POSSIBLE CHANGES IN WASTE MANAGEMENT POLICY REGARDING DILUTION OF LLW TO CHANGE WASTE CLASSIFICATION: TEXAS OFFERS A BETTER SOLUTION - 10214

J.S Kirk, CHP, W.P. Dornsife, P.E., and J.M. Skov
Waste Control Specialists LLC, 5430 LBJ Freeway, 3 Lincoln Centre, Suite 1700, Dallas, Texas, 75240

ABSTRACT

With the closure of the disposal facility in Barnwell, South Carolina, the U.S. Nuclear Regulatory Commission (NRC) is seeking solutions that would once again provide a disposal option to waste generators in the 36 states for disposal of Class B/C Low-Level Radioactive Waste (LLW). One of the options involves reversing NRC's longstanding policy that proscribes (with exceptions) diluting LLW for the purpose of changing waste classification. Another option involves the State of Texas' recently licensed disposal facility in Andrews County, Texas.

In considering reversal of the existing policy, the NRC should carefully weigh views from the States of Texas and Utah. The State of Texas specifically prohibits dilution of waste for the purpose of changing waste classification. Utah has recently opposed allowing diluting or blending of Class B/C LLW to levels allowing its disposal as Class A LLW. A petition for rulemaking to prohibit such practices is currently under consideration in Utah.

NRC Chairman Gregory B. Jaczko addressed the subject of diluting or blending waste for the purpose of changing waste classification at the Waste Management Symposium 2009. Since then he has directed the NRC staff to develop recommendations related to blending of LLW for the Commissioners to consider by April 2010.

INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) is seeking solutions to the Nation's dilemma whereby waste generators in 36 states—respected entities that generate electricity, conduct vital research to find cures for pernicious human diseases, etc.—currently lack a disposal option for their Class B/C Low-Level Radioactive Waste (LLW). This dilemma was created with the closure of the disposal facility in Barnwell, South Carolina, to waste generators outside of the Atlantic Interstate Low-Level Radioactive Waste Management Compact on July 1, 2008. However, for years prior to the closure of Barnwell, policymakers and the regulated community have explored many options to solve the nation's need for assured, cost-effective and predictable access to a facility licensed to dispose of Class B/C LLW. In fact, Congressional hearings were held in September 2004 that addressed the possible impacts should non-regional generators lose access to the Barnwell facility for disposal of Class B/C LLW [1,2]. Soon thereafter, Congress commissioned the Government Accountability Office (GAO) to study the matter further and report their findings to the Senate Energy and Natural Resources Committee.

The GAO completed the necessary research and issued several reports to Congress. One of the recommendations issued by the GAO was the development of a National Radioactive Waste Management Plan that would be used to ensure waste generators nationwide have a disposal pathway for Class A, B and C LLW [3]. That plan would be updated and provided annually to Congress. A so-called "federal option" has also been proposed [4]. This approach calls for the Federal Government to take title to stranded LLW and dispose of it in facilities operated by the U.S. Department of Energy (DOE). Until recently, none of the options discussed have involved diluting, mixing, or blending of Class B/C LLW so that it could be disposed of as Class A LLW.

OPTIONS UNDER CONSIDERATION

With the closure of Barnwell, the NRC is considering reversing its established, longstanding policy and allowing dilution, mixing or blending of Class B/C LLW to concentrations that would ultimately allow its disposal as Class A LLW. The proposal under consideration would involve changes to the Final *Branch*

Technical Position on Concentration Averaging and Waste Encapsulation (referred henceforth as the BTP) [5]. However, many have questioned whether this policy reversal alone would provide the solution that the nation has sought; i.e., provide assured, predictable and cost-effective disposal options for Class B/C LLW. Some have suggested that a rulemaking would be required since the BTP is not an enforceable instrument to accomplish such an objective.

The Texas Solution

We note at 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 from the Texas Commission on Environmental Quality authorizing disposal of Class A, B, and C LLW at its facility in Andrews County, Texas [6]. 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 the WCS facility will eventually be open for disposal of Class A, B, and C LLW by non-regional generators. Over the past several months, the Texas Low-Level Radioactive Waste Disposal Compact Commission ("Texas Compact Commission") has been establishing rules to govern the import and export of Class A, B and C LLW into and out of the Texas Compact. In fact, on January 22, 2010, the Texas Compact Commission passed a draft rule for a 60-day public comment period that would allow flexible waste importation into the Texas Compact by non-regional generators—this action marks a very important step is establishing a national solution to the nation's challenge of disposing of Class B/C LLW.

If the Texas Compact Commission allows importation of Class B/C LLW, then waste generators across the country may again have continued access to a licensed disposal facility for such waste. Such actions would allow management of radioactive waste to continue under the current regulatory framework and negate the need for radical changes in established policy—changes which are sure to result in controversy and strong opposition.

WCS has encouraged the NRC not to make radical changes to policy that has served the regulated community very well since issuance of the BTP without first evaluating the unintended consequences such changes could cause [7]. According to the NRC, allowing blending[1] of waste at the large scale under consideration would eliminate approximately 50% of the Class B/C waste generated annually [8]. However, not all waste streams and waste forms are suitable for blending. The proposed policy change would almost exclusively apply to ion exchange resins generated at commercial nuclear power plants.

Some have claimed[2] that there is not enough Class A LLW ion exchange resins generated in the country today to blend all the Class B/C waste produced at nuclear power plants [9]. Consequently, the effects of a policy change that only addresses half of the nation's problem could result in stranding some if not most of the remaining Class B/C LLW into perpetuity. This stranded Class B/C LLW would disproportionately be waste associated with medical treatment, diagnosis, and research; impeding the disposal of this waste. Additionally, reversal of existing policy could have devastating effects by undermining the economic viability of the first licensed operating facility since Congress enacted the LLWPA [10,11].

With the stakes so high, any decision to alter the current regulatory and waste management framework must be carefully thought out. Given the lack of political will to develop new radioactive waste disposal

[1] NRC staff recently adopted the term "blending" to describe the process of physically mixing higher classes of LLW—e.g., Class B, and Class C—with sufficient volumes of Class A waste such that the classification of the resulting mixture is reduced. See NRC's Federal Register Notice dated November 30, 2009 (Volume 74. pp. 62606-62609). The term is not defined in the Atomic Energy Act of 1954, as amended, the Low-Level Radioactive Waste Policy Act of 1980, as amended (including the Low-Level Radioactive Waste Policy Amendments Act of 1985), or NRC's regulations.

[2] Comment from Lewis Johnson at NRC Stakeholder Meeting on December 14, 2009.

facilities as required under the LLWPA, the history of failed attempts to do so, and the huge initial economic investment required, it is doubtful that any new disposal facility will be licensed other than the Texas Compact Waste Disposal Facility in Andrews County, Texas.

NRC CHAIRMAN SETS THE PATH FORWARD

On March 2, 2009, at Waste Management Symposium 2009 (WM09) held in Phoenix, Arizona, NRC Chairman Gregory B. Jaczko specifically addressed the topic of blending LLW for the purpose of changing the waste classification as defined in Title 10 of the U.S. Code of Federal Regulations (CFR) Section 61.55 (10 CFR 61.55) [12]. During the presentation titled, *Public Confidence Needed for Successful Low-Level Waste Management***,** Chairman Jaczko addressed the issue of blending Class B/C LLW to lesser concentrations so that the resulting waste could be disposed of as Class A LLW.

Chairman Jaczko's remarks were aimed at a proposal under consideration by the NRC staff to revise the BTP to reverse its policy and thereby allow blending for the purpose of changing waste classification.

While reversal of the NRC policy would provide an option to help solve the Class B/C waste disposal dilemma, Chairman Jaczko noted that it was the long-standing policy of the Commission that mixing should not be done for the sake of changing the classification of LLW. He acknowledged that staff was currently evaluating a change to the policy for such purposes and would provide their recommendations to the Commission. Chairman Jaczko expressed his intent to study the matter but stated that his "initial perspective is that blending should only be considered after a careful analysis of any effects on public health and safety. It should also increase the confidence of the public, or it ultimately won't be successful as a waste management approach, regardless of whether it's shown to meet minimum technical standards."

On April 17, 2009, a briefing before the NRC Commissioners was held on low-level radioactive waste management [13]. Informed representatives from the NRC staff, NRC's Advisory Committee on Reactor Safeguards, the U.S. Department of Energy (DOE), the National Nuclear Security Administration (NNSA), Agreement States, the nuclear industry and others expressed their views on the scope of radioactive waste management concerns facing the nation. Additional materials were submitted by WCS, Studsvik Inc., Energy*Solutions*, and others to better share their views on this important topic.

Following the briefing to the Commissioners, NRC staff provided written comments to Energy*Solutions* regarding the BTP as it relates to blending of waste for the purpose of changing waste classification [14]. The letter from NRC caused considerable confusion regarding whether the NRC had reversed its policy and would now allow blending of Class B/C LLW so that it could be disposed of as Class A waste. Consequently, WCS wrote to the Commissioners expressing its views [10]. In its letter WCS encouraged the NRC to consider the unintended adverse consequences a change in policy could have to its newly licensed disposal facility in Andrews County, Texas—the first operating facility to be licensed under the LLWPA in nearly three decades. Studsvik also expressed concerns with possible reversal of policy on blending waste for the purpose of changing waste classification [15].

On October 8, 2009, Chairman Jaczko directed the NRC staff to develop a vote paper for the Commission on issues related to blending of LLW [17]. In a memo to NRC staff he stated that since the closing of the disposal facility in Barnwell to non-regional generators the Commission had received several inquiries from stakeholders asking for clarification of the Commission's position on blending and what is acceptable under NRC's regulations and guidance, especially with respect to blending that results in a change in classification of the waste under 10 CFR Part 61.55. He noted that the staff had already identified revision of the BTP as a high priority item in the Low-Level Waste Strategic Assessment [18] published in 2007.

When Chairman Jaczko directed the staff to prepare a vote paper within six months, he stated that they should specifically consider:

- Issues related to intentional changes in waste classification due to blending, including safety, security, and policy considerations
- Protection of the public, the intruder, and the environment

- Mathematical concentration averaging and homogeneous physical mixing
- Practical considerations in operating a waste treatment facility, disposal facility, or other facilities, including the appropriate point at which waste should be classified
- Recommendations for revisions, if necessary, to existing regulations, requirements, guidance, or oversight related to blending of LLW

On November 30, 2009, the NRC requested comment on blending of LLW [9]. In addition to providing background information and specific topics solicited for stakeholder comments, the NRC also announced a stakeholder meeting to be held in Rockville, Maryland on January 14, 2010.

Prior to that date, on December 14-15, 2009, the NRC staff held public meetings with three companies that had expressed views on blending of LLW: Energy*Solutions*, Studsvik, and WCS. At the stakeholder meeting on January 14, 2010, industry requested NRC clarify its position on blending of waste [19].

THE BRANCH TECHNICAL POSITION: BACKGROUND

On May 11, 1983, the NRC issued the *Final Waste Classification and Waste Form Technical Position Papers* [20]. The purpose of this Technical Position Paper (TPP) was to describe methods that would be acceptable to NRC staff to determine the presence and concentrations of radionuclides listed in 10 CFR 61.55, needed to properly classify the waste as Class A, B, or C for near-surface disposal.

The guidance in the TPP also provided information that could be used as the basis by licensees for qualifying process control programs to meet the waste form stability requirements, including tests that could be used to demonstrate resistance to degradation arising from the effects of compression, moisture, microbial activity, radiation and chemical changes. The tests could be used to demonstrate structural stability to ensure that the waste does not degrade and thereby promote slumping, collapse or other failure of the cap or cover and to limit exposure to an inadvertent intruder. The test for demonstrating compliance for stability (10 CFR 61.56(b)) would only be required for Class B/C LLW. Whereas, for Class A waste no tests for demonstrating stability were required—Class A LLW only has to meet the minimum requirements specified in 10 CFR 61(a) which include basic packaging criteria, prohibitions against disposal of pyrophoric, explosive, toxic and infectious materials, as well as requirements to solidify or absorb liquids.

On June 26, 1992, the NRC published a proposed BTP for public comment. Of the 19 comments received, the DOE noted that although the Part 61 performance objectives generally call for protection of the inadvertent intruder, the intruder was never the driving force behind Part 61. Comments received from a citizens group opposed the position because it would allow Greater-Than-Class-C (GTCC) waste to be classified as Class C LLW that could be disposed of in a near-surface radioactive waste facility. Another stakeholder expressed similar concerns and suggested that there not be allowed a movement of waste from one waste class to another.

On January 17, 1995, the NRC issued its BTP for the purpose of providing concentration and waste encapsulation practices that the NRC staff would find acceptable for determining the concentrations of the 10 CFR 61.55 tabulated radionuclides in LLW.

While the NRC did place constraints on concentration averaging and encapsulation of waste to prevent mixing for the sole purpose of changing waste classification as specified in 10 CFR 61.55, it acknowledged that such practices were acceptable if performed for operational efficiencies or radiation dose reduction.[3] Additionally, NRC provided guidance on the use of the "Alternative Classification" provisions specified in 10 CFR 61.58 that allowed licensees to propose other acceptable approaches for waste classification. While

[3] Section 3.1.1 of the BTP clarifies that a designed collection of homogenous waste types from a number of sources within a licensee's facility, for the purpose of operational efficiencies or occupational dose reduction, is not considered "mixing" for the purposes of this position.

NRC promulgated alternative approaches to waste classification the rulemaking process did not require strict compatibility by Agreement States.[4]

The NRC also published with the BTP an enclosure to describe the manner in which stakeholder comments were dispositioned. In response to the concern over the potential for mixing to be used as a means to manipulate waste classification, the NRC stated its belief "that the averaging practices specified in the BTP always result in a waste classification that would be at least as high, if not higher, than that indicated in the concentration table in the regulations." Additionally, the NRC limited the amount of credit allowed for concentration averaging so that extreme measures could not be taken solely for the purposes of dilution. Accordingly, the current policy proscribing blending of waste for the purpose of changing waste classification was in direct response to resolving stakeholder comments following an open and transparent process.

Industry and regulators alike have relied on the BTP for proper classification of Class A, B, C, and GTCC LLW since the BTP was established.

CORNERSTONES OF WASTE MANAGEMENT

Waste minimization, isolation, and containment have always been the cornerstones of waste management—ever since the 1960s when the environmental community effectively championed the principle that "dilution is not the solution to pollution." In fact, the NRC established a policy in 1981 titled, *Policy Statement on Low-Level Waste Volume Reduction*, encouraging its licensees to develop programs to reduce the volumes of radioactive waste generated [21]. The stated objectives of this volume reduction policy were to: (1) extend the operational lifetime of the existing commercial LLW disposal sites; (2) alleviate concern for adequate storage capacity if there are delays to establishing additional regional sites; and (3) reduce the number of waste shipments

Since this policy was established in 1981, the regulated community has made tremendous strides in reducing the volumes of waste generated, particularly for Class B/C LLW. Regulators in Agreement States and non-Agreement States alike have monitored the volumes of radioactive waste generated annually as part of their waste minimization campaigns. Similarly, Federal agencies, such as the DOE, the U.S Environmental Protection Agency (EPA), and the U.S. Department of Defense have robust waste minimization programs for radioactive and hazardous wastes.

The NRC has acknowledged that the origin of its policy to proscribe blending or dilution of waste for the purpose of changing waste classification was a manifestation of the Commission's policy on volume reduction. However, the great successes that have been realized through volume reduction would be curtailed should the NRC allow blending of Class B/C LLW, at the large scale under consideration, for the purpose of its disposal as Class A LLW (Fig. 1).

An attempt to solve the nation's Class B/C LLW problem with such a drastic change to the BTP would be counter to the Commission's longstanding waste volume reduction policy. The result of such a shift in the BTP to allow the intentional blending or dilution of waste for the sole purpose of changing waste classification would be counter to the stated objectives of the Volume Reduction Policy by (1) decreasing the lifetime of existing disposal sites; (2) potentially stranding some Class B/C LLW in perpetuity by undermining the viability of the newly licensed site in Texas; and (3) increasing the number of waste shipments across the country.

[4] The States of Texas and Utah chose not to adopt regulations that would allow licensees to propose alternative waste classification approaches under 10 CFR 61.58.

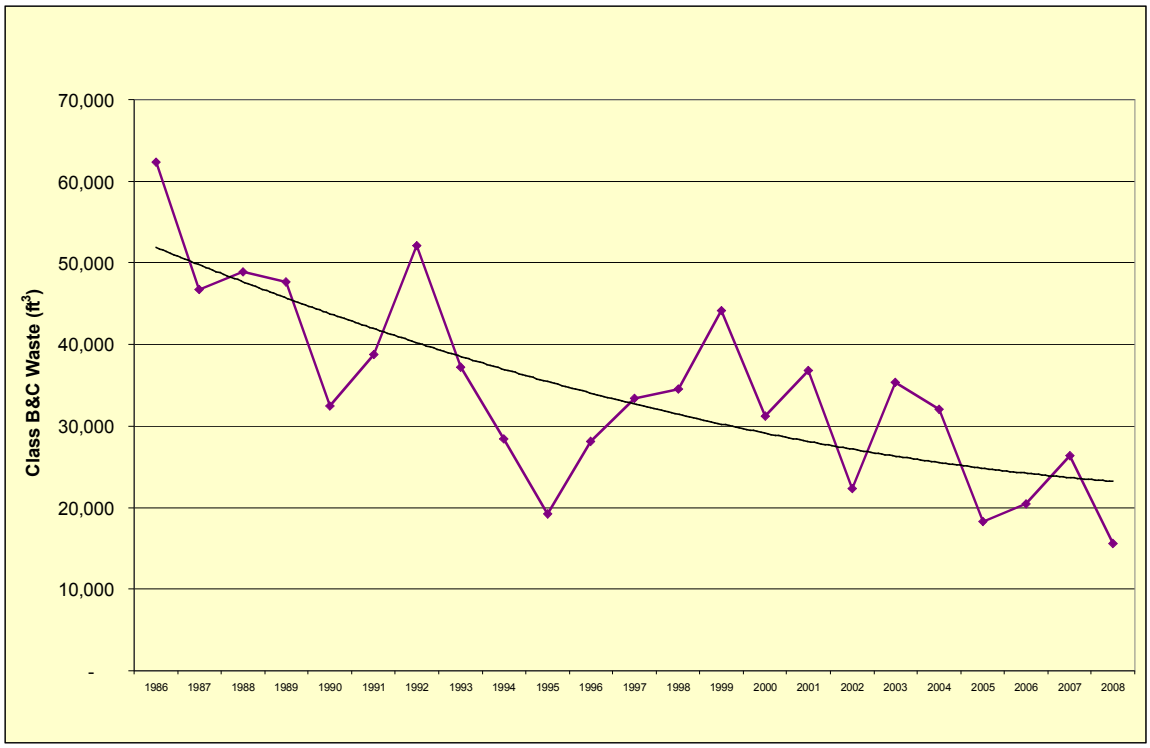

Fig 1. Success of NRC Volume Reduction Policy - DOE's Manifest Information Management System.

CONSISTENCY WITH NRC GUIDANCE AND PRONOUNCEMENTS

While the NRC's policy constraining blending of waste may originally have been based on its 1981 policy on volume reduction, the NRC has consistently reiterated and reinforced a philosophy against blending or dilution for the purpose of changing waste classification. In a proposed rulemaking, the NRC stated that dilution of licensed materials to concentrations less than 0.05 weight percent of source materials should not be allowed, without prior authorization, for the purpose of exempting such materials from further regulation under 10 CFR 40 [22]. In response to public comments, NRC considered defining "dilution" to delineate between *intentional dilution* for the purpose of circumventing regulatory requirements and *inadvertent* or *natural dilution* that occurs when clean soil is inadvertently mixed with and reduces the concentrations of licensed material during site decommissioning.

The NRC also addressed dilution or intentional mixing of clean soil with licensed materials to provide flexibility to licensees' efforts at complying with the License Termination Rule (LTR) [23,24]. The NRC reiterated and "approved use of intentional mixing of homogenous waste streams for meeting the waste acceptance criteria of an offsite disposal facility, as long as the classification of the waste as defined by requirements of 10 CFR 61.55, is not altered." NRC staff also conducted a regulatory analysis comparing the use of intentional mixing of contaminated soil against the policies of other federal agencies and other stakeholders, including those of the international community [25]. The results of this analysis revealed that the use of intentional mixing for the purpose of changing waste classification was: counter to the policy of the DOE, prohibited by the EPA, advised against by the Conference of Radiation Control Program Directors (CRCPD) unless specifically approved by a state agency, and advised against for the purpose of circumventing regulatory requirements by responsible entities in the international community.

Most recently, the *Draft Interim Concentration Averaging Guidance for Waste Determinations* for use at DOE sites would only allow blending of waste if no "extreme measures" were taken [26]. Extreme measures explicitly included "[d]eliberate blending of lower concentration waste streams with high activity waste streams to achieve waste classification objectives." Consequently, blending of Class A with Class B/C LLW for the purpose of reclassifying the waste as Class A LLW would be an extreme measure and prohibited under this guidance, which was issued on December 16, 2005.

NRC also prepared the *Draft Interim Concentration Averaging Guidance for Waste Determinations* to support the *NRC Staff Guidance for Activities Related to the U.S. Department of Energy Waste Determinations* [27]. These documents provide guidance in determining whether certain waste resulting from spent nuclear fuel reprocessing at certain DOE facilities can be considered LLW and managed accordingly. The latter document (Section 3.5.1.1 of NUREG-1854) also defines fundamental principles regarding concentration averaging that are equivalent to the BTP. These fundamental principles explicitly proscribe "extreme measures" that involve the "deliberate blending of lower concentration waste streams with high activity waste streams solely to achieve waste classification objectives."

The NRC's Advisory Committee on Nuclear Waste and Materials (ACNW&M) commented [26] that the staff guidance should contain circumstances where blending of certain waste classes may be appropriate. In response, NRC reiterated that blending of waste streams should not be undertaken solely for the purpose of changing waste classification.

CHANGES DISPROPORTIONATELY AFFECT MEDICAL, RESEARCH AND UNIVERISTY LICENSEES, AS WELL AS THE NNSA

WCS shared its views with NRC staff that changes to the BTP that result in the elimination of 50% of the Class B/C LLW across the nation would have a drastic effect on the cost of waste disposal for the remaining 50% [28] since to recover a given fixed cost investment in a disposal facility, the cost of waste disposal is inversely proportional to the volumes disposed. Thus, the scale of blending as noted in the November 30, 2009, Federal Register Notice [9] could potentially undermine the economic viability of the first operating disposal facility licensed since the U.S. Congress enacted the LLWPA in 1980.

WCS encouraged the NRC to reach out to the medical, university, and research communities since they had previously expressed concerns regarding the high cost and lack of disposal options available following the closure of Barnwell. The NRC was also informed that the University of the Missouri Research Reactor (MURR), and the Council on Radionuclides and Radiopharmaceuticals (CORAR) had encouraged the Texas Compact Commission to establish flexible rules allowing importation of Class B/C LLW into the Texas Compact for disposal at the Texas Compact Waste Disposal Facility.

At the meeting with the Texas Compact Commission held on December 10, 2009, these medical and academic researchers stated that access to WCS' licensed disposal facility was perhaps their only hope to salvage important medical and academic research [29]. In its letter to the Texas Compact Commission, MURR described the shortage, and the dependence on foreign sources, of molybdenum-99 (Mo-99) that is critical to the medical community and to patient wellness. Mo-99's daughter product, technetium-99m (Tc-99m), is used in an estimated 50,000 medical procedures *every day* in the U.S., including advanced detection of cancer and heart disease [30].

MURR stated that they are involved in an initiative that would aid in the establishment of domestic producers of Mo-99. In fact, the U.S. House of Representatives recently passed the American Medical Isotopes Production Act of 2009; if enacted, this bill would authorize the DOE to support the commercial development of domestic sources of Mo-99.

MURR noted that the State of Texas offers the best solution for low-level radioactive waste management currently facing our nation. The likelihood of opening a new disposal facility other than WCS is remote. As such, it is imperative that federal and state regulatory authorities establish policies that ensure access to a safe, cost-effective disposal facility, as opposed to those that only offer long-term, indefinite storage as the final solution.

The NNSA also addressed a joint effort[5] with the CRCPD to collect disused sealed sources. NNSA informed[6] the NRC Commissioners at a briefing on LLW held on April 17, 2009, that every year,

[5] The Source Collection and Threat Reduction Program (SCATR) is jointly administered by NNSA and the CRCPD.

thousands of sources become disused and unwanted in the United States [14]. They noted that while secure storage is a temporary measure, the longer sources remain disused or unwanted the chances increase that they will become unsecured or abandoned. Thus, permanent disposal is essential. However, significant political, statutory, and regulatory challenges were causing significant obstacles to disposing of disused sealed sources.

On December 11, 2009, NNSA briefed the Texas Compact Commission on the programs to collect and disposition sealed sources and expressed their hopes that the Texas Compact Waste Disposal Facility could be used to solve a potentially serious security threat facing the nation. Blending of sealed sources (like irradiated hardware) for the purpose of changing waste classification is not a feasible waste management option available. The NNSA noted that, with the closure of Barnwell to non-regional generators, disused sealed sources currently being stored would remain stranded until such time that a disposal pathway became available. Accordingly, NNSA encouraged the Texas Compact Commission to approve a rule for importation of waste from non-regional generators.

At a meeting held on December 14, 2009, WCS encouraged the NRC to seriously consider the unintended consequences that could result from reversal in its longstanding policy on blending waste for the sole purpose of changing waste classification. WCS stated that such changes could cause major increases in the cost of disposal for waste streams not amenable to blending. Furthermore, if such changes to policy resulted in undermining the economic viability of the Texas Compact Waste Disposal Facility, then waste streams not suitable for blending (such as disused sealed sources and irradiated hardware) could be stranded in perpetuity.

At the meeting on December 14, 2009, NRC staff stated that they are largely unconcerned with commercial issues [10]. Staff noted, however, that "awareness of disposal access and a viable disposal pathway being available, not only for the Texas Compact but for the nation at large, is an issue of concern."

UNANIMITY AGAINST POLICY CHANGE BY STATES AND COMPACTS

The State of Texas in its regulations specifically prohibits intentional dilution of waste for the purpose of changing waste classification. Waste that is intentionally blended or diluted 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.

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. In 2007, then-Governor Jon Huntsman also signed an agreement reaffirming that Class B/C LLW would not be accepted. Under a similar agreement, a limitation was placed on the volume of Class A LLW that would be disposed of at a site in Utah.

The State of Utah's regulators have 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, a petition for rulemaking was introduced in Utah on August 6, 2009, seeking a new *Rule 313-25-36* that would explicitly prohibit processing and disposal of *material* that would otherwise be Class B/C LLW, if the purpose was to circumvent existing laws regarding disposal of Class B/C LLW.

On January 12, 2009, the State of Utah's Radiation Control Board met to discuss, among other things, the petition for rulemaking prohibiting blending LLW for the purpose of changing waste classification. During the meeting Utah regulators summarized NRC guidance on blending and received input from Utah's Attorney General on certain legal formalities raised by board members.

---

[6] See http://www.nrc.gov/reading-rm/doc-collections/commission/slides/2009/20090417/cuthbertson-llw.pdf.

More importantly, Utah's Department of Environmental Quality (DEQ) submitted comments to the NRC explicitly stating that "Utah is *opposed to waste blending* as the intent is to alter the waste classification for the purposes of disposal site access" (emphasis added). The submittal also stated that "if some waste blending is found acceptable, the NRC should specify through a performance-based rule, the criteria to blend waste" [31]. The Executive Director of DEQ stated more than once at the January 12th meeting in Utah, that the positions taken were reviewed by and supported by the Utah Governor's office. In a January 14, 2010, letter to NRC Chairman Jaczko, Utah Congressman Jim Matheson also raised serious concerns regarding a change in policy to allow blending for the purpose of changing waste classification [32].

The petition for rulemaking in Utah was referred to a subcommittee for further study. Based on board member comments, it appears that a majority are in favor of the rule and it should proceed for further discussions at the next meeting, set for February 9, 2010.

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,[7] close coordination with Agreement States should be undertaken before making fundamental changes in policy.

THE INTRUDER-AGRICULTURE SCENARIO

At the meetings in December 2009, the NRC acknowledged that an analysis had not been performed to assess the radiological impacts to an inadvertent intruder resident for 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 in 1981. The Environmental Impact Statement (EIS) supporting this rulemaking was also silent on the radiological impacts to an intruder for waste streams at the upper end of the Class A limits [33].

In a January 8, 2010, letter to the NRC, 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 [34]. 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 [35]. 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 Class A limits is intended to be treated as any other Class A waste. Imposition of any additional controls deemed necessary for blended Class A LLW should be considered as part of a larger rulemaking to risk-inform 10 CFR 61.

Modeling Assumptions and Pathway Analysis Results

Following NUREG/CR-4370, it was assumed that that a member of the public constructed a house over a generic waste disposal facility after the 100-year institutional control period had expired. During construction of the house, radioactive waste is unknowingly exhumed and brought to the surface. It is also assumed that clean soil is also mixed with the waste materials during construction of the resident basement such that the radiological source term is diluted by a factor of three.

The source term used to support the analysis was based on radioanalytical data from a shipping manifest for processed ion exchange resins. The radioanalytical data were adjusted to depict the concentration of resins

[7] See prepared statement from Leonard C. Slosky [13], 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.

blended to the upper bound of the Class A limits. The radiological source term used to estimate the potential dose to an intruder resident is provided in Table 1.

Table 1. Radionuclide Source Term Based on Actual Resin Waste Stream.

Radionuclide	Shipping Manifest Activity (Ci/m3)	Adjusted to Class A Limit (Ci/m3)	Source Term* at T=0 (pCi/g)
Am-241	0.0	1.3E-05	3.0
C-14	0.0	2.3E-04	54.8
Cm-243	0.0	5.5E-05	13.3
Co-60	62.4	1.0E+00	247785.2
Cs-134	32.9	5.4E-01	130747.9
Cs-137**	60.8	1.0E+00	241545.9
Fe-55	172.0	2.8E+00	683545.5
H-3	0.0	2.0E-04	48.5
I-129	0.0	2.5E-09	0.0
Ni-59	0.3	5.6E-03	1359.1
Ni-63	62.0	1.0E+00	246235.3
Pu-238	0.0	2.0E-05	4.8
Pu-239	0.0	1.4E-05	3.3
Pu-241	0.3	4.3E-03	1029.3
Sb-125	0.1	2.4E-03	580.2
Sr-90	0.2	2.7E-03	655.7
Tc-99	0.0	4.9E-08	0.0

*Includes source term adjustment to account for a dilution factor of 3.
** ^{137}Cs was the primary class driver in the analysis conducted.

Consistent with the guidance, approximately 640 m^3 of clean soils mixed with blended Class A waste is uniformly spread on the ground with a surface area of approximately 1750 ft^2. The intruder is assumed[8] to reside in the newly constructed home, grow produce and raise cattle similar to a resident farmer. The radiological exposure pathways for the intruder resident include direct exposure to gamma radiation, inhalation, ingestion, drinking water, fish, plant, meat, and milk. The radon exposure pathway was excluded from the analysis. The potential radiation doses to an intruder resident were estimated using RESRAD Version 6.5 [36].

The results of the analysis indicated that the potential annual radiation doses to an intruder resident following expiration of institutional controls at times 100, 150, and 300 years were approximately 46.6 rems, 20.2 rems to 500 mrems, respectively. Figure 2 depicts the radiation doses estimated over a 500-year time period.

[8] Based on guidance contained in NUREG/CR-4370, the fraction of time spent outdoors and indoors by the intruder resident was assumed to be 0.25 and 0.50, respectively.

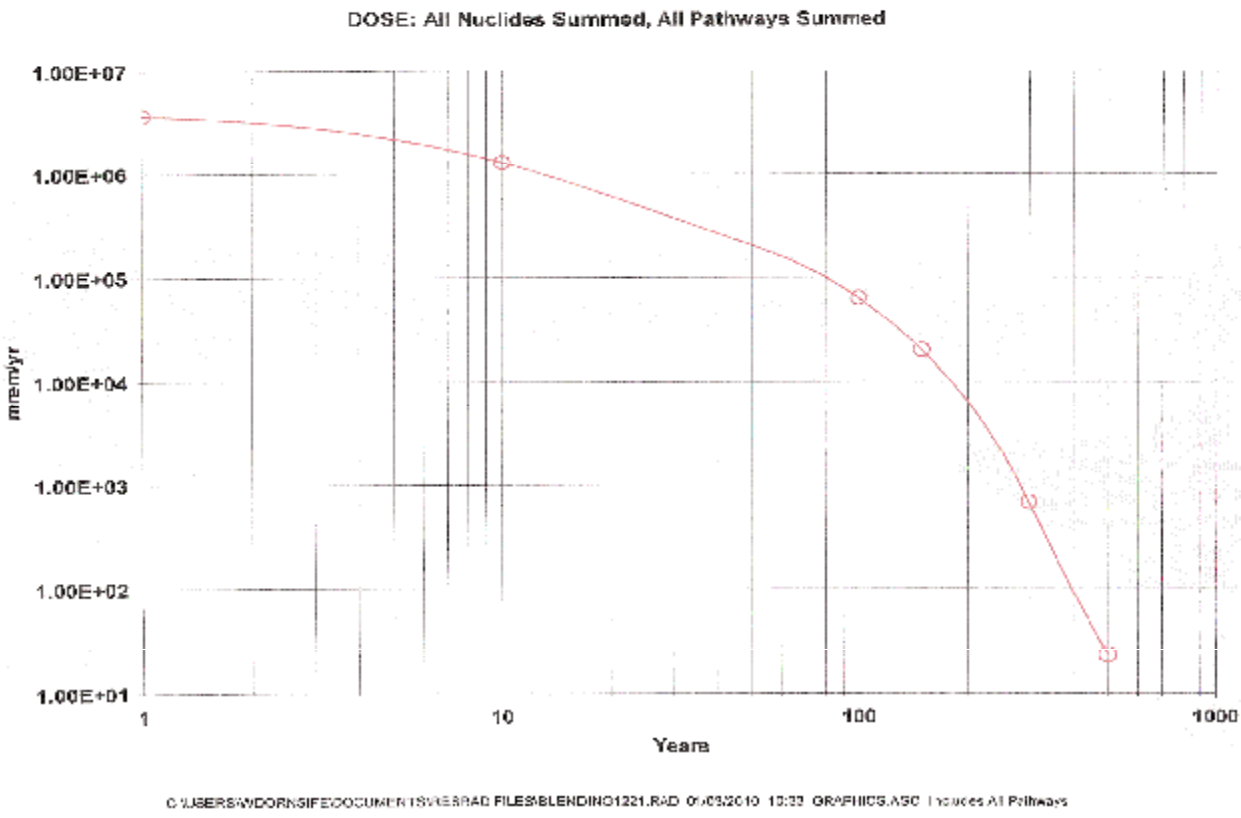

Fig. 2. Radiation Dose to an Intruder Resident (mrem/y).

The principal radionuclide that accounted for approximately 99 percent of the radiation dose was ^{137}Cs. Additionally, the radiation dose from three exposure pathways—gamma radiation from the ground surface, inhalation of re-suspended particulates, and consumption of food stuffs—accounted for over 90 percent of the dose compared to all other exposure pathways (Tables 2 and 3).

Interestingly, information contained in the BTP[9] also provided insights that corroborated the radiation dose estimates for the intruder resident conducted by WCS. The NRC assumed that an intruder was exposed to waste at the upper end of the Class C limit after the engineered intruder barriers had failed to perform their intended function 500 years into the future. The source term was also corrected for mixing and radioactive decay.[10] With these assumptions an annual dose of 500 mrems was estimated based on a ^{137}Cs concentration of 340 pCi/g. This information was used to derive a Dose-to-Source Ratio (DSR) of 1.47 mrems per pCi/g of ^{137}Cs assuming the intruder is exposed to an infinite half-plane source. The intruder dose rate was estimated by multiplying the DSR by a ^{137}Cs concentration at the upper end of the Class A limit (i.e., 1 Ci/m^3 or 10^6 pCi/cm^3) assuming a mixing ratio of 3, density of 1 g/cm^3 and decay corrected at

[9] See BTP, Enclosure 2, *Bases for Concentration Averaging and Encapsulation Guidance for Classification of Discrete (Heterogeneous) Wastes Reflected in Revised Branch Technical Position*.

[10] The BTP specifies an interstitial and cover mixing factor of 0.125 with an intrusion likelihood and mixing factor with lower activity waste of 0.10. It also assumes a waste density of 1.6 g/cm^3 and an exposure time to the intruder of 2360 hours per year.

100 years when the institutional control period had expired. Based on this approach, an annual dose to an inadvertent intruder was estimated at 46.6 rems.

Table 2. Radiation Dose for Water Independent Pathways (mrem/y)

Radionuclide	Ground	Inhalation	Plant	Meat	Milk	Soil
Am-241	5.89E-02	5.72E-02	2.90E-01	1.28E-03	7.37E-05	2.40E-01
C-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cm-243	3.77E-01	1.93E-02	9.71E-02	1.83E-04	2.45E-05	8.06E-02
Co-60	3.98E+00	5.28E-06	3.19E-02	3.42E-03	4.23E-04	3.32E-04
Cs-134	1.45E-09	6.92E-16	2.70E-11	5.19E-12	1.76E-12	5.62E-13
Cs-137	4.43E+04	4.04E-02	1.56E+03	3.00E+02	1.02E+02	3.25E+01
Fe-55	0.00E+00	6.14E-13	8.55E-11	1.50E-10	3.26E-12	7.10E-11
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-129	1.76E-08	2.22E-11	4.34E-07	2.60E-08	4.88E-08	1.80E-08
Ni-59	0.00E+00	1.96E-04	4.68E-01	1.40E-02	7.06E-02	7.80E-03
Ni-63	0.00E+00	4.00E-02	1.13E+02	3.38E+00	1.70E+01	1.88E+00
Pu-238	1.94E-04	4.59E-02	2.31E-01	2.03E-03	3.01E-05	1.92E-01
Pu-239	5.40E-04	7.47E-02	3.80E-01	3.34E-03	4.84E-05	3.16E-01
Pu-241	6.91E-01	6.75E-01	3.42E+00	1.51E-02	8.67E-06	2.84E+00
Sb-125	1.09E-12	6.06E-19	1.31E-14	2.33E-16	2.48E-17	8.22E-17
Sr-90	7.78E-01	4.00E-03	8.57E+01	3.16E+00	8.97E-01	2.39E-01
Tc-99	9.71E-11	6.11E-13	3.31E-07	1.45E-10	1.71E-09	5.49E-11
Total	4.43E+04	9.57E-01	1.76E+03	3.06E+02	1.20E+02	3.83E+01

Table 3. Radiation Dose for Water Dependent Pathways (mrem/y)

Radionuclide	Water	Fish	Plant	Meat	Milk	All Pathways Summed
Am-241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.47E-01
C-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cm-243	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-01
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E+00
Cs-134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-09
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.63E+04
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E-10
H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-129	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.44E-07
Ni-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.61E-01
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E+02
Pu-238	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.71E-01
Pu-239	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.74E-01
Pu-241	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E+00
Sb-125	6.45E-11	0.00E+00	5.14E-12	2.64E-13	5.19E-14	7.11E-11
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.08E+01
Tc-99	4.31E-05	0.00E+00	7.62E-06	9.03E-09	1.87E-07	5.12E-05
Total	**4.31E-05**	**0.00E+00**	**7.62E-06**	**9.03E-09**	**1.87E-07**	**4.66E+04**

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 waste to the upper bound of the Class A limits, on such a large scale that is now under consideration by the NRC, was never 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 [37,38]. The Commissioners' directive was based in part, on the fact that disposal of large quantities of DU was not adequately 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 risk-informed rulemaking with strict compatibility requirements for Agreement States hosting a disposal facility.

Similar observations were identified by the Advisory Committee on Nuclear Waste and Materials (ACNW&M) in response the NRC's "Strategic Assessment of Low-Level Radioactive Waste Regulatory Program" (SECY-07-0180) [18] where they recommended: "*the potential need to reevaluate 10 CFR Part 61 to account for the fact that the types, forms, and quantities of commercial LLW that are and may be generated in the foreseeable future differ significantly from those projected during the development of 10 CFR Part 61."*[39] The recommendation should be studied more carefully by the Commission to ensure that a policy change allowing blending of waste to the upper bound of the Class A limits would not create a new "unique waste stream." The NRC should also consider that should a licensee desire an alternative approach to waste classification then the existing regulatory framework [40] already provides such a mechanism under 10 CFR 61.58.

INDUSTRY HAS FOLLOWED AND RELIED ON ESTABLISHED NRC POLICY FOR NEARLY THREE DECADES

The 1983 Technical Position Paper [20] that preceded the BTP was clear that artificial manipulation was not to be conducted to sidestep or "game" the 10 CFR 61.55 classification tables. For example, that Technical Position:

- Barred an approach where resin wastes in partially full containers could be classified based on the full volume of the container. Such a calculation methodology could result in a lower waste classification for the resin wastes.

- Noted that "more sophisticated programs [i.e., licensee programs to determine radionuclide concentrations and waste classes] would be required for licensees generating Class B or Class C waste . . . or for licensees generating waste for which there is a reasonable possibility of the waste containing concentrations of radionuclides which exceed limiting concentration limits for near-surface disposal [i.e., GTCC waste]." If blending were thought to be allowed under the 1983 Technical

Position, then increased attention—as through "more sophisticated programs"—would not have been particularly warranted for Class B, Class C, and GTCC waste since the expectation would have been that these waste streams would generally have been blended out of existence.

- Noted that "more sophisticated programs [to determine radionuclide concentrations and waste classes] would be required . . . for licensees generating waste for which minor process variations may cause a change in classification." If blending were thought to be allowed under the 1983 Technical Position, then why would increased attention have been warranted for "minor process variations [that] may cause a change in classification"?

In the development of the BTP, the NRC staff explicitly addressed a concern that GTCC waste could be blended and thereby eliminated, and a more general U.S. Department of Health suggestion that "there not be a movement of waste from one class to another" in the "Analysis of and Response to Comments" document that accompanied the issuance of the BTP. That document stated: "[T]he staff believes that the averaging practices specified in the position always result in a waste classification that is at least as high, if not higher, than that indicated by the concentration tables in the regulations." Why would the NRC staff have made that statement if they did not believe it to be true?

As recently as 2006, the NRC responded to a licensee request that it confirm whether "it is within the intent of the BTP that such mixing could be used to blend Class B or C wastes with Class A to produce Class A waste." If blending were thought to be allowed under the BTP, then why would this question have been posed? Staff responded (Kinneman [NRC] letter to Harverson [ALARON] dated October 16, 2006) [41] that "[i]t is not the intent of the BTP that mixing be used solely to reduce the resulting waste classification." The response allowed that "if waste is mixed in accordance with the guidance of the BTP, resulting changes in waste classification are acceptable." However, the BTP is clear (in its Sec. 3.1) that its exception, for "operational efficiency or occupational dose reduction," is limited to "a *designed* collection of homogenous waste types from a number of sources *within a licensee's facility*" (emphasis added). Thus the BTP exception does not cover "operational efficiency or occupational dose reduction" that are said to exist in holistic combinations of plant sites and remote processing facilities. Further, even at the plant sites, the exception only applies where the plant design is controlling in this regard.

Reviewing this history, it is clear that the NRC's policy related to the practice of blending to change waste classification has been clear and consistent for almost three decades. Indeed, the very fact that industry has not been performing blending during this long period is sufficient evidence by itself that the practice was unambiguously viewed as proscribed.

NRC's interpretation of 10 CFR 61.55 was thus long-standing, widely held, and authoritative. In effect, the expressed, direct, and uniform interpretation established itself as administrative common law. The regulated community relied on it. In particular, Studsvik and WCS invested hundreds of millions of dollars in direct reliance on it.

Once an agency's interpretation of a rule becomes well-established, to the extent that businesses are built up in reliance on the interpretation, then the agency is prohibited from changing the interpretation without notice-and-comment rulemaking. This is the rule of law established by *Alaska Professional Hunters Association, Inc. v. Federal Aviation Administration*, 177 F.3d 1030 (D.C. Cir. 1999), as tempered by *Association of American Railroads v. Department of Transportation*, 198 F.3d 944 (D.C. Cir. 1999) and subsequent cases.

POLICY CHANGES VS. RULEMAKING

During the December 14-15, 2009, stakeholder meetings, the NRC discussed the manner in which any potential changes to allow blending of waste to change waste classification should occur. The options addressed included issuance of a Regulatory Issues Summary (RIS), revision to the BTP, development of additional regulatory guidance, or a rulemaking.

None of these three options—i.e., a RIS, revisions to the BTP, or additional regulatory guidance—could alone accomplish the objective by requiring Agreement States hosting a disposal facility to issue

compatible regulations. Only a rulemaking with strict compatibility requirements by Agreement States could mandate provisions that would allow blending of Class B/C LLW to concentrations that would allow its disposal as Class A LLW. This is especially the case given the stated opposition of waste blending by Utah and the regulations in Texas that currently prohibit such waste management practices.

From a legal perspective, regulatory agencies often issue policies to assist the regulated community to interpret or implement a regulation. However, in accordance with established case law, once a policy has been issued for such purposes, and industry has relied on it and built businesses based on it, then the agency must undertake a rulemaking in the event that it desires to reverse the policy. Since the BTP has been so widely used as the NRC's interpretation of its 10 CFR Part 61 waste classification rules, any major changes or reversal in policy are only allowed via a rulemaking. Therefore, the NRC should only consider initiating a rulemaking if it believes this BTP policy reversal is truly warranted for non-commercial reasons.

WCS continues to urge the NRC to consider all the radiological and environmental risks, including those related to transporting blended Class B/C LLW across the country on such a large scale. Such an evaluation should be performed via a rulemaking that would trigger an EIS as specified in the NEPA.

The radiological analysis WCS performed clearly demonstrated that not all Class A LLW can be safely disposed of without placing additional controls to ensure that the waste is stable once the 100-year institutional control period has expired. Disposal of waste at the upper bound of the Class A limit and at such a large scale that was never before analyzed (i.e., USQ) in the EIS supporting promulgation of 10 CFR 61 requires additional studies. Therefore, the NRC should strongly consider proceeding with any changes to policy with a rulemaking similar to the direction provided by the Commissioners for DU.

A rulemaking requiring use of additional controls to ensure stability of waste blended to the upper bound of the Class A limit should be undertaken during the major revision to 10 CFR 61 expected to commence in the near future.

CONCLUSIONS

The divergent views and lively debates that were expressed at the NRC's stakeholder meetings related to its blending proposal were constructive in seeking the best option for ensuring the waste generators across the country once again have an assured, predictable, and cost-effective disposal pathway for Class B/C LLW.

The NRC's longstanding policy that proscribes blending of waste for the purpose of changing waste classification (except for radiation dose reductions or operational efficiencies within a licensee's facility) has served the regulated community well for nearly three decades. The NRC 1981 Volume Reduction Policy coupled with constraints on blending has resulted in significant reductions in the volumes of radioactive wastes generated since 1981. They have extended the operational lifetime of the existing commercial LLW disposal sites; alleviated concerns for adequate storage capacity given delays in establishing additional regional sites; and reduced the number of waste shipments across the country.

The NRC should recognize that blending of waste does not provide a solution for all waste steams and waste forms of Class B/C LLW. In particular, licensees involved in important medical research may be disproportionately disadvantaged by a policy reversal that artificially eliminates 50% of the Class B/C LLW generated annually. Safe disposal of their Class B/C LLW would necessarily become significantly more costly. Such decisions could potentially strand certain waste streams in perpetuity. The NRC should reach out to the medical and research communities and further explore the positions they recently shared with the Texas Compact Commission that "it is imperative that federal and state regulatory authorities establish policies that ensure access to a safe, cost-effective disposal facility, as opposed to those that only offer long-term, indefinite storage as the final solution."

The tremendous strides recently achieved in Texas demonstrate that new disposal facilities can be licensed for Class A, B and C LLW, especially when they have the strong support of the local and regional communities, as well as the state legislature. Such accomplishments should not be taken lightly and policymakers should be keenly aware of the low likelihood that another radioactive waste disposal facility

will be licensed in the near or even intermediate future. Policy changes to allow blending of waste for the purpose of changing waste classification at this time will indeed only discourage the development of a new site—thus the policy change runs counter to the intent of Congress as expressed in the LLWPA nearly three decades ago that "low-level radioactive waste can be most safely and efficiently managed on a regional basis."

Recent actions by the Texas Compact Commission, which passed a draft rule for a 60-day public comment period that would allow for waste importation by non-regional generators into the Texas Compact, are very encouraging. Should the Texas Compact Commission allow importation of waste by non-regional generators into the Texas Compact then the nation may once again have a solution to the challenges of disposal of Class B/C LLW. This would negate the NRC's need to embark on such a controversial policy reversal.

A risk-informed analysis of the radiological impacts for waste blended to the upper bounds of the Class A limits has clearly demonstrated that additional controls for waste stabilization or measures to protect an inadvertent intruder should be required by regulation for disposal as Class A LLW. However, should a licensee desire to pursue alterative approaches for waste classification for disposal of waste blended to the upper bounds of the Class A limits, then the existing regulatory framework already provides an acceptable approach under 10 CFR 61.58.

The public's perception that changes to the NRC's policy on blending would result in placing unwanted radioactive materials in states and communities that have already expressed their opposition should not be taken lightly. Texas has a regulation that specifically prohibits blending of waste for the purpose of changing waste classification and Utah has voiced their strong objections to this practice as well. Information shared at the recent stakeholder meetings suggested that the public will view such policy change as "disingenuous, tomfoolery, and a shell game." Since such views are counter to the NRC's mission of fostering public confidence in the decision-making process one can only concur with Chairman Jaczko's statements made at WM09 that the proposed policy reversal "ultimately won't be successful as a waste management approach, regardless of whether it's shown to meet minimum technical standards."

In April 2010, the Commissioners will proceed on a path forward and consider whether or not to reverse or reaffirm a well-established, longstanding policy proscribing blending of radioactive wastes for the purpose of changing waste classification. Should the Commissioners decide to change the policy, the selection of the proper regulatory mechanism to achieve the change may be as important as the policymaking decision, i.e., should the change be made simply via a revision to the BTP or will it require a rulemaking? For either choice, the NRC will also have to determine whether the policy reversal requires an environmental analysis as mandated under NEPA.

It seems wisest for the Commissioners simply to maintain the status quo and let events in Texas unfold. If the policy reversal is deemed warranted, then it should be accomplished with all the safeguards, stakeholder participation, and transparency afforded by a rulemaking.

REFERENCES

1. U.S. Government Accountability Office (GAO-04-04), "Low-Level Radioactive Waste: Disposal Availability Adequate in the Short Term, but Oversight Needed to Identify Any Future Shortfalls", June 2004.
2. U.S. Senate, Hearing Before the Committee on Energy and Natural Resources, United States Senate, 108th Congress, 2nd Session, "To Receive Testimony Regarding Issues Related to Low-Level Radioactive Waste", September 30, 2004.
3. U.S. Government Accountability Office (GAO 07-221), "Low-Level Radioactive Waste Management, Approaches Used by Foreign Countries May Provide Useful Lessons for Managing U.S. Radioactive Waste", GAO-07-221, March 2007.
4. Health Physics Society, "Position Statement, Low-Level Radioactive Waste Management Needs A Complete And Coordinated Overhaul", September 2005.

5. U.S. Nuclear Regulatory Commission, "Final Branch Technical Position on Concentration Averaging and Encapsulation, Revision in Part to Waste Classification Technical Position", January 17. 1995.
6. J.S. KIRK, "The Problem of B/C LLW—A Better Solution Than Dilution", The Second Annual RadWaste Summit - Las Vegas, NV, ADAMS Accession No. ML090230081, September 2008
7. Waste Control Specialists, Radioactive Material License No. R04100, Amendment 0, issued by the Texas Commission on Environmental Quality, September 10, 2009.
8. W.P. DORNSIFE, Letter to Dale Klein, "Information for Consideration by the Commission at Scheduled 4/17/09 Briefing on Low-Level Radioactive Waste", April 6, 2009, ADAMS Accession No.ML091030174.
9. Federal Register, "Notice of Public Meeting and Request for Comment on Blending of Low-Level Radioactive Waste", Notices, Vol. 74, No. 228, November 30, 2009.
10. RadWaste Monitor, "Companies Press NRC to Provide Clarity on Blending", Vol. 2, No. 27, December 28, 2009.
11. J.S. KIRK, Letter to NRC Commissioners (A.L. Vietti-Cook), "Low-Level Radioactive Waste Policy", September 22, 2009, ADAMS Accession No.ML092740571.
12. RadWaste Monitor, "Without Non-Compact Waste WCS Says Disposal Site Will Fail", Vol. 2, No. 26, December 14, 2009.
13. G. B. JACZKO "Public Confidence Needed for Successful Low-Level Waste Management", Prepared Remarks for The Honorable Gregory B. Jaczko Commissioner, U.S. Nuclear Regulatory Commission, Waste Management '09 Conference, March 2, 2009, Phoenix, AZ.
14. U.S. Nuclear Regulatory Commission, "Commissioner Briefing on Low-Level Radioactive Waste", April 17, 2009.
15. L.W. CAMPER, NRC letter to Thomas Maggett, "Blending Of Low-Level Radioactive Waste", August 27, 2009, ADAMS Accession No. Ml092170561.
16. J.D. DICAMILLO, Letter to Honorable G.P. Jaczko, "Low Level Radioactive Waste Policies-Comments to April 17, 2009 Commission Meeting", August 7, 2009, ADAMS Accession No. ML092430370.
17. U.S. Nuclear Regulatory Commission, "News Release- NRC Staff Directed to Make Recommendations on Blending Low Level Waste", October 8, 2009.
18. U.S. Nuclear Regulatory Commission, "2007 Strategic Assessment of the Low-Level Radioactive Waste Regulatory Program", SECY-07-0180, March 17, 2007.
19. RadWaste Monitor, "Utilities Ask NRC for Near-Term Clarity on Blending Issue", Vol. 3, No. 1, January 18, 2010.
20. U.S. Nuclear Regulatory Commission, "Final Waste Classification and Waste Form Technical Position Papers", May 11, 1983.
21. Federal Register, "Policy Statement on Low-Level Waste Volume Reduction", Notices, Vol. 46, No. 200, October 16, 1981.
22. Federal Register, "Proposed Rulemaking of Unimportant Quantities of Source Material", Vol. 67, No. 167, August 28, 2002.
23. U.S. Nuclear Regulatory Commission, "Results of the License Termination Rule Analysis of the Use of Intentional Mixing of Contaminated Soil", SECY-04-0035, March 1, 2004.
24. B.A. WATSON, "The Status of NRC Decommissioning Guidance on Intentional Soil Mixing", Waste Management '07 Conference, February 25 – March 1, 2007, Tucson, AZ.
25. U.S. Nuclear Regulatory Commission, "Consolidated Decommissioning Guidance", NUREG-1757, Rev. 2, September 2006.
26. Federal Register, "Draft Interim Concentration Averaging Guidance for Waste Determinations", Vol. 70, No. 241, December 16, 2005
27. U.S. Nuclear Regulatory Commission, "NRC Staff Guidance for Activities Related to US. Department of Energy Waste Determination", NUREG-1854, August 2007.
28. J.S. KIRK, "Changing NRC Policy on Waste Dilution to Alter Waste Classification: Why Now?", NRC Stakeholder Meeting, December 14, 2009, Rockville, Maryland, ADAMS Accession No.ML093620115.
29. RadWaste Monitor, "Researcher Want WCS Site Open for Nation's B, C Waste", Vol. 2, No. 26, December 14, 2009.
30. R.A. BUTLER, Letter to Michael Ford, Texas Compact Commission, "Rulemaking for Importation of Low-Level Radioactive Waste into the Texas Compact", December 3, 2009.
31. Utah Department of Environmental Quality, Letter to NRC "Comments for the Nuclear Regulatory Commission Stakeholder Meeting on Waste Blending", January 12, 2010.

32. J.D. MATHESON, Letter to Honorable Gregory Jaczko, "Concerning Downblending of Low-Level Radioactive Waste", January 14, 2010.
33. U.S. Nuclear Regulatory Commission, "Final Environmental Impact Statement on 10 CFR Part 61 Licensing Requirements for Land Disposal of Radioactive Waste: Summary and Main Report", NUREG-0945, November 1982.
34. J.S. KIRK, Letter to L.A. Camper, Supplemental Information Regarding Potential Impacts to an Intruder from Blended Low-Level Radioactive Waste, January 8, 2010, ADAMS Accession Number ML100131012.
35. U.S. Nuclear Regulatory Commission, "Update of Part 61 Impacts Analysis", NUREG/CR-4370, January 1986.
36. U.S. Department of Energy, "User's Manual for RESRAD Version 6", ANL/EAD-4, July 2001.
37. U.S. Nuclear Regulatory Commission, "Response to Commission Order CLI-05-20 Regarding Depleted Uranium", SECY-08-0147, Oct. 7, 2008.
38. U.S. Nuclear Regulatory Commission, "NRC Directs Staff to Initiate Rulemaking on Depleted Uranium Disposal", News Release, March 18, 2009.
39. Advisory Committee on Nuclear Waste & Materials, Letter to Dale E. Klein, "2007 Strategic Assessment of the Low-Level Radioactive Waste Regulatory Program, March 25, 2008, ADAMS Accession No. ML080780476.
40. P. TRAN and D. JAMES, EPRI Takes on Low-Level Waste Disposal Issues, Radwaste Solutions, May/Jun 2008.
41. J.D. KINNEMAN, NRC letter to Joseph Harverson, "ALARON Corporation, Waste Classification Control No. 139125", October 16, 2006, ADAMS Accession No. ML062900166.