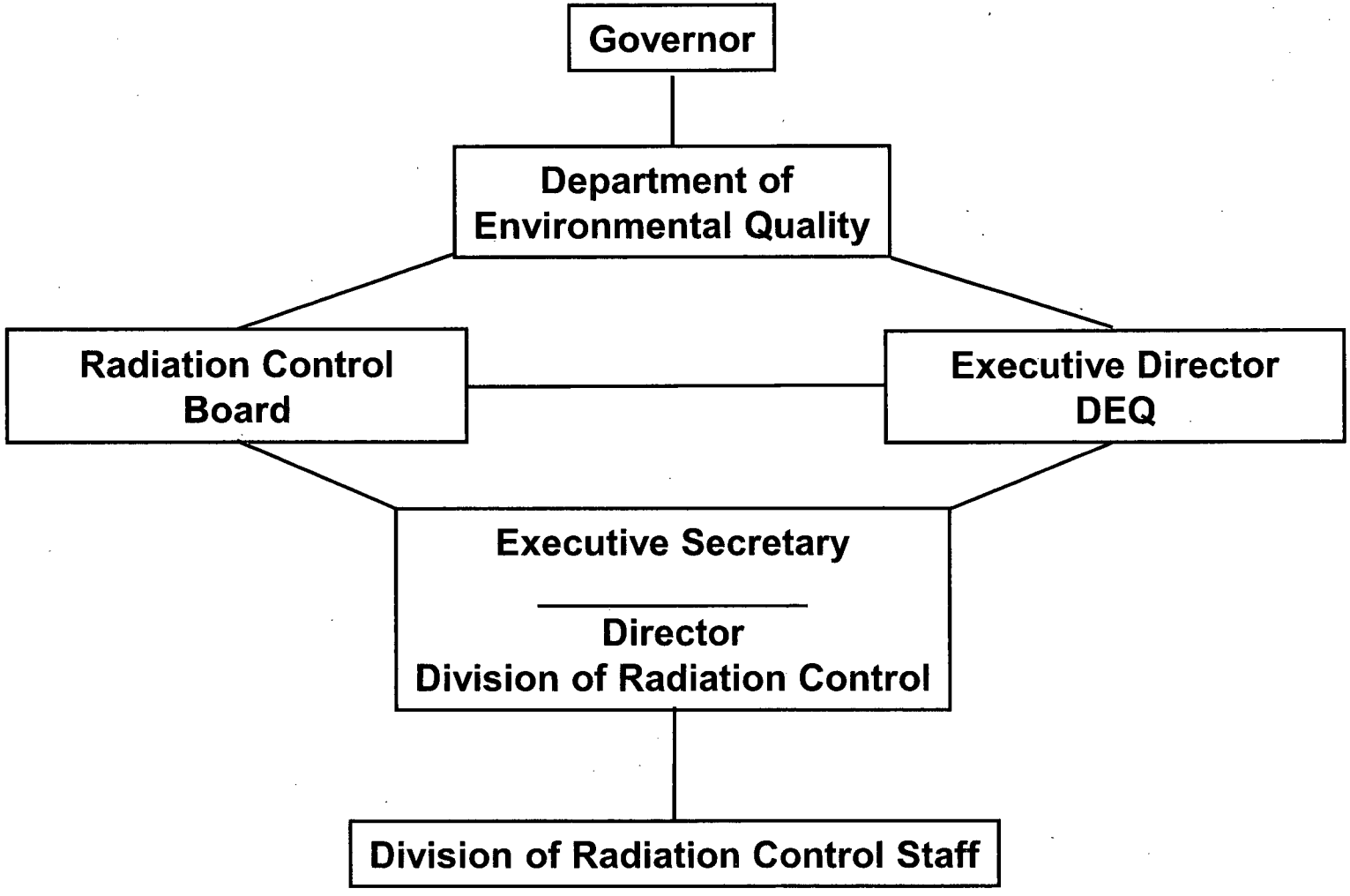
- FSME – Office of Federal and State Materials and Environmental Management Programs
- SECY– Office of the Secretary
- DWMEP – Division of Waste Management and Environmental Protection

The Utah Perspective on Blending Waste

June 17, 2010

Craig W. Jones, Program Manager
Utah Division of Radiation Control

Structure


Governor
Department of Environmental Quality
Radiation Control Board
Executive Director DEQ
Executive Secretary
Director
Division of Radiation Control
Division of Radiation Control Staff

Utah Radiation Control Board Position Statement

- The Utah Radiation Control Board (Board) recognizes that down-blended radioactive waste does not pose any unique health and safety issues to the public that are not observed in other classes of low-level radioactive waste.

Utah Radiation Control Board Position Statement

- The Board is also aware that down blending may appear to some persons as a process to circumvent Utah law, which prohibits any entity in Utah from accepting Class B or Class C low-level radioactive waste for commercial storage, treatment or disposal.

Utah Radiation Control Board Specific Position Statements

1. The Board is opposed to waste blending when the intent is to alter the waste classification for the purposes of disposal site access.
2. Dilution of radioactive wastes with uncontaminated materials should be explicitly prohibited.

Utah Radiation Control Board Specific Position Statements

3. Current guidance documents dealing with concentration averaging and mixing should be updated to address the current understanding of the possible down-blending issues. Important matters dealing with waste blending, such as prohibition of certain practices, currently in guidance should be put into regulation.

NRC Briefing on "Blending LLRW" - PA Perspective

June 17, 2010

David J. Allard, CHP
Director, Bureau of Radiation Protection

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

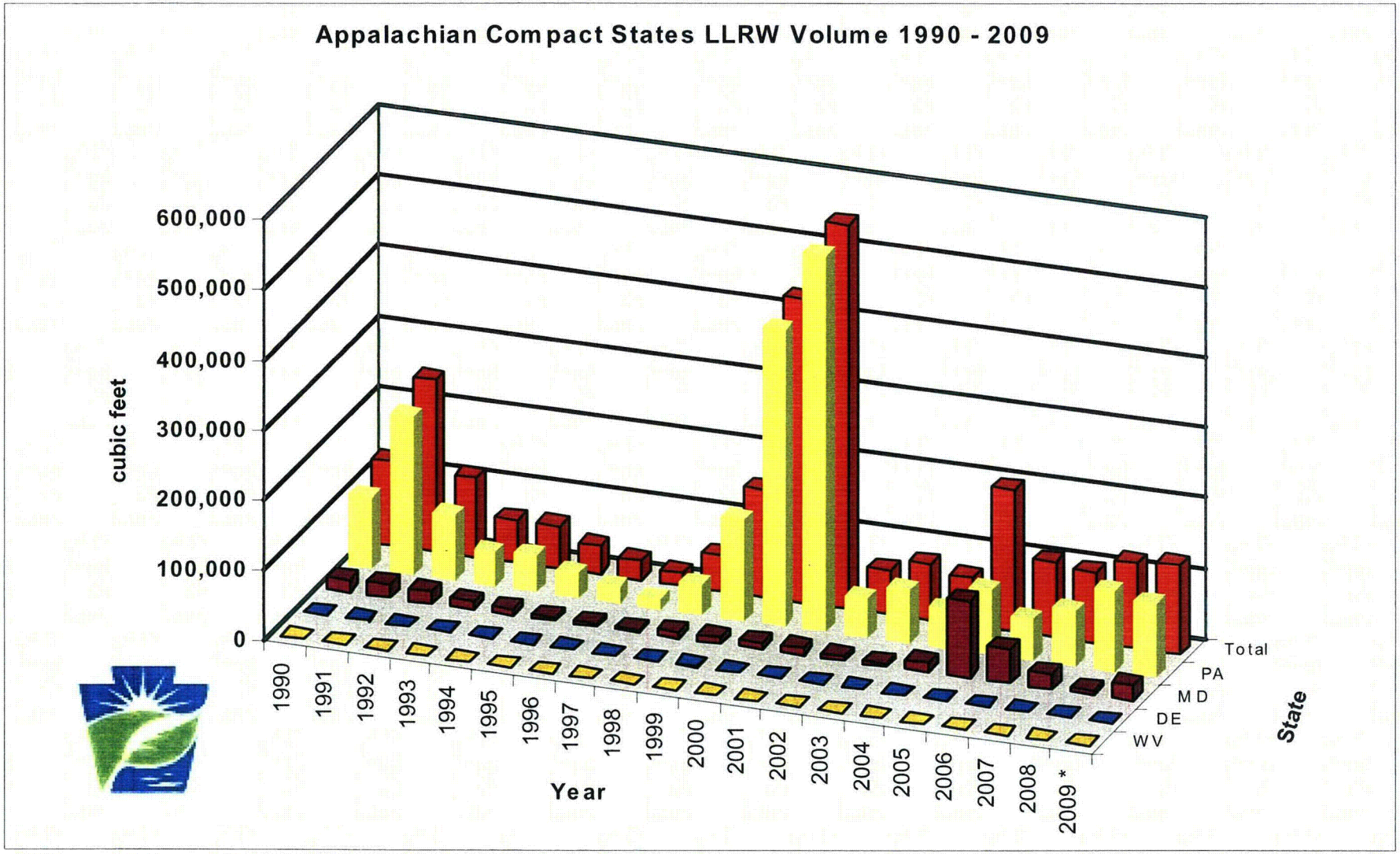
Overview of Presentation

- Introductory Remarks
- Appalachian Compact LLRW Data
- PA Position on "Blending" LLRW
- Q & A

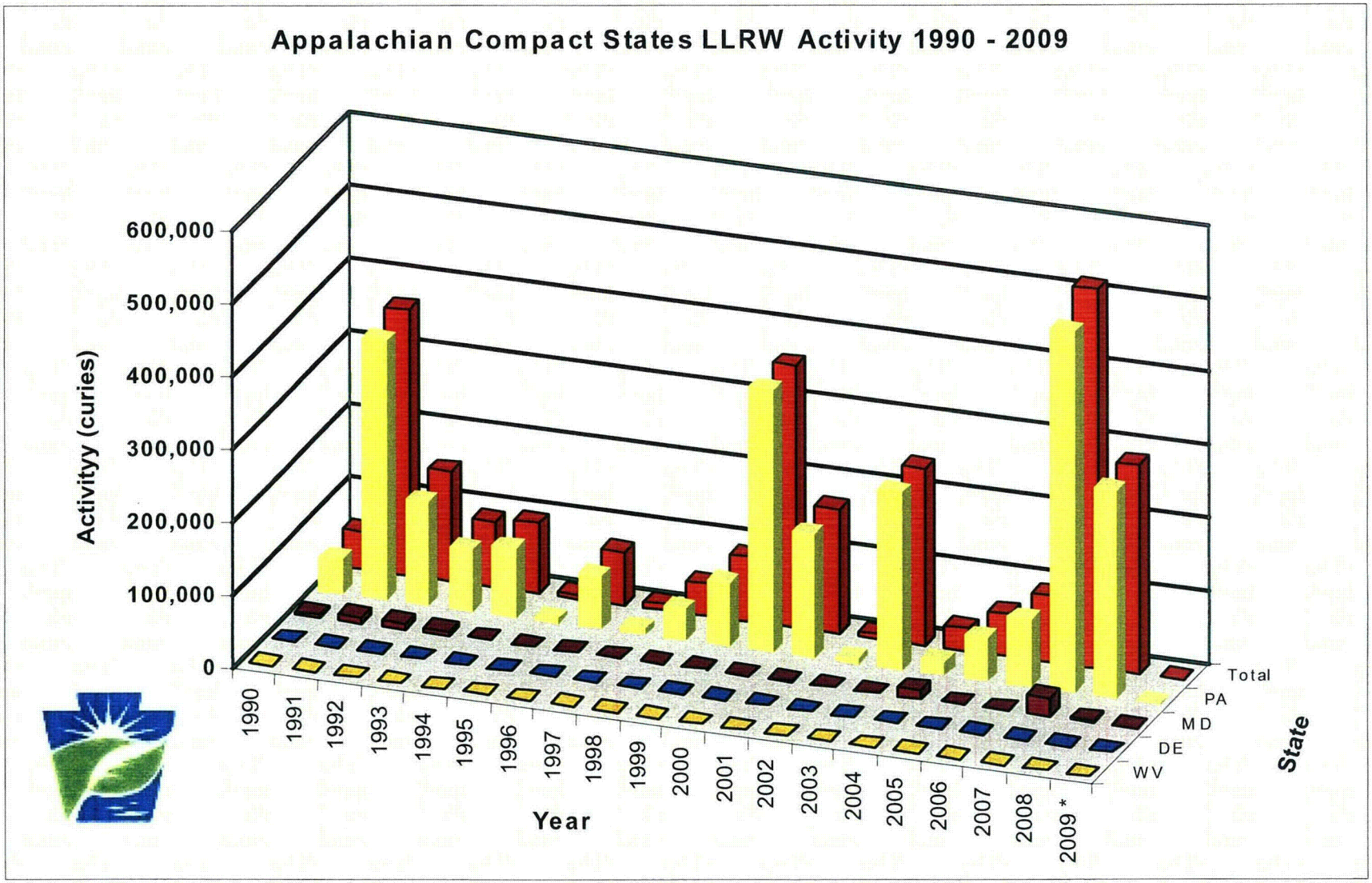
Introductory Remarks

- Recent history of LLRW in the USA
- LLRW Classification A, B, C & >C
- Compacts and stand-alone states
- Access for LLRW disposal
- Impact on medicine and industry

Appalachian Compact LLRW Data



Appalachian Compact LLRW Data



PA Position on Blending LLRW

- Disposal is preferred to storage
- Define blending vs. dilution
- Prohibit dilution with clean material
- LLRW tracking by generator a must
- Regulatory / license conditions
- Generator and processor oversight

Summary

- Commonwealth not opposed to blending
- Thank you for consulting the states
- Acknowledgements - BRP staff

Questions?

Contact Information -

David J. Allard, CHP
PA DEP / BRP
PO Box 8469
Harrisburg, PA 17105-8469

Tel: 717-787-2480

MAJOR BLENDING TECHNICAL AND POLICY ISSUES REQUIRE RULEMAKING

June 17, 2010

William Dornsife
Executive VP Licensing & Regulatory Affairs
Waste Control Specialists

Rulemaking Only Acceptable Solution

- WCS supports Option 2 with interim guidance removed
- Rulemaking is necessary to fully address important policy and technical issues
  - Unique waste stream under Part 61 EIS similar to DU
  - Rulemaking allows full stakeholder notice and comment for these substantial changes to long existing NRC waste disposal policies

Rulemaking Only (cont)

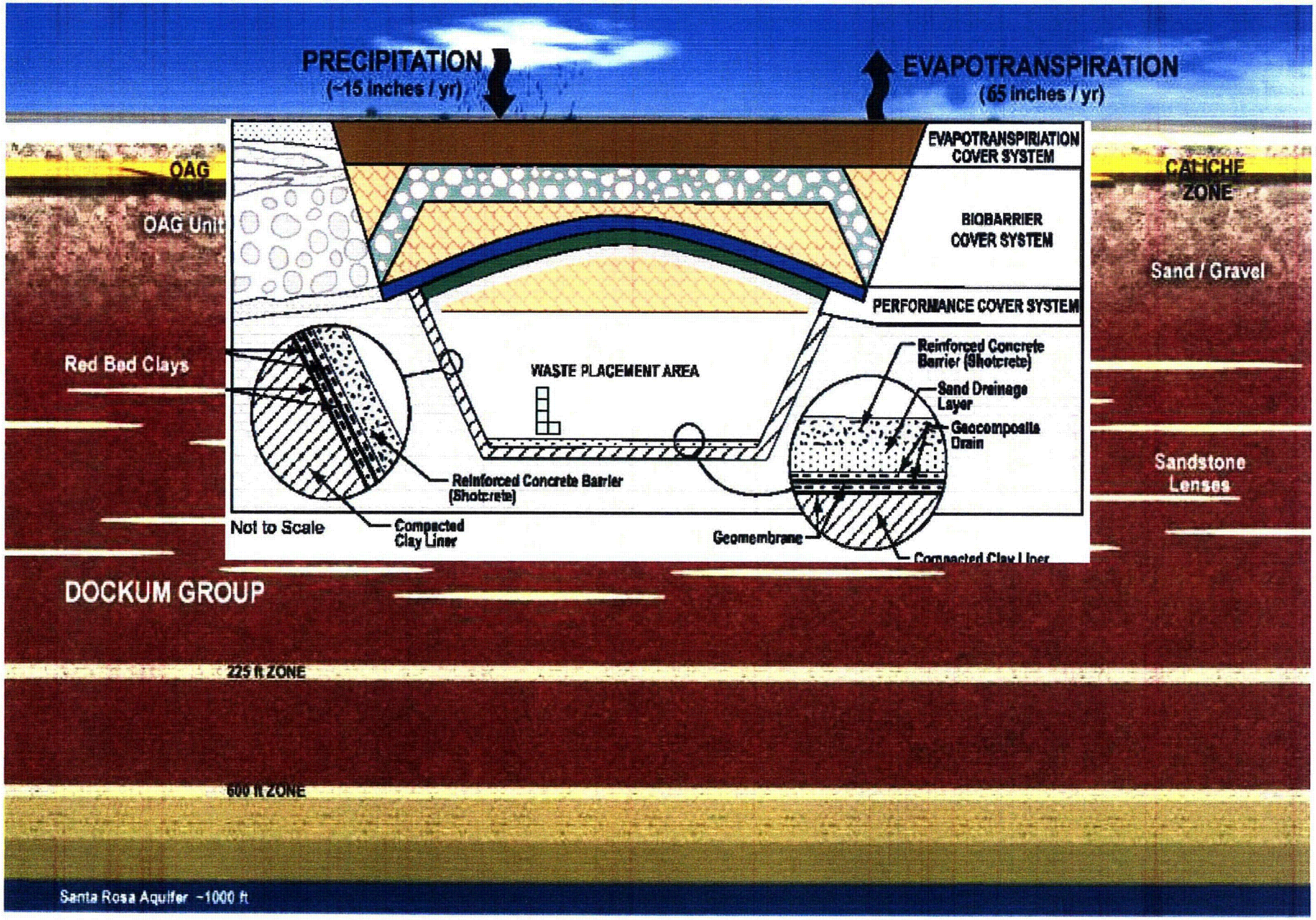
- Numerous technical and safety issues that require full NEPA review
- No identified health and safety issues with storage until permanent solution can be implemented (Importation to Texas Compact)
- Interim guidance could be shown to be not sufficiently protective by rulemaking

Compatibility: Need for Uniform Implementation

- Compatible rules only way to assure uniform implementation by states
- Texas regulations prohibit dilution of waste for purpose of changing waste class
- WCS license would require a complete reanalysis to accept waste at or near the Class C limit

Compatibility (cont)

- In Texas blended Class A waste would be classified as containerized Class A waste (Class A > 100 mrem/hr) and would need to meet the same disposal requirements as Class B & C.
- WCS disposal requirements for this waste would include reinforced concrete canisters with an independent concrete barrier and a disposal depth of at least 10 meters.


PRECIPITATION
(~15 inches / yr)
EVAPOTRANSPIRATION
(65 inches / yr)
OAG
OAG Unit
Red Bed Clays
DOCKUM GROUP
225 ft ZONE
600 ft ZONE
Santa Rosa Aquifer ~1000 ft
CALICHE ZONE
Sand / Gravel
Sandstone Lenses
EVAPOTRANSPIRATION COVER SYSTEM
BIOBARRIER COVER SYSTEM
PERFORMANCE COVER SYSTEM
WASTE PLACEMENT AREA
Reinforced Concrete Barrier (Shotcrete)
Sand Drainage Layer
Geocomposite Drain
Reinforced Concrete Barrier (Shotcrete)
Compacted Clay Liner
Geomembrane
Compacted Clay Liner
Not to Scale

Conclusions

- Important policy and safety issues can only be addressed by rulemaking
- Need to be uniformly implemented in Agreement States by compatible rules

Studsvik

June 10, 2010

Rochelle Bavol
Sandy Joosten
Office of the Secretary
Nuclear Regulatory Commission
Mail Stop O-16G4
Washington, DC 20555-0001

Re: Submission of Material for Commission Meeting on June 17, 2010:
Issues with Blending of Different Types of Ion Exchange Resin

Dear Ms. Bavol and Joosten:

Studsvik hereby submits the enclosed written material for review by the Commission in advance of the June 17th public Commission meeting on blending of low level radioactive waste.

Thank you for the opportunity to provide this material. Feel free to contact me at 312-343-7808 or at joseph.dicamillo@studsvik.com should the Commission have any questions or should it require any additional information.

Sincerely,

Joseph DiCamillo
General Counsel

JGD:geb

Enclosure

cc: Via Electronic Mail
Commissioner Kristine L. Svinicki
Commissioner George Apostolakis
Commissioner William D. Magwood, IV
Commissioner William C. Ostendorff
Chairman Jaczko

Studsvik

Via Electronic Mail

June 10, 2010

Honorable Gregory B. Jaczko
Chairman
Nuclear Regulatory Commission
Mail Stop O-16G4
Washington, DC 20555-0001

Re: Comments to Policy Issue Vote Paper on Blending of Low Level Radioactive Waste and Accompanying Analysis Issued April 7, 2010 (SECY 10-0043)

Dear Mr. Chairman:

Studsvik, Inc. ("Studsvik") submits the following comments on the Policy Issue Vote Paper on Blending of Low Level Radioactive Waste ("Vote Paper") and the Accompanying Analysis issued by Commission staff on April 7, 2010. These comments are for the Commission to consider as it reviews the staff's recommendations.

Studsvik recommends to the Commission that it not adopt Option 2 which allows large scale blending of low level radioactive waste ("LLRW"). As discussed below, there are significant drawbacks to that option: the Class B/C LLRW that would be downblended with Class A LLRW is *not homogenous*; large scale blending would *reduce safety and environmental safeguards*, and significant volumes of *Class B/C LLRW would continue to be stranded*. When these facts are taken into consideration the proposal does not meet the Commission's standards for a risk-informed, performance-based approach to environmental and safety regulations for radioactive waste.

Homogeneity

The different types of waste that are being considered for large scale blending – Class A LLRW and Classes B/C LLRW – are ***not*** homogeneous. According to NRC's guidance (Savannah River Site High Level Waste Tank Closure: Classification of Residual Waste as Incidental, 1999, p. 20), homogeneous wastes are defined as:

"A homogeneous waste type is one in which the radionuclide concentrations are likely to approach uniformity in the context of the intruder scenarios used to establish the values included in Tables 1 and 2 of 10 CFR 61.55."

A separate technical analysis sent by Studsvik to the Commission today examines attempts to blend different types of ion exchange resins and concludes:

"Blending is not an appropriate technique for the disposal of ion exchange resins that have widely different activity levels and different particle sizes or densities, as the heavier bead resins with one level of activity will mostly settle to the bottom of the disposal container while the lighter bead resins or much smaller powdered resins will mostly accumulate near the top of the disposal container producing a final dewatered disposal container that is highly segregated by resin type, density, particle size and/or by relative activity."

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> (Studsvik Memo, "Issues with Blending of Different Types of Ion Exchange Resin," June 10, 2010, p. 9)

That analysis also determines that it may not be possible to achieve radiological homogeneity in blended waste.

Given the results of this analysis, Option 2 would allow large scale blending of non-homogeneous forms of waste – ions that can be differentiated in nature.

Homogeneity is a key component of and will affect the intruder site assessment to be addressed in the rulemaking on unique waste streams. As noted above, there are questions about the technical feasibility of blending to create homogenous wastes that the Commission should carefully examine. Therefore, regardless of which option the Commission selects, any issues relating to homogeneity should be addressed only in a regulation, not in guidance as recommended in the Vote Paper.

Reduction of Intruder Safety and Environmental Safeguards

Large scale blending will result in lowering the environmental and safety requirements for the disposal of Class B/C LLRW and will erode the public's confidence in the safety of LLRW disposal. WCS submitted a study to the Commission showing that large scale blending results in waste that is 450 times higher than the NRC standard for A level waste 100 years after disposal (WCS January 29 letter). The Vote Paper also acknowledges that blended waste poses an unresolved safety question with respect to the inadvertent intruder. Specifically, the Accompanying Analysis to the Vote Paper determined that:

> "{T}he specific concern with proposals for large-scale blending is that significant fractions of waste in one area in a disposal facility, corresponding to a large shipment of blended waste, could have radionuclides at or just below the Class A disposal limits. This configuration would pose a greater risk to an inadvertent intruder than smaller batches of waste with the same radionuclide concentrations because the intruder would be more likely to exhume a significant volume of waste near the Class A limit unmixed with lower concentration waste."
>
> (Section 3.2.2)

In response to safety concerns, the owner of the Clive, Utah disposal site has asserted to the Commission that blended waste will be disposed of with more safeguards than are required for Class A waste. This belies the fact that the industry recognizes that blended waste is more hazardous than Class A waste. In addition, without a regulation requiring explicit safeguards, there is no guarantee that these extra disposal measures promised by the Clive facility operator will be maintained in the future. The public expects the Commission as the responsible regulator to promulgate enforceable regulatory safeguards and not to rely upon merely voluntary practices to protect public safety and the environment.

The Vote Paper recommends that a "risk-informed, performance-based" approach justifies reducing the current regulatory safeguards. However, this kind of approach risks reinforcing the public perception that environmental and safety requirements for disposal are being compromised or circumvented through a practice that undermines the current classification system.

Stranded Waste

The Vote Paper and Accompanying Analysis give inadequate attention to the problem of stranded waste. According to the Electric Power Research Institute ("EPRI"), at least 5,000 cubic feet of Class B/C resin cannot be addressed by large scale blending, at least in part because there is an insufficient amount of Class A resin to successfully blend all Class B/C resin into Class A. The Vote Paper merely reports EPRI's findings without analyzing the true extent of the stranded waste, or the consequences stranded waste will have for the long-term stability of LLRW disposal options.

As a starting matter, EPRI's analysis does not account for non-resin Class B/C waste. Large scale blending does not address various other types of Class B/C LLRW such as irradiated hardware, sealed sources, filters, medical and scientific research waste. These wastes, by their nature, simply cannot be "blended" together with Class A waste. As such, unless a Class B/C disposal site opens to the 36 states left without a disposal path since the Barnwell site closed to them, 5,000 cubic feet of resin waste and all the non-resin Class B/C LLRW describe above will be stranded.

Medical research and treatment would bear a disproportionate share of the negative impact because Class B/C medical waste would continue to be stranded. Increasing storage costs for these wastes would only multiply the difficulties for medical researchers.

The Commission must carefully examine the possible consequences large scale blending will have for stranded waste and the long-term stability of LLRW disposal options before it makes any changes to its policy on blending.

Alternatives to Staff Recommendation

For all the reasons stated above, Studsvik recommends that the NRC adopt Option 4 in the Vote Paper and modify 10 CFR Part 61 to prohibit large scale blending by waste processors because it is tantamount to intentional mixing to lower the waste classification. Further we recommend that 10CFR Part 20, Appendix G be modified to explicitly codify the long-standing industry practice – that waste be classified at the time it is prepared for shipment from a generator's facility, i.e., before being sent to an intermediate processor prior to disposal.

This approach also reflects the position that the nuclear waste regulatory authority in Utah, the only state with a disposal site that can accept blended waste, has taken on blending. The Utah Radiation Control Board recently passed a Position Statement on Down-Blending Radioactive Waste and a Policy Maintaining Waste Classification System Integrity that express the Board's opposition to waste blending when the intent is to alter the waste classification for the purposes of disposal site access and call for maintenance of the current radioactive waste classification system.

As outlined above, there are clear safety benefits for choosing Option 4. When coupled with volume reduction by processors, Option 4 would decrease LLRW volumes. As the Vote Paper recognizes, this option addresses stakeholder concerns that environmental and safety requirements for disposal are not being compromised or circumvented through a practice that undermines the current classification system. Under Option 4 generators would continue to have flexibility under the Branch Technical Position on Concentration Averaging and Encapsulation ("BTP") to mix waste when, for example, it results in operational efficiency or reduced worker exposure.

Studsvik

Should the Commission choose to adopt the staff's recommended Option 2 in the Vote Paper, the Commission should use formal rule-making processes, including notice and comment, to make any changes in policy which would allow large scale blending. In addition, the Commission should direct that the environmental impacts of the proposed new regulation be fully assessed under the National Environmental Policy Act. Specifically, criteria for homogeneity and sampling should be implemented through rulemaking. Implementation of these criteria through guidance as recommended under Option 2 risks engendering the same uncertainty and varying interpretations among industry that exists now with blending. Homogeneity is a key component of and will affect the intruder site assessment to be addressed in the rulemaking on unique waste streams, making it vital that its requirements and standards be set by rule.

Regardless of which option the Commission selects, it should state publicly that no large scale blending will be allowed under current NRC guidance while the Commission formally adopts new regulations and/or guidance setting forth the standards under which blending would be permitted.

This public clarification is necessary to remove confusion that arises from several statements in the Accompanying Analysis to the Vote Paper. The Analysis states that until the Commission's decision is fully implemented the staff would be authorized to respond to individual stakeholder requests to allow large scale blending using current guidance in the BTP. When coupled with a series of letters sent last year from the NRC staff to various stakeholders which have been interpreted by some in the industry to allow large scale blending under the BTP, these statements in the Analysis effectively could establish large scale blending as accepted industry practice prior to implementation of the Commission's decision.

Sincerely,

Joseph DiCamillo
General Counsel

cc: Via Electronic Mail
Commissioner Kristine L. Svinicki
Commissioner George Apostolakis
Commissioner William D. Magwood, IV
Commissioner William C. Ostendorff
Rochelle Bavol
Sandy Joosten

Studsvik

June 10, 2010

MEMORANDUM

FROM: Brad Mason, Chief Engineer, and Corey Myers, Engineer I

TO: Joseph DiCamillo, General Counsel

RE: ISSUES WITH BLENDING OF DIFFERENT TYPES OF ION EXCHANGE RESIN

INTRODUCTION

This document summarizes the results of testing that demonstrates that it is not technically feasible to blend certain types of ion exchange resins due to substantial particle size and density differences that result in rapid segregation of resin types in the disposal container.

Ion exchange resins are used in the cleaning of water in nuclear power plants. Depleted resins are produced in a wide variety of forms that vary in size, shape, density, and chemical composition. These variations significantly impact the settling time and resultant segregation of different resin types when otherwise well-mixed resins are transferred to the disposal container for final dewatering. When well-mixed resins are transferred into a large disposal container, the filling and dewatering operations occur over at least several hours to as much as several days to fully fill and dewater a large disposal container with resins. Table 1 in the Addenda provides a few examples of the different types of ion exchange resin and their general characteristics. Partially or fully depleted resins will have further density and particle size differences from the resin data provided in Table 1.

BLENDING, RESIN MIXING, AND SEGREGATION

Blending of resins is based upon the mathematical averaging of small amounts of high activity Class B and/or C wastes with a large amount of lower activity Class A waste in such a way that the overall waste class of the combined mixture is still considered Class A. In order for blending to be viable, a relatively homogenous mix of high activity and low activity waste must be achieved. Otherwise, blending is nothing more than placing high activity waste next to low activity waste and calling both wastes low activity.

For resins, blending requires that two or more batches of resin be thoroughly mixed in an appropriate vessel and the resultant well-mixed resins be transferred to a disposal container for dewatering and ultimate shipment to a licensed disposal facility. It is not possible to mix the resins in the disposal container due to the presence of large banks, sheets and/or racks of dewatering filtration media that make it impossible to mix resins in the disposal container.

As is seen in nuclear power plants, the mixing and movement of resins requires copious amounts of water. However, testing has shown that as the water content of a resin slurry increases, the segregation of different resin types becomes faster and more distinct, see Addenda - Table 2, resin settling test data. As shown in Table 2, in all cases, the initially well-mixed resins segregate much more quickly than the 'mixture' can ever be dewatered, with substantial to complete segregation occurring in less than one minute. Consequently, the final product in the high activity waste can separate from the low activity waste producing a non-homogeneous final waste in the disposal container.

Resins segregate in a process called segregation or 'classification' based primarily on two factors: 1) particle size and 2) particle density. Classification is well-documented phenomenon, as described by the Department of Energy Handbook on Water Treatment Processes [1]:

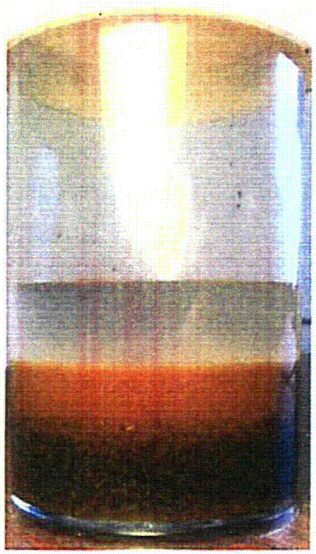
'Because of the different densities of anion and cation resins...lighter anion resin would gradually rise to the top by a process called classification, resulting in a layer of anion resin on top of the cation resin'

The denser, larger cation resin beads settle quickly to the bottom of a container, while smaller and lighter bead resins, such as anion resins, are carried upward by rising water turbulence and eventually settle on top of the denser, larger cation beads. In the event that powdered resins are mixed with bead resins, the segregation phenomenon is significantly aggravated as the very fine powdered resins can remain fluidized until the last of the initially well-mixed powdered-bead resin mixture is added to the disposal container. This results in the bead resins being largely settled in the bottom of the disposal container while the powdered resins are still fluidized or only partially settling at best. While it is obvious that a homogeneous physical mixture cannot be achieved, the same concepts apply to radioactivity. The theoretical possibility of achieving homogeneity of radioactivity exists; the physical and technological challenges of achieving radiological homogeneity make such a goal virtually impossible to meet.

Six sets of photos are provided below that show the classification/segregation of different resin mixes at various water concentrations. Table 2 provides a discussion of the parameters for each test run with information on the resin mix ratios and the water content of the initially well-mixed resin/water slurries. In the photographs the settled resins segregate rapidly, in less than one minute, as recorded in Table 2.

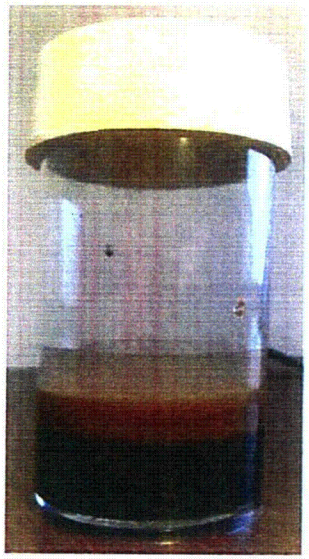
TEST NO. 6: 86% BEAD RESIN, 14% POWDERED RESIN, 2:1 RESIN TO WATER RATIO

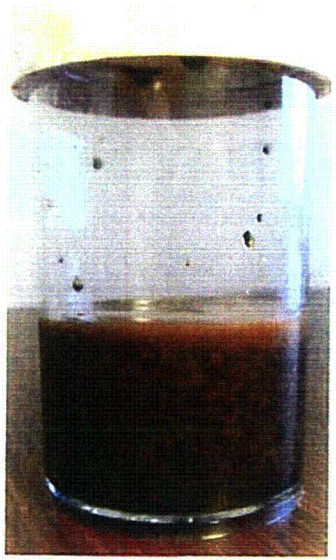
The bead resin used in this test comprises mixed resins with part anion (clear) and part cation (black). The powdered resin is tan or beige in color. As is evident in the first photo, the anion/cation beads will segregate with the lighter anion beads settling on top of the cation beads and the much smaller powdered resins mostly separated and settled on top of the clear anion resins. The lighter clear anion resins appear to have the same color as the powdered resins that have settled on top of the anion resins. There is some minor mixing of the powdered resins into the bottom cation layer and the middle anion layer. The second picture was taken immediately following the vigorous mixing and pouring of the combined resins from another container into the container shown in the second and subsequent photos. At this very early stage, second photo, resin classification is already occurring. In less than 15 seconds, the resin has re-segregated as shown in photos 3, 4 and 5, with cation beads on the bottom, anion beads in the middle, and powdered resin on top. Examination from above and below shows no beads are at the top of the 'mixture', and no powder is at the bottom; therefore, this cannot be called a homogeneous mixture, but shows strong segregation of each resin type.

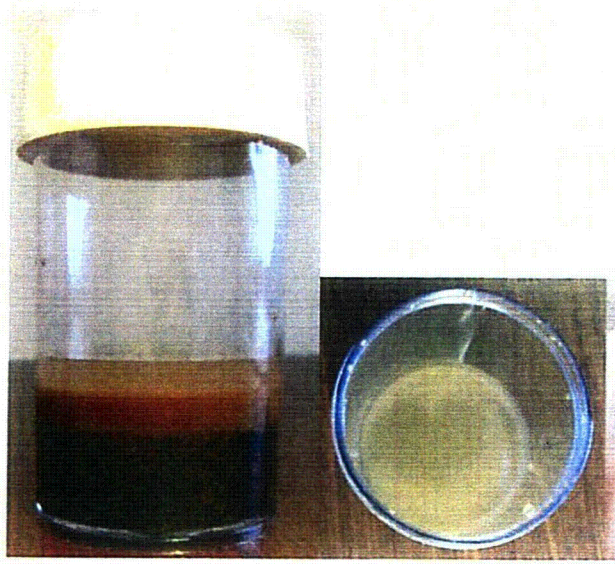


TEST NO. 3: 86% BEAD RESIN, 14% POWDERED RESIN, 3:1 RESIN TO WATER RATIO

The same resins used in Test No. 6 were used in Test No. 3, but less water was used for Test No. 3. Classification again occurred in less than 15 seconds and significant segregation of the resins occurred. Again, this cannot be called a homogeneous mixture, but shows strong segregation of each resin type.

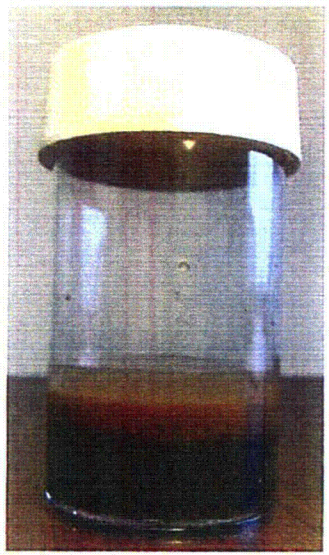


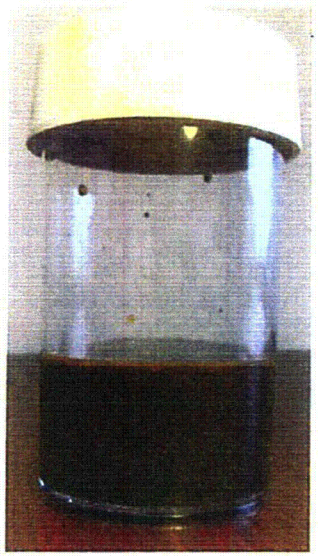


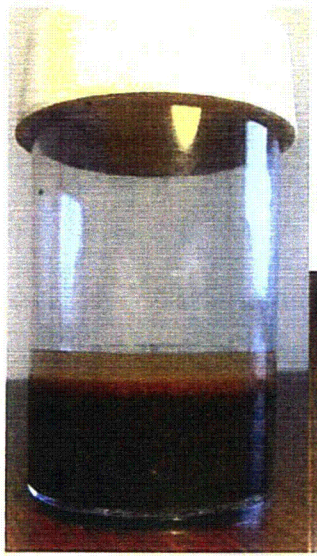


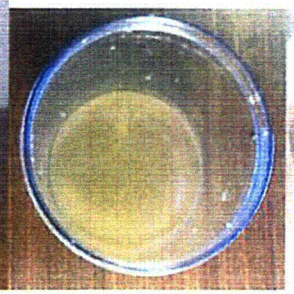
TEST NO. 1: 86% BEAD RESIN, 14% POWDERED RESIN, 4.5:1 RESIN TO WATER RATIO

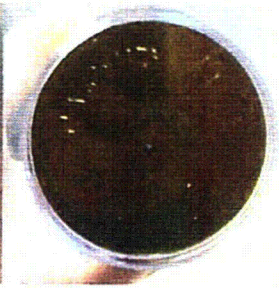
The same resins used in Test No. 3 were used in Test No. 1, but less water was used for Test No. 1. The first photo illustrates the very small amount of excess water used in this test. Again, picture 2 represents the slurry immediately after mixing. The third picture was taken approximately 1 minute after mixing was stopped. It shows that the anion and cation beads are not substantially segregated. However, the powdered resins have largely segregated to the top of the bead mixture. Since the powdered resin is only 14% of the total resin volume it shows that most of the powdered resins have fully segregated from the bead resins. Examination of above and below shows the top is entirely powdered resin and the bottom has only cation beads with some anion beads. Classification occurred in approximately 30 seconds. Again, this does not represent a homogenous mixture, as the powdered resins show strong segregation from the bead resins.





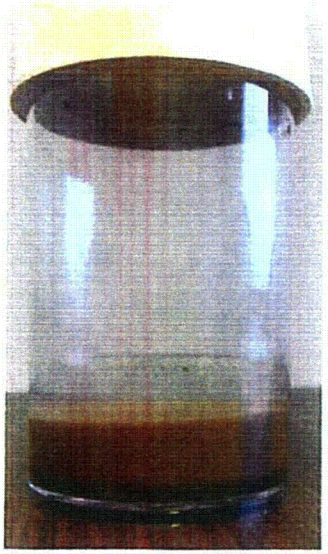


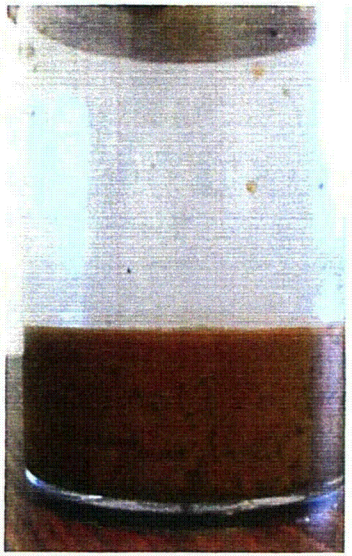


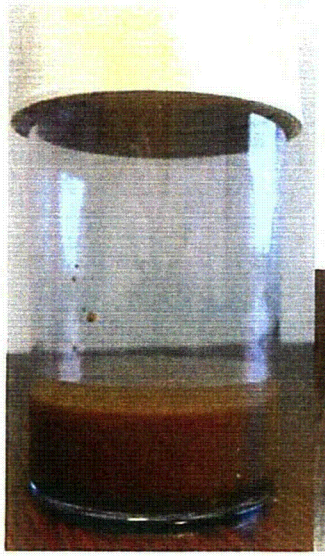


TEST NO. 12: 14% BEAD RESIN, 86% POWDERED RESIN, 2:1 RESIN TO WATER RATIO

The bead resin used in this test comprises mixed resins with part anion (clear) and part cation (black). The powdered resin is tan or beige in color. Due to the small volume of the mixed bead resins, the composition of the bead portions of the resin mix appears to be relatively homogenous. However, the bead resins are clearly segregated from the much smaller sized powdered resins that form a separate layer on top of the bead resins. The second picture was taken immediately following the vigorous mixing and pouring of resins from another container into the pictured container. At this very early stage, resin classification is already occurring with the much larger bead resins rapidly settling to the bottom of the container. In less than 15 seconds, the resin has re-segregated, with beads on the bottom and powdered resin on top. Examination from above and below shows no beads are at the top of the 'mixture', and no powder is at the bottom; therefore, this cannot be called a homogeneous mixture, but shows strong segregation of each resin by size.

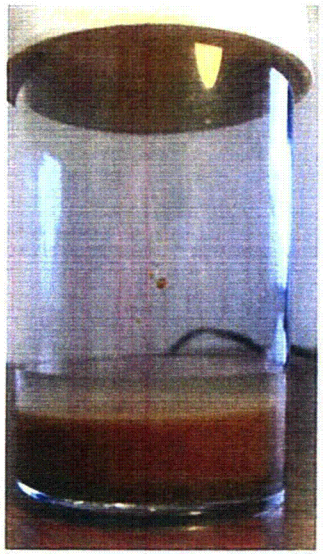


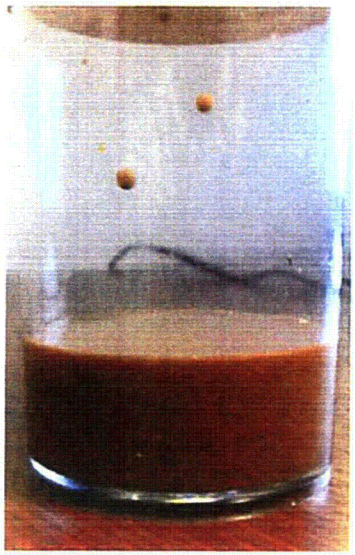


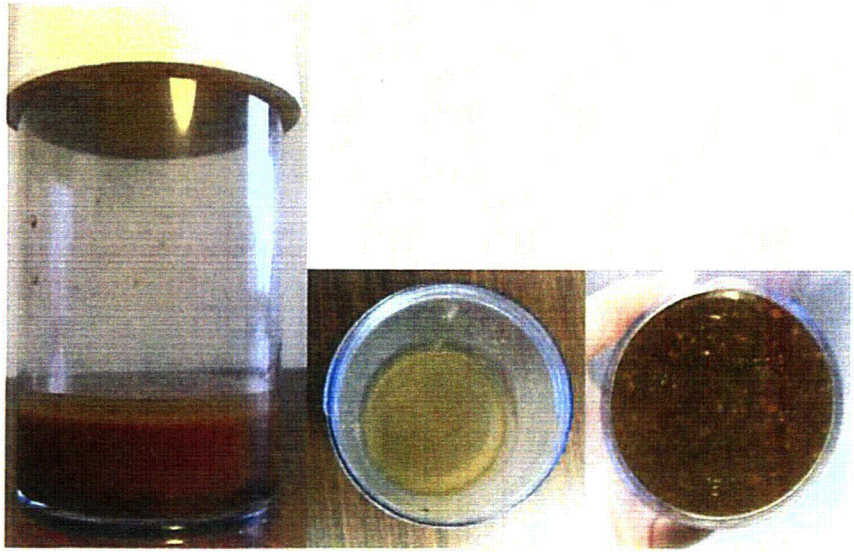


TEST NO. 9: 14% BEAD RESIN, 86% POWDERED RESIN, 3:1 RESIN TO WATER RATIO

The same resins used in Test No. 12 were used in Test No. 9, but less water was used for Test No. 9. Classification of the bead resins from the powdered resins occurred in approximately 30 seconds. The third picture shows a solid layer of bead resins on the bottom, a secondary layer of low bead resin concentration in the middle, and an entirely powdered resin layer on top. This cannot be called a homogeneous mixture, but shows strong segregation of each resin by size.

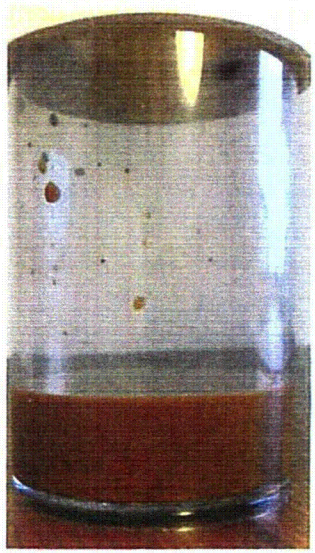


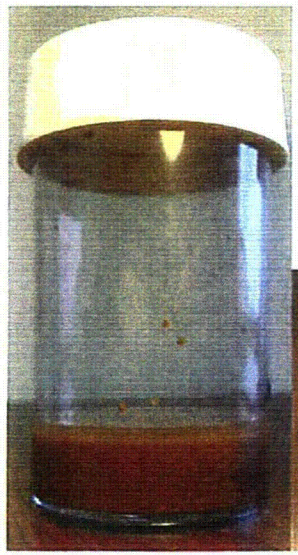




TEST NO. 7: 14% BEAD RESIN, 86% POWDERED RESIN, 4.5:1 RESIN TO WATER RATIO

The same resins used in Test No. 9 were used in Test No. 7, but less water was used for Test No. 7. The first photo demonstrates the very small amount of excess water used in this test. Picture 2 represents the slurry immediately after mixing. The third picture was taken approximately 1 minute after mixing. It shows a completely segregated layer of powdered resins on top of a variable layer of bead and powdered resins in a non-uniform mixture. However, the side view misrepresents the location of most of the bead resins. This occurs because the walls of the container increase the drag force on the bead resin, slowing their descent. This becomes evident when the beaker is examined from below. The bottom of the beaker shows uniform bead content of a higher concentration than is seen from the side of the container. Examination from above confirms the top layer is entirely powdered resin. Classification occurred in less than one minute. Again, this does not represent a homogeneous mixture, but shows strong segregation of each resin by size.





VIDEO

A video recording of the testing was taken to demonstrate the classification of resins in real time.

Video available upon request.

SUMMARY

Blending is not an appropriate technique for the disposal of ion exchange resins that have widely different activity levels and different particle sizes or densities, as the heavier bead resins with one level of activity will mostly settle to the bottom of the disposal container, while the lighter bead resins or much smaller powdered resins will mostly accumulate near the top of the disposal container, producing a final dewatered disposal container that is highly segregated by resin type, density, particle size and/or by relative activity.

If resin blending is to be authorized, only resins of similar particle size and density should be mixed together to prevent substantial segregation in the disposal container, as it is not technically feasible to provide mixing in the disposal container where there are numerous banks or racks of dewatering filter media. Of special concern is that powdered resins of one Class should not be mixed with bead resins of a different Class, or large variations in activity will certainly result as demonstrated by the testing document in this paper.

ADDENDA

TABLE 1: EXAMPLES OF UNSPENT RESIN CHARACTERISTICS

Brand - Model	Size (microns)	Shape	Bulk Density	Moisture Retention	Type
Purolite – NRW 5010	650 – 950	Spherical Beads	36.9 lb/ft^3	80-90%	Strong Base Anion
Rohm Haas – IRN99	300 – 850	Spherical Beads	52.4 lb/ft^3	37-43%	Strong Acid Cation
DOW – DOWEX SBR-C	350 – 1200	Bead	42 lb/ft^3	43-48%	Strong Base Anion
Graver – POWDEX PAO	<200	Powder	44 lb/ft^3	50-60%	Strong Base Anion
Graver – POWDEX PCN	<200	Powder	45 lb/ft^3	40-60%	Strong Acid Cation

TABLE 2: RESULTS OF BLENDING OF POWDERED RESINS WITH ANION AND CATION BEAD RESINS – SEGREGATION

Test No.	Bead : Powder	Resin : Water	Degree of Classification / Segregation	Settling Time (sec)
1	6 : 1	4.5 : 1	Powder/Bead Classification Present	27
2	6 : 1	3.6 : 1	Complete Powder/Bead Classification	24
3	6 : 1	3.0 : 1	Anion/Cation Bead Classification	13
4	6 : 1	2.6 : 1	Rapid Classification	9
5	6 : 1	2.25 : 1	Immediate Classification	7
6	6 : 1	2.0 : 1	Tightly Packed Classification	7
7	1 : 6	4.5 : 1	Concentration Gradient with all Powder on top	41
8	1 : 6	3.6 : 1	Powder/Bead Classification Present	33
9	1 : 6	3.0 : 1	Powder/Bead Classification	32
10	1 : 6	2.6 : 1	Complete Classification	16
11	1 : 6	2.25 : 1	Rapid Classification	8
12	1 : 6	2.0 : 1	Tightly Packed Classification	4

REFERENCES

[1] U.S. Department of Energy. DOE Fundamentals Handbook, Chemistry, DOE-HDBK-1015/2-93. Vol. 2. Washington, 1993.

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[1] U.S. Department of Energy. DOE Fundamentals Handbook, Chemistry, DOE-HDBK-1015/2-93. Vol. 2. Washington, 1993.

Blending of Low-Level Radioactive Waste

June 17, 2010

Ralph Andersen, CHP
Senior Director – Radiation Safety
& Environmental Protection

Nuclear Energy Industry Principles for LLRW Management (2008)

1. Storage and disposal of nuclear energy industry LLRW is managed safely and securely.
2. Timely, safe, and secure disposal is preferable to long-term storage.
3. Regulation should not restrict safe and secure LLRW management options
4. States and LLRW compacts play key roles in the implementation of safe and secure LLRW management options.
5. An open and competitive market best facilitates development of innovative and cost-effective options for safe and secure LLRW management.

EPRI Research Conclusions (2008)[1]

- Risk-informed changes to NRC guidance on concentration averaging (including blending) are warranted and justified
- Proposed changes will provide a more flexible basis for LLRW classification while still meeting disposal site safety performance objectives
- Such changes will enable, but not require, other affected parties to implement related processing and disposal options

[1]*Proposed Modifications to the NRC Branch Technical Position on concentration Averaging and Encapsulation* - EPRI Report 10116761 (ML090230195)

EPRI Research Conclusions (cont'd)

- 104 U.S. nuclear power plants generate ~15,000 ft^3 of LLRW that would be disposed of as Class B/C LLRW without further processing
  - Consists of resins, filter cartridges and irradiated hardware
  - Approximately 2/3 by volume (at 65 plants) is currently being placed in safe and secure interim storage
  - Proposed modifications to the NRC guidance on concentration averaging and encapsulation would help facilitate processing and disposal of much of this LLRW

Industry Perspective on NRC Staff Recommendation (SECY -10-0043)

- Support Option 2 recommendation to revise blending positions to be risk-informed and performance-based
- Support a rulemaking to explicitly require a site-specific evaluation
- Accept that efficiency will be obtained by linking with depleted uranium rulemaking
  - Blended LLRW is <u>not</u> a unique waste stream

Prepared Remarks by Lawrence E. Nanney, Director
Tennessee Division of Radiological Health

to the

U. S. Nuclear Regulatory Commission
Regarding Blending of Low-level Radioactive Waste (SECY-10-0043)

June 17, 2010

Mr. Chairman and members of the Commission, thank you for the opportunity to present our views on this issue here today.

I represent a state that hosts several licensed processors of low-level waste, which conduct a variety of processing operations for a broad spectrum of LLW generators from all across the nation. Predominant among those generators are the nation's nuclear power stations, themselves licensees of the NRC.

As the Agreement State agency in Tennessee, the Division of Radiological Health, in the Department of Environment and Conservation, licenses the two waste processors that are at the center of this issue of blending. EnergySolutions and Studsvik have both previously presented their cases, and will do so again later today. Through differing business models, these processors offer different technological and philosophical approaches to solving the same problem.

NRC staff has addressed, in the blending paper, various advantages and disadvantages associated with these competing processes. We have chosen not to endorse one process over the other. Our only interest and sole responsibility lies in protecting the workers in the facilities that we license, the health and safety of the public, and the environment of Tennessee.

EnergySolutions approached the Division with preliminary plans for developing a methodology to blend ion exchange resins and similar waste materials having varying radioactivity concentrations into a homogeneous mixture, which it hopes to dispose at its licensed disposal site in Clive, Utah. Those discussions have centered on "blending", and not "dilution", in the context that these terms are used by the NRC.

During our initial discussions with representatives of EnergySolutions, it was clear that they wanted the Division to license them for conduct of this activity on a commercial scale. They presented a rationale to support the position that this was already within the scope of the Branch Technical Position on Concentration Averaging and Encapsulation.

The Division was not convinced that this was the case, and told EnergySolutions that we had no interest in licensing a process that lacked commercial viability, by which we meant that it must have both a customer base to support it and a pathway for disposal of the processed wastes.

The Division requested that EnergySolutions pursue confirmation regarding both of these "viability" aspects of their proposal. We also authorized them to do some limited R&D work to identify any technical obstacles to producing a LLW form acceptable for disposal. It was made clear that the satisfactory resolution of each of these issues was prerequisite to any consideration of authorization for commercial operation.

Since the NRC's reactor licensees constitute a major customer base for Tennessee's LLW processing facilities, whether they will be allowed by the NRC to utilize the services of offsite waste processors to blend LLW in preparation for disposal is key to the first viability issue. That was not at all clear from our reading of the Branch Technical Position. We note that subsequent NRC correspondence has confirmed the applicability of the BTP to offsite processors, but that can be undone in a moment, depending on what action the Commission takes regarding the various options presented in the blending paper.

Regardless of which option the Commission chooses, the Division would like the NRC to clarify those aspects of its position that may affect the ability of its reactor licensees to utilize blending as proposed by EnergySolutions. That would provide part of the answer to the question of commercial viability.

In regard to the issue of a clear pathway for disposal of blended waste, the Division notes the staff recommendation in Section 4.5 of the blending paper, regarding how the current blending proposal might move forward, pending completion of whichever option may be selected by the Commission. Having a viable pathway for disposal of the resulting wastes, as well as clarity and finality in the NRC's position, is critical to our goal of protecting public health, safety, and the environment.

In Section 8.0 of the blending paper, NRC staff noted, regarding Option 1 - Maintaining the Status Quo, "This option could lead to inconsistent treatment of LLRW that could vary according to where the waste is generated, processed and/or disposed. Waste blended and classified in accordance with the requirements of the State in which the generator is located may not be accepted for disposal at a site in another State that has adopted different waste classification and blending criteria."

The Division notes that the foregoing situation, ascribed to Option 1, is not unique to that option. In fact, something very similar to that is a reality of life that waste processors deal with on a daily basis, and is something that may well continue regardless of the option selected.

Tennessee's waste processors receive, process, and either return or dispose LLW generated in both sited and unsited states and compact regions. In each case involving disposal, the waste processor must ensure compliance with applicable, often varying, and sometimes inconsistently applied disposal site, state, and compact requirements regarding waste forms and import/export policies. Decisions that are made in those states and compacts, as well as those made by the NRC, have a profound impact on waste processing in Tennessee.

The sited states and compacts bear the primary responsibility for implementing requirements for disposal sites within their jurisdictions. We believe those requirements should be based on considerations that serve the best interests of public health and safety, however, it is unclear in some cases how existing requirements are connected to that goal. For example, we agree with the NRC's stated view on the reason and timing for classifying waste for disposal, however, some who have commented on that, in regard to the blending issue, seem to be basing their rationales on criteria other than scientific analysis of factors affecting health and safety.

For EnergySolutions' blending proposal to move forward, a LLW disposal site must be willing and able to receive those blended wastes, and there is only so much that the NRC can do to influence that course of events. While it is not the responsibility of the NRC to standardize all requirements for LLW disposal across the nation, the Division believes that the NRC can play a key role in improving uniformity, through this effort to clarify its position on this issue.

The Bureau of Environment, in the Tennessee Department of Environment and Conservation, has a statement of core values, which includes in part the following: "We strive ... to solve problems through a scientific and evidence-based approach that respects diverse opinions and provides opportunities for input ...". We commend the effort of the NRC to bring clarity where it is lacking, and we encourage the NRC to pursue this effort in a manner consistent with these core values.

We believe that the NRC has appropriate resources, processes, and trained staff, and is the right agency to address this issue. We concur with the NRC's policy of moving toward risk-informed, performance-based regulation, and are, ourselves, moving in that direction. By making this decision on the basis of scientific analysis of the evidence, through a rulemaking process that allows for public input under the National Environmental Policy Act, the NRC will provide both a sound rationale for the decision, and a basis that can lead to increased national uniformity.

To summarize, two competing processing technologies are at the center of this blending issue. The choice of which, or both, or neither of these technologies will be proven viable lies with the Commission and its licensees, as well as with the sited states and compacts, and their regulatory agencies. To the extent that the resolution of this blending issue is grounded in a well-reasoned discussion of the associated health and safety considerations that underlie the Commission's decision, it is our hope that sited states and compacts may find encouragement to conform their disposal requirements toward those same health and safety goals.

Again, I thank you for the opportunity to present these views.

Ms. Annette Vietti-Cook
Secretary
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

June 13, 2010

SUBJECT: SECY-10-0043 Blending of Low-Level Radioactive Waste

Dear Ms. Vietti-Cook:

This letter is to provide my comments on issues raised in SECY-10-0043. The NRC staff has provided an excellent summary of the past practice regarding classification and disposal of low level radioactive waste. Almost thirty years ago the Commission sponsored regional workshops to provide opportunity for open dialogue on the issues in the Part 61 rulemaking. Since that time, the concepts contained in Part 61 have been adopted by other agencies and international regulatory authorities responsible for disposal and radioactive waste management. It is now time to take advantage of the lessons learned and update the regulations to modern standards.

I support the Staff's recommendation in SECY-10-0043 to adopt Option 2. However, I do not think that adopting Option 2 will be sufficient to address the current challenges pending the completion of the effort to risk inform 10 CFR Part 61. Specifying requirements for a site-specific analysis for the disposal of large quantities of depleted uranium (DU) alone is not enough in revising 10 CFR 61 in a limited scope rulemaking. A larger effort is needed to risk inform part 61. I do not think piecemeal action will be effective.

The NRC should consider the latest IAEA waste classification system and reference the latest International Committee on Radiation Protection methodology. The Part 61 classification and staff guidance was appropriate thirty years ago under a deterministic rule. However, based on the lessons learned over the last thirty years a less prescriptive, performance based approach is warranted. The NRC staff guidance for activities related to the DOE waste determinations (NUREG-1854) provides such an approach and has been proven effective. I would recommend reliance on NUREG-1854 rather than expending resources to update outdated deterministic guidance documents.

Option 2 should be expanded to require performance assessments demonstrating compliance with the performance objectives of Part 61 for all waste streams at low-level radioactive waste disposal facilities. There are a number of other changes that should also be made to risk inform Part 61. I recommend you take the necessary steps to complete a comprehensive revision to risk inform 10 CFR Part 61. Specific recommendations are identified in an October 30, 2009 letter from Talisman International which I, along with Jim Lieberman, sent to NRC.

In parallel with your effort to update Part 61, DOE is updating its requirements for managing disposal of radioactive waste. I would recommend working with DOE to insure consistency in management and disposal of this waste on a national level.

I appreciate the opportunity to provide these comments to the Commission. I would be pleased to respond to any questions or comments. I can be contacted at 301- 452- 3511 or Greevesj@aol.com.

Best Regards,

John T. Greeves

John T. Greeves

JTG Consulting
209 Rockwell Terrace
Frederick, MD 21701

6/15...To Chairman/Comrs/EDO for Information...Copy to: RF...10-0273 (Note: SECY to make part of the record for commission meeting scheduled for 6/17/2010)

WASTE CONTROL
SPECIALISTS LLC

June 10, 2010

Ms. Annette L. Vietti-Cook, Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

References: (1) Texas Radioactive Material License No. R04100, Amendment 01

(2) Letter from J. Scott Kirk, CHP (WCS), to Michael T. Lesar (NRC), *Additional Comments Regarding Waste Blending*, dated January 29, 2010

(3) Letter from J. Scott Kirk, CHP (WCS), to Larry M. Camper (NRC), *Supplemental Information Regarding Potential Radiological Impacts to an Intruder Resident from Blended Low-Level Radioactive Waste*, dated January 8, 2010

Subject: NRC Commissioners' Briefing Regarding Waste Blending (SECY-10-0043)

Dear Ms. Vietti-Cook:

Waste Control Specialists LLC (WCS) is pleased to be invited to participate in the June 17, 2010, public meeting to share our thoughts regarding blending of Low-Level Radioactive Waste (LLW). We have reviewed staff's analysis in SECY-10-0043 and agree with their recommended Option 2—with one exception. Rather than allow large-scale commercial downblending to proceed in parallel with the rulemaking, in accordance with interim guidance staff would promulgate, we recommend the long-established, industry-accepted policy prohibiting intentional downblending for purposes of changing waste classification be preserved until (1) the U.S. Nuclear Regulatory Commission's (NRC's) rulemaking process is completed and (2) compatible Agreement State regulations are issued and effective. This approach would have many benefits, including:

- Ensuring the controversial issue of downblending is addressed only through a deliberate, public, open, and transparent process that provides for full stakeholder input, and that examines and resolves not just the safety, environmental, interstate commerce, and public perception issues associated with downblending, but also the "unintended consequences" the proposal would create.

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- Preserving the *de facto* technical basis of Title 10 of the U.S. Code of Federal Regulations, Part 61 (10 CFR 61), which relies on waste streams that are similar to those that existed at the time that rule was promulgated, and have not been artificially manipulated (as by intentional downblending).

- Preserving the well known regulatory paradigm established by the NRC's 1981 *Policy Statement on Low-Level Waste Volume Reduction* and the 1995 *Final Branch Technical Position on Concentration Averaging and Encapsulation* ("BTP"), and reiterated as recently as October 2006 in staff correspondence to the ALARON Corporation.[1]

- Avoiding the perception of conduct that is "disingenuous," "tomfoolery," and "a shell game," as one commenter remarked at the January 14, 2010, stakeholder meeting, which may erode public confidence in the agency in the long term.

- Comporting with a standard of fairness that urges that changes to long-established agency interpretations of its rules, that are well accepted and form the basis for substantial investments in the regulated community, not be changed except through notice-and-comment rulemaking.[2]

- Ensuring harmonization of Agreement State implementing regulations, which can only be accomplished through a rulemaking (with appropriate compatibility requirements), and cannot be accomplished through guidance, including especially interim guidance, which Agreement States need not follow.

We offer the Commissioners our insights on this matter, as expressed herein, to assist in shaping this proposed change in radioactive waste management policy—a change that will affect national stakeholders for decades to come.

INTRUDER ANALYSIS

At the NRC stakeholder meetings held in December 2009, the NRC acknowledged that an analysis had not been performed to assess the radiological impacts to an inadvertent intruder resident from the disposal of waste blended to the upper bound of the Class A limits after expiration of institutional controls in 100 years. During the rulemaking for 10 CFR 61, the NRC established limits for Class A waste based on the typical waste streams and waste forms that were being generated at that time (1981). The Environmental Impact Statement (EIS) supporting that rulemaking was also silent on the radiological impacts to an intruder for waste streams at the upper end of the Class A limits.

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[1] Letter from John D. Kinneman (NRC) to Joseph Harverson (President, ALARON Corporation) dated October 16, 2006.

[2] See, e.g., *Alaska Professional Hunters Association, Inc. v. Federal Aviation Administration*, 177 F.3d 1030 (D.C. Cir. 1999).

In our January 8, 2010, letter to the NRC (Reference 3), WCS submitted an analysis of the potential radiological impacts to an intruder-agriculture scenario (referenced henceforth as the "intruder resident") to supplement comments previously submitted to the Commission on the proposed policy change. The analysis was performed following the guidance contained in NUREG/CR-4370, *Update of Part 61 Impacts Analysis*, for a "generic" site in a risk-informed manner. It was assumed that disposal of waste blended to the upper end of the Class A limits at a generic site only had to comply with the minimum requirements for disposing of Class A LLW. That is, no credit was given for controls for structural stability or measures intended to protect an intruder, as these controls are not required by regulation for disposal of Class A LLW. This conservative approach is appropriate when considering potential changes to the BTP because waste blended to the upper end of the Class A limits is intended to be treated as any other Class A waste.

WCS shared its views pertaining to the intruder analysis and other aspects of waste blending with Commissioners Magwood and Ostendorff, as well as other NRC staff, during a site visit on May 18, 2010. WCS indicated that the estimated doses were unacceptably high—as high as 46,600 millirem per year 100 years after expiration of institutional controls or 466 times in excess of the dose limits for members of public specified in 10 CFR 20.1301 (See Reference 3). At the meeting during the site visit, NRC staff acknowledged that an independent review of WCS' intruder analysis had been performed. The staff agreed that the guidance had been properly followed and the estimated radiation doses were correctly calculated.

UNREVIEWED SAFETY QUESTION FOR A GENERIC SITE ANALYSIS

Radiological consequences of this magnitude arise from the manner in which the original analysis underlying 10 CFR 61 was conducted. When the regulation was first issued, the NRC did not consider all radionuclides at the upper thresholds of the waste classifications in 10 CFR 61.55. Instead, the NRC evaluated typical wastes and waste forms that were being generated at the time. Therefore, dilution of higher classification wastes to the upper bound of the Class A limits, on a large scale that is now under consideration by the NRC, was not analyzed when this regulation was first promulgated. The analysis performed by WCS underscores the point that waste at the upper end of the Class A limits may not be safely disposed of in Class A disposal sites without requiring additional controls for structural stability and intruder protection. Such controls are currently not required under 10 CFR 61, and the waste classification tables by themselves—i.e., without the proscription against blending currently contained in the BTP—do not provide adequate assurances to protect public health or the environment now or in the future.

At the direction of the Commissioners, the NRC staff is preparing a rulemaking to consider additional requirements that may be necessary to ensure that unique waste streams, such as large quantities of depleted uranium (DU), may be safely disposed of as Class A, B, or C LLW. The Commissioners' directive was based in part on the fact that disposal of large quantities of DU was not analyzed during the initial rulemaking for 10 CFR 61 (i.e., the disposal of large quantities of DU constituted an Unreviewed Safety Question [USQ]).

The results of WCS' radiological analysis related to blending raises concerns similar to those related to disposing of large quantities of DU, since "blending" on the scale contemplated has also never before been analyzed by the NRC. Such an analysis could identify additional regulatory requirements needed to protect a future inadvertent intruder resident from potential exposures to high doses of radiation. Such requirements may include similar or identical regulatory controls to those currently mandated for disposal of Class B/C LLW—requirements that could only be enforceable through a rulemaking with strict compatibility requirements for Agreement States hosting a disposal facility. For the reasons stated above, WCS strongly agrees with the NRC staff's recommendation to mandate that an intruder analysis be performed either as part of the rulemaking for unique waste streams or as part of the overhaul to 10 CFR 61 expected to begin sometime in 2011.

CONTROLS NEEDED TO PROTECT PUBLIC HEALTH AND ENSURE HOMOGENEITY

During the stakeholder meetings held in December 2009 and January 2010, as well as in correspondence with WCS and other stakeholders, NRC staff reiterated that the regulated community is only compelled to abide by regulations, and not by regulatory guidance or policy. WCS' intruder analysis strongly suggests that the NRC take a hard look at the additional controls that must be required by rulemaking (not guidance) to reduce the likelihood of a future intruder resident from incurring such high radiological consequences. The rulemaking should require the same controls for waste blended at the upper bound of the Class A limits to ensure stability and intruder protection as those currently mandated for Class B/C LLW. Additionally, a qualification and testing criteria[3] that currently only apply to Class B/C LLW must also be stipulated for LLW blended to the upper end of the Class A limits to ensure that any such controls will be able to perform their intended function for as long as the radiation doses remaining unacceptably high.

Currently, the regulated community must ensure that final waste stream is relative homogenous only through guidance. WCS disagrees with the staff that the requirements for mandating homogeneity and any associated sampling requirements could be adequately controlled by issuance of guidance. Any such requirements would require a rulemaking to ensure consistent and uniform implementation by both licensees and Agreement States hosting disposal facilities. Should NRC elect to establish such controls or practices only via guidance and not in

[3] Currently, the licensed community relies on information contained in the Waste Form Technical Position, Revision 1 (January 1991). This Technical Position Paper specified certain criteria needed to provide suitable controls to ensure stability for Class B/C LLW.

It also noted that Class A LLW does not require the same level of stabilization to meet the disposal site performance criteria. Class A solidified materials need only be a free standing monolith as opposed to Class B/C LLW that must meet the waste form qualification testing (specified in section C.2). Segregation of the Class A waste from the Class B/C waste in the disposal environment serves to prevent failure of the engineered systems for disposal of the Class B/C waste. Stability is allowed but not currently required for Class A waste.

regulations, then the regulated and the regulator may have challenges in determining what is required to protect public health versus what is suggested in guidance or policy.

THE TEXAS SOLUTION

We have noted from the outset that the State of Texas has made great strides in demonstrating that new facilities can be licensed and made available to help solve the Nation's challenges in disposing of Class B/C LLW. On September 10, 2009, Waste Control Specialists LLC (WCS) received its final license (Reference 1) from the Texas Commission on Environmental Quality (TCEQ) authorizing disposal of Class A, B, and C LLW at its facility in Andrews County, Texas. The issuance of this license is the first step to opening the first facility for disposal of LLW under the Low-Level Radioactive Waste Policy Act of 1980 and as amended in 1985 ("LLWPA").

WCS is optimistic that its Compact facility will eventually be open for controlled disposal of Class A, B, and C LLW by non-Compact generators. Over the past several months, the Texas Low-Level Radioactive Waste Disposal Compact Commission ("Texas Compact Commission") has been drafting rules to govern the import and export of Class A, B and C LLW into and out of the Texas Compact. The Texas Compact Commission is currently responding to stakeholder comments on a draft rule that would establish the process to apply for import and export petitions for LLW into and out of the Texas Compact. It is anticipated that the Texas Compact Commission will vote on the draft rule in the very near future.

ECONOMIC IMPACTS

WCS recognizes that the NRC is largely unconcerned with commercial issues. However, the NRC staff has shared their awareness that disposal site access and a viable disposal pathway, not only for the Texas Compact but for the nation at large, is an issue of concern. WCS recently announced that that the cost of waste disposal, should controlled importation by non-Compact generators be authorized, would be approximately a factor of 10 less expensive than if importation were prohibited by the Texas Compact Commission.

The rates recently provided as part of a rate-setting rulemaking to the TCEQ reflect that there has never been a more expensive and robust waste disposal facility licensed or constructed in the United States. WCS' disposal facility is required to be constructed using state-of-the-art science and technology designed specifically for Class B/C LLW that ensures members of the public will be safe for thousands of years[4] into the future. The significant safety, health and environment safeguards that TCEQ directed be put in place include concrete and clay liners, 150 active monitoring wells and almost $140 million of funds to cover closure, post-closure and long-term monitoring of the disposal facility.

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[4] Under Title 30, Texas Administrative Code (TAC), Chapter 336.709, a minimum period of 1,000 years after closure or the period where peak dose occurs, whichever is longer, is required as the period of analysis.

At a meeting held on December 14, 2009, WCS encouraged the NRC to seriously consider the unintended consequences that could result from reversal of its longstanding policy on blending waste. WCS noted that changes to the BTP that artificially eliminated 50% of the Class B/C LLW across the nation would have a drastic effect on the cost of waste disposal for the 50% of the waste remaining. To recover a given fixed cost investment in a disposal facility, the cost of waste disposal is inversely proportional to the volumes disposed. Furthermore, if such changes to policy resulted in undermining the economic viability of the Texas Compact Waste Facility, then waste streams not suitable for blending (such as disused sealed sources, irradiated hardware, and sealed radioactive sources) could be stranded in perpetuity. Therefore, WCS has encouraged the NRC to reach out to the medical, university, and research communities, as well as National Nuclear Security Administration since it has previously expressed concerns regarding the high cost and lack of disposal options available following the closure of the disposal facility in Barnwell, South Carolina.

OPPOSITION REMAINS BY STATES HOSTING A DISPOSAL FACILITY

The State of Texas in its regulations specifically prohibits intentional dilution or mixing of waste for the purpose of changing waste classification. Waste that is intentionally diluted or blended as a result of stabilization, mixing, or treatment or for any other reason is subject to the disposal regulations to which it would have been subject prior to dilution. As noted in SECY-10-0043, Texas believes that its regulations that serve to classify waste at the point-of-origin rather than the point-of-disposal have served the state well by effectively prohibiting waste blending for the purpose of changing waste classification (similar to Option 3 in SECY-10-0043).

In 2005, the State of Utah's legislature enacted Code Section 19-3-103.7, prohibiting any entity from accepting or seeking a license to accept Class B/C LLW. The State of Utah's regulators have since expressed concerns regarding potential changes to the BTP-established policy that would have the effect of circumventing the State's prohibition of disposing of Class B/C LLW in Utah. Such a decision would allow the same Class B/C radiological source term that is currently prohibited to enter the state, but labeled as Class A LLW. To counter this possibility, Utah's Department of Environmental Quality (DEQ) and the Utah Radiation Control Board (RCB) have expressed their opposition to allowing the disposal of downblended waste if the intended purpose is to acquire disposal site access. This opposition was expressed as comments to the NRC at the January 14, 2010, stakeholder meeting by Utah's DEQ and in a recently issued Position Statement by Utah's RCB.

Given that unanimity against changes to the BTP-established policy exists among the states that host a commercial disposal facility, as well as among the Regional LLW Compacts,[5] close coordination with Agreement States should be undertaken before making fundamental changes in policy.

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[5] See prepared statement from Leonard C. Slosky, representing the Low-Level Radioactive Waste Forum, Inc., and the States of South Carolina, Utah and Washington for the U.S. Nuclear Regulatory Commission meeting on Low-Level Radioactive Waste, dated April 17, 2009.

CONCLUSIONS

The NRC staff should be commended for working towards a solution to the nation's challenge of disposing Class B/C LLW. WCS believes that its site in Andrews County, Texas, potentially offers the best solution for generators in the country that currently lack a disposal option for Class B/C LLW. The Texas Compact Commission will soon determine if this solution is best also for Texas and Vermont.

As discussed above, WCS agrees with the recommended Option 2 in SECY-10-0043 with one important exception. The Commission should not allow large-scale commercial downblending to proceed in parallel with the rulemaking. Instead, the well known and established policy of not allowing intentional downblending for purposes of changing waste classification should be preserved until the rulemaking is complete and nationwide implementation is harmonized through promulgation of consistent and compatible Agreement State regulations.

In addition to ensuring thorough examination of the downblending proposal—through an established, known, comprehensive, transparent process—this approach would be fair to all stakeholders; would ensure the unintended consequences of the proposal are fully understood, examined, and appropriately addressed; would further NRC's credibility and reputation for thoughtful, deliberative action; and, importantly, would ensure safety and environmental protection are not inadvertently compromised.

WCS requests that a copy of all correspondence regarding this matter be submitted directly to my attention by fax (972-448-1419) or email (skirk@valhi.net). Thank you for your consideration of this submission.

Sincerely,

J. Scott Kirk, CHP
Vice President, Licensing, Corporate Compliance & Radiation Safety

cc: Commissioner Gregory B. Jaczko
Commissioner Kristine L. Svinicki
Commissioner George Apostolakis
Commissioner William D. Magwood
Commissioner William C. Ostendorff
R. William Borchardt
Martin J. Virgilio

Charles L. Miller, Ph.D.
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June 8, 2010

Ms. Annette Vietti-Cook
Secretary
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: SECY-10-0043 Blending of Low-Level Radioactive Waste

Dear Ms. Vietti-Cook:

The purpose of this letter is to provide the Commission with my views on the blending issues raised in the above SECY paper. I support the Staff's recommendation in SECY-10-0043 to adopt Option 2. However, I do not think that adopting Option 2 will be sufficient to address the current low-level waste challenges pending the completion of the effort to risk inform 10 CFR Part 61. For the reasons provided below, Option 2 should be expanded to require performance assessments demonstrating compliance with the performance objectives of Part 61 for **all** waste streams at low-level radioactive waste disposal facilities. There are a number of other changes that should also be made to Part 61 as part of any rulemaking to address depleted uranium and blended materials in advance of the effort to risk inform Part 61.

The Staff also noted that stakeholders in addressing blending raised questions concerning the timing of waste classification and attribution. These are important issues that have interstate commerce implications. NRC should address them to provide uniform national standards from a health and safety perspective.

Part 61 Issues

In the past year, the NRC has considered disposal issues associated with depleted uranium, unique waste, and blended waste streams. The regulatory concern is whether the existing regulatory structure provides a safe pathway for the disposal of these materials since the quantities and concentrations of radionuclides in these waste streams today are different from that considered in the development of Part 61. This concern is understandable given the time that has past and changes during the past three decades from uses of radioactive material, waste management processes, and regulatory direction. Option 2 as proposed by the Staff will address these known waste stream problems by requiring, among other things, performance assessments for these particular waste

streams. However, the Staff approach, guided in part by the language of the March 18, 2009 SRM on SECY 08-0147, appears to only address the specific waste streams at issue today, i.e., depleted uranium and blended waste.

But what will be the waste streams that are challenged in future years? It is not unrealistic to expect that in the future additional waste streams will be identified that have characteristics today that are different from that considered in the development of Part 61. In my view, the solution is to provide in Part 61 that each disposal site is required to have a site-specific performance assessment demonstrating compliance with the performance objectives of Part 61 that encompasses all of the waste at the site. With this approach there will be assurance that all waste disposed at a disposal site will meet the performance objectives of Part 61 and, therefore, the public will be protected. As the Commission stated in the Louisiana Energy Services proceeding, CLI-05-05 at page 11, January 18, 2005:

> In the end, the "bottom line for disposal" of low-level radioactive wastes are the *performance objectives* of 10 C.F.R. Part 61, Subpart C, which set forth the ultimate standards and radiation limits for (1) protection of the general population from releases of radioactivity; (2) protection of individuals from inadvertent intrusion; (3) protection of individuals during operations; (4) and stability of the disposal site after closure.

This should not be a onerous rulemaking. In fact, in my view this is currently required as 10 CFR 61.12 and 13 address the need to demonstrate that the performance objectives will be met. A reasonable construction of the regulations would be that to achieve compliance with 10 CFR 61.12 and 13 a site-specific performance assessment is required for that demonstration. I recognize that the NRC has issued various guidance documents over the years that can be read as not necessarily requiring a site-specific intruder analysis for Class A waste. See NUREG-1573, Performance Assessment Methodology for Low-level Waste Disposal Facilities (2002).[1] However, NUREG-1573 states that separate intruder scenarios analyses may be necessary in cases where the projected waste spectra are fundamentally different from those considered in the technical analyses supporting the Part 61 draft environmental impact statement. Thus, I agree with the Staff statement in SECY 10-0043, at page 18 that

> because the requirement to conduct a site-specific inadvertent intruder analysis is not specifically identified in 10 CFR Part 61 and may not be well understood, there is a concern that applicants or licensees could misinterpret the regulations to only require compliance with the concentration limits in the waste classification tables for ensuring protection of the intruder, as required by 10 CFR § 61.42.

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[1] NUREG-1573 at page 1-13, footnote 7 states that "separate intruder scenario dose analyses are not envisioned to be included in an LLW performance assessment" based on 10 CFR 61.13(b). Section 61.13(b) provides that a demonstration be made that adequate barriers have been provided. In my view, a performance assessment is necessary to provide that demonstration.

Therefore, the Commission should clarify 10 CFR 61.13 to provide clear notice that low-level waste disposal sites must have a performance assessment that demonstrates that the performance objectives of Part 61 are met for all waste streams and not just for depleted uranium and blended waste. While this might be done by an interpretive rule, a more formal rulemaking is warranted in order to make a number of additional changes that would constitute more than a clarification of the existing requirements.

In addition, to recommending that 10 CFR61.13 and 61.13(b) be clarified to require that the analyses required to demonstrate that the performance objectives of subpart C of part 61 will be met include a site specific performance assessment, I recommend that there be periodic updating of the performance assessment to reflect changed conditions at the site, past disposal history, and new methodology, if any. This is consistent with the approach taken by DOE at its disposal sites under DOE Order 435.1.

The attached October 30, 2009, letter (ML093090484) from Talisman International which I along with John Greeves sent to the NRC in response to the Federal Register Notice on depleted uranium, 74 FR 30175 (June 24, 2009), provides specific rule language to adopt the above recommendations and other changes that need to be done as part of the depleted uranium rulemaking to assure quality and consistent performance assessments. These include amending 10 CFR 61.41 to update the dose methodology used in Part 61 and 10 CFR 61.42 to codify the current dose standard of 500 mr and a compliance period of 10,000 years.

Waste Classification

It is important to have uniform waste classification standards to support robust interstate commerce within the United States. From a disposal perspective, the public's health and safety is based on the waste stream that is to be disposed not its pedigree prior to processing. Thus, it does not matter from the health and safety view why waste was blended and what the original concentrations were. There is no regulatory need to have a proscription on changing concentration levels or its equivalent classification level if a licensee desires for whatever reason to have a classification made prior to the final waste stream being ready for disposal. What is important are the concentrations and quantities of radionuclides at the time of the disposal that must be considered by the site-specific performance assessment to ensure that the performance objectives of Part 61 are met.

As stated by the Staff in SECY-10-0043,

> waste is not required to be classified at intermediate points between its generation and disposal, such as processing and storage, because the characteristics of the waste at these intermediate points do not directly affect its safe disposal. Once waste is ready for disposal, it must be classified.

This is a fundamental concept that is reflected in NRC regulations in Part 20, Appendix G, Section III, which provides that the waste processor is responsible for classifying waste it has processed in accordance with 10 CFR 61.55. This is a compatibility B

requirement as it has significant direct transboundary implications. Accordingly Agreement states' requirements should be essentially identical to Appendix G of Part 20.

The Commission should ensure that the resulting rulemaking for blending, if option 2 is approved, provides clear notice to the public, States, and licensees that pursuant to the existing regulations in Part 20, Appendix G, classification is a disposal issue that is done at the time the decision is made to send the waste stream to a disposal site and not at intermediate steps along the way.

Attribution

When radioactive waste is processed, a question is raised as to who is the generator of the waste for purposes of completing required manifests under Part 20. In some cases the answer to this question is readily apparent if the processing involved only material from one generator such as in compaction or blending various materials from one generator. To the extent waste is reasonably traceable to the original generator it should be attributed to the generator. However, in many cases it is impractical to do so if, for example, the processing comingles materials from different generators. For example, unless a processor provides a complete cleaning and decontamination of its facility after each processing run, there will be comingled material whose source will be difficult to determine. Ash from incineration, slag from metal melting, sludge from processing tanks, floor sweepings, personnel protective equipment, sandblasting grit and HEPA filters will contain contaminated material from various generators. It is unrealistic to expect that there will be complete decontamination after each processing run so that any waste will be clearly traceable to the original generator. Part 20, Appendix G, Section I, recognizes this concept by defining residual waste as

> low-level radioactive waste resulting from processing or decontamination activities that cannot be easily separated into distinct batches attributable to specific waste generators. This waste is attributable to the processor or decontamination facility, as applicable.

The definition of "residual waste" is fundamental to attribution. The regulator of the processing or decontamination licensee, i.e., NRC or a particular Agreement State, is in the best position to determine compliance with this definition. While Appendix G is as noted above, a category B compatibility level, the Statements of Consideration for Appendix G (60 FR 15649, March 27, 1995) notes that the NRC has encouraged States and Compacts to have a common definition for "residual waste."

The NRC has a degree of oversight over Agreement States based on the need to periodically assure that such states' regulatory program are adequate and compatible pursuant to section 274 (j) of the Atomic Energy Act of 1954, as amended. Thus, Agreement States should be applying the same definition of "residual waste."

The Staff notes in SECY-10-0043 that some States and Compacts believe that the NRC should establish a national attribution policy. However, NRC does not have oversight

over Compacts. Nevertheless, NRC is in a position to serve as a central point for national guidance.

The Commission should develop a policy statement that provides a national attribution policy and guidance for determining when waste is sufficiently commingled that it should be attributed to the processor and, if not, how it should be assigned ownership. In this regard, NRC should consider holding a workshop with the various Compacts, Agreement States, processors, disposal sites, and other stakeholders to obtain insights for developing a policy statement.

I appreciate the opportunity to provide these comments to the Commission. I would be pleased to respond to any questions or comments. I can be contacted at 301- 299- 3607 or JL @ LIEBLET.COM.

Respectively submitted,

Jim Lieberman

Jim Lieberman

Attachment: Letter to M. Lesar, NRC, from John Greeves and Jim Lieberman, Talisman International, LLC., "Comments on Potential Rulemaking for Safe Disposal of Unique Waste Streams Including Significant Quantities of Depleted Uranium – 74 FR 30175," October 29, 2009

cc:
Chairman Gregory B. Jaczko
Commissioner Kristine L. Svinicki
Commissioner George Apostolakis
Commissioner William D. Magwood, IV
Commissioner William C. Ostendorff
William Borchardt, EDO
Stephen Burns, OGC

TALISMAN
INTERNATIONAL, LLC

October 30, 2009

Michael Lesar
Chief, Rulemaking and Directive Branch
Division of Administrative Services
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: Comments on Potential Rulemaking for Safe Disposal of Unique Waste Streams Including Significant Quantities of Depleted Uranium – 74 FR 30175

Dear Mr. Lesar:

We are filing these comments on behalf of Talisman International, LLC, in response to the subject notice. In our view, it is important to establish a clear requirement in 10 CFR Part 61 to perform performance assessments to ensure sites meet the performance objectives of Part 61. In that regard, there are several fundamental changes that need to be made to Part 61 to strengthen that requirement. Other matters to improve the implementation of Part 61 can be treated by NRC guidance. Our comments are contained in the attachment.

Questions regarding these comments may be directed to Jim Lieberman at (301) 299-3607 or jl@lieblet.com and to John Greeves at (301) 452-3511 or greevesj@aol.com.

Sincerely,

Jim Lieberman

Jim Lieberman
Senior Regulatory Nuclear Consultant

John Greeves

John Greeves
Senior Regulatory Nuclear Consultant

Comments on Potential Rulemaking

Safe Disposal of Unique Waste Streams including Significant Quantities of Depleted Uranium

We support the concept of a rulemaking to specify a requirement for a site-specific analysis and associated technical requirements for the disposal of significant quantities of depleted uranium as directed by the Commission in *Staff Requirements—SECY–08–0147—Response to Commission Order CLI–05–20 Regarding Depleted Uranium.*

1) <u>10 CFR 61.13</u>

The issue before the Commission is what changes should be made to 10 CFR Part 61 to ensure that large quantities of depleted uranium and other unique waste streams are disposed safely. In our view the solution to this issue is to a large degree clarifying the requirements to perform a site specific performance assessment demonstrating that the performance objectives of Part 61 are met. This is consistent with the view of the Commission in the Louisiana Energy Services proceeding, CLI-05-05 at page 11, January 18, 2005, that:

> In the end, the "bottom line for disposal" of low-level radioactive wastes are the *performance objectives* of 10 C.F.R. Subpart C, which set forth the ultimate standards and radiation limits for (1) protection of the general population from releases of radioactivity; (2) protection of individuals from inadvertent intrusion; (3) protection of individuals during operations; (4) and stability of the disposal site after closure. Thus, while there may not yet be detailed technical criteria established for all of the kinds of land disposal that might be proposed under Part 61, criteria can be developed "on a case-by-case basis," as needed. After all, any technical requirements are "intended to help ensure that the performance objectives established in Subpart C are met," but they are "not the end in themselves, ... [only] a means of achieving the end," which are the performance standards. (Citations omitted)

Currently, 10 CFR 61.12 and 13 addresses the need to demonstrate that the performance objectives will be met. However, these provisions have been interpreted by some to not require the submittal of a site specific performance assessment. As to protection against the intruder, NRC

appears to have accepted the provisions of 10 CFR 61.52 (a)(2) for either five meter depth or the 500 year intruder barrier to meet the performance objectives of 10 CFR 61.42. While these depths and barriers may be sufficient in many cases to meet the performance objectives, without a site specific performance assessment there is not assurance that the performance objectives will be met for all waste packages regardless of the radionuclides.

Therefore, we recommend that 10 CFR61.13 be clarified to require that the analyses required to demonstrate that the performance objectives of subpart C of part 61.41 and 61.42 will be met include a site specific performance assessment. We also recommend that there be periodic updating of the performance assessment to reflect changed conditions at the site, past disposal history, and new methodology, if any. This is consistent with the approach taken by DOE at its disposal sites under DOE Order 435.1.

In addition, we recommend that this amendment adopts a Part 61 compliance a period of 10,000 years consistent with NUREG 1573 and 40 CFR 191. However, recognizing the peak dose may occur after this period, we recommend that the rule require a qualitative analysis if the peak occurs beyond 10,000 years for input into the environmental analysis consistent with section 3.2.3 of NUREG-1573, A Performance Assessment Methodology for Low-Level Radioactive Waste Disposal Facilities (2000), to determine if there is a need for environmental mitigation. This is also consistent with Section IV.A.6 of the Decommissioning Criteria for the West Valley Demonstration Project at the West valley Site (67 FR 5003, 5006, Feb 1, 2002). See also section 4.1.1.1 of NUREG-1854, NRC Staff Guidance for Activities Related to US DOE Waste Determinations (2007). A period of compliance in the rule would assure consistent assessment of compliance by all parties.

Recognizing that performance assessments require the use of assumptions and scenarios, we also recommend that the proposed language provides that the assumptions and scenarios used in performance assessments be reasonably foreseeable to avoid undue speculation and overly conservative approaches. NRC should permit licensees to justify, site-specific assumptions and exposure scenarios based on reasonably foreseeable circumstances to evaluate the critical group that could reasonable encounter material that is released from the disposal cell after the institutional control period based on reasonably foreseeable circumstances. This would include

residential use; farming; resident farming; and any other reasonable use consistent with the current environment of the specific site. For example, a site would not be expected to consider a groundwater pathway if the groundwater was not useable for irrigation or human consumption. In addition, the assumptions for the performance analyses would not need to project changes in society, the biosphere, human biology, or increases or decreases of human knowledge or technology except for foreseeable changes to the geology, hydrology, and climate based upon cautious, but reasonable assumptions of the changes in these factors that could affect the disposal site. The actual details for performing performance assessments consistent with the regulatory language would be treated in NRC guidance which can be updated periodically by the NRC without a rule change.

Specifically, we would recommend that the introductory sentence of 10 CFR 61.13 be amended to read:

> **The specific technical information must also include ~~the following analyses needed to demonstrate that the performance objectives of subpart C will be met:~~ a site specific performance assessment to demonstrate that the performance objectives of subpart C of this part will be met. The performance assessment would need to be updated for Commission approval at a five year frequency unless the license provides an alternative period for updating it. The performance assessment shall include the following analyses and be preformed for a compliance period of 10,000 years using reasonably foreseeable assumptions and scenarios. If the peak dose occurs after 10,000 years, a qualitative analysis shall be prepared up to the time of the peak dose for consideration in the site's environmental evaluation.**

2) 10 CFR 61.13 (b)

An important aspect of the performance assessment is to demonstrate that the performance objective for the intruder is met. Demonstration of meeting the applicable performance objective is currently in paragraph (a). Therefore, we recommend that the requirements for the analysis required in 10 CFR 61.13 (b) be amended to be consistent with section 61.13(a). Section 61.13(b) would read:

(b) Analyses of the protection of individuals from inadvertent intrusion must include demonstration that there is reasonable assurance the waste classification and segregation requirements will be met and that adequate barriers to inadvertent intrusion will be provided. The analyses must clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses must clearly demonstrate that there is reasonable assurance that the exposure to humans from the release of radioactivity will not exceed the limits set forth in § 61.42.

3) 10 CFR 61.41

We recommend that an amendment to section 61.41 be made to update the annual dose methodology to the newer methodology of ICRP 26 and 30 used in 10 CFR Part 20 rather than the methodology used in Part 61 based on ICRP 2 recommendations. This is consistent with the approach taken in sections 3.3.7.1.2 and 3.3.7.3.1 of NUREG 1573; footnote 6 of the Decommissioning Criteria for the West Valley Demonstration Project at the West Valley Site (67 FR 5003, 5005, Feb 1, 2002); and section 4.6.1.3 of NUREG-1854.

In addition, section 61.41 should be amended to be consistent with the period of compliance stated in the proposed amendment to 10 CFR 61.13. Section 61.41 would read:

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 total effective dose equivalent for a compliance period of 10,000 years ~~25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of~~ to 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.

4) 10 CFR 61.42

10 CFR 61.42 currently requires "...protection of any individual inadvertently intruding into the disposal site and occupying the site or contacting the waste;" however, the regulations are silent on the specific dose standard to apply. We recommend that section 61.42 be amended to provide a dose standard for an intruder of 500 mr/yr. This would provide in the rule the dose standard that currently is only stated in guidance. It is noted that the 500 millirem was the standard proposed in Part 61 in 1981. (46 FR 38081, July 24, 1981). The Statement of Considerations for the final rule did not object to the number. It was removed apparently at the request of EPA because of its concern of how one would monitor it or demonstrate compliance with it, but not because EPA disagreed with it. (47 FR57446, 57449 , December 27, 1982). A dose standard of 500 mr/yr is also used as part of the license termination rule dose standard for intruders (10 CFR 20.1403). A dose objective would assure consistent assessment of compliance by all parties.
Section 61.42 would read:

> **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. <u>The intrusion must not result in an annual dose exceeding an equivalent of 500 millirems total effective dose equivalent for a compliance period of 10,000 years.</u>**

5) <u>10 CFR 61.55</u>

If the Commission adopts the above changes, performance assessments would be the norm for disposal sites. However, such performance assessments would be performed initially when the applicant applied for its license and then periodically thereafter. There could be a situation where a licensee desired to dispose of depleted uranium or other radionuclide not addressed in the tables under situations where either the performance assessment had not considered the depleted uranium or other radionuclide, or the performance assessment had yet to be performed. This could be addressed by establishing a requirement that would provide for a site specific performance assessment if the quantity of the radionuclide to be disposed had not been previously considered in a performance assessment

approved by the NRC. Such a performance assessment would need to meet the amended provisions discussed above. However, this does not necessarily mean that a new performance assessment would need to be developed. Depending on the scope and detail of an existing performance assessment, a current performance assessment may only need minor changes to update it to include the new radionuclide.

We recommend that 10 CFR 61.55 (a)(6) be amended to read:

> **(6) Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If radioactive waste does not contain any nuclides listed in either Table 1 or 2, it is Class A. <u>However, before such waste can be disposed a performance assessment must be approved by the Commission.</u>**

6) <u>Definition of Significant Quantity and Unique Waste Stream</u>

The subject Federal Register notice sought input on how the NRC should define a "significant quantity" of depleted uranium and unique waste streams. In light of the recommended changes discussed above, it is unnecessary to define these terms as the performance assessment will address them.

7) <u>Guidance vs. Regulation</u>

Regulations provide for certainty, consistency, and enforceability. However, changing regulations entails significant effort and time. Guidance while not directly enforceable is easier to change over time. Consequently, it is our view that the fundamental objectives should be in regulations leaving the details for guidance. This leaves the regulator in the position to offer its positions on implementation to the industry as guidance and the industry the ability to defend other ways to implement the fundamental objectives. However, it is important that the development of guidance like regulations involve public input that would allow for public comments on drafts before such guidance is issued for use by either the staff or industry.

Accordingly, we recommend as indicated above that requirements include the need to demonstrate meeting of performance objectives through performance assessments, compliance periods, dose standards, and the

standard for scenarios and assumptions used in performance assessments. However, the details for achieving compliance which are often site related should be in guidance. In that regard, the subject Federal Register notice addressed a number of issues for consideration in this rulemaking, e.g., geochemical parameters, impacts of radon gas releases, and details of performance assessments. In our view, the issues other than the ones we addressed above should be addressed in NRC guidance and not made a part of this rulemaking.

8) Implementation

It is recognized that existing licensees may need an appropriate time period to prepare quality performance assessments so that ongoing operations will not be unduly interrupted. It is suggested that the effective date be 12 months after publication in the Federal Register. However, recognizing it is difficult to predict how long it may take for a regulator to review and approve a performance assessment, the rule should provide that disposals made after the effective date may be made if the required performance assessment was submitted for approval at least six months prior to the effective date.