

A Proposed Solution to the Challenges of Disposal of Greater Than Class C Low-Level Radioactive Waste - 15172

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ABSTRACT

In 1982, the US Nuclear Regulatory Commission (NRC) adopted rules for the disposal of low-level radioactive waste. These rules established new standards for the siting, construction, operation and closure of low-level radioactive waste disposal facilities. The new rules also set out a classification system for low-level radioactive waste based on half-life and concentration of the radionuclides in the waste stream. The defined classes – Class A, Class B and Class C – were based on increasing toxicity with Class A being the least hazardous and Class C being relatively more hazardous. Radioactive waste that could not fit the classification scheme due to its long half-life or its high concentration of radioactive material was deemed to be greater than Class C low-level radioactive waste, with the ascribed acronym “GTCC” low-level radioactive waste. Such waste was deemed not suitable for shallow land disposal based on the design standards for low-level radioactive waste landfills in place at that time. This resulted in a radioactive waste stream that had no disposal option. To remedy this problem, the US Congress in 1985 stipulated that the US Department of Energy would be responsible for the disposal of GTCC waste. Subsequently, the NRC amended its regulations to require GTCC low-level waste to be disposed in a geologic repository unless the Commission approved proposals for disposal in a low-level radioactive waste disposal facility. The Commission did not concurrently establish any specific technical requirements for GTCC disposal in a low-level radioactive waste disposal facility, but did infer that a site-specific performance analysis could be conducted in support of any proposal for land disposal of such waste. In light of this, Waste Control Specialists LLC (WCS) has conducted such a site-specific performance analysis that has indicated the disposal facility at Andrews Texas will perform satisfactorily as a disposal facility for certain types and quantities of GTCC waste. Concurrently with this analysis, WCS has submitted to the Texas Commission on Environmental Quality a petition for rulemaking that will permit disposal of GTCC waste in their disposal facility. This paper summarizes the technical and legal analyses that were conducted in support of the proposed rulemaking.

INTRODUCTION

On December 27, 1982, the U.S. Nuclear Regulatory Commission (NRC) promulgated new regulations governing the disposal of low-level radioactive waste (LLW) in Title 10 of the Code of Federal Regulations (CFR), Part 61 [1]. This regulation contained specific requirements for packaging and disposal of Low-Level Radioactive Waste (LLW). Included in the new regulation was a classification system that categorized the waste as Class A, Class B and Class C LLW based on increasing concentration and half-life of the contained radionuclides. Waste exceeding the Class C concentration-based limits was deemed “Greater than Class C” LLW, or GTCC

waste. GTCC waste was considered not generally suitable for near-surface disposal in a shallow landfill as designed and constructed at that time. While the NRC discouraged disposal of GTCC waste in a disposal facility, they did not specifically prohibit it. The Commission provided licensees with the flexibility to request authorization to dispose of GTCC LLW in a near-surface disposal facility on a case-by-case basis.

At the same time that the Commission was developing rules for the disposal of LLW, states were undertaking the task of developing new disposal facilities. This nationwide undertaking was spurred on by the 1980 Congressional mandate that each state should be responsible for the disposal of low-level radioactive waste generated in that state. As an alternative, states could form interstate compacts of two or more states to dispose of LLW on a regional basis. Several compacts and individual states began the task of developing such facilities, but none proposed to include an alternative for disposing of GTCC LLW.

Realizing that GTCC LLW was not likely to be disposed in a state or compact disposal facility, in 1985 the U.S. Congress amended the law to reserve the disposal of commercially generated GTCC waste to the federal government, a task that was ultimately assigned to the U.S. Department of Energy (DOE) [2]. The amended law also reserved the licensing of such a facility to the NRC. The law did not grant the Commission the authority to regulate the disposal of radioactive waste generated or owned by the DOE, including waste in the possession of the DOE that is comparable in half-life and concentration to commercial GTCC LLW (referred to as “GTCC-like” waste).

Since 1985, little has been done to provide a permanent repository for GTCC LLW. In 1987, the DOE issued a report that quantified the amount of GTCC LLW requiring management and disposal. That estimate was followed by a 1988 report from the Congressional Office of Technology Assessment [3] that predicted a GTCC disposal facility would not be available for “...at least fifteen to twenty years.” The report recommended a three-step management approach that included a recommendation that the NRC update its guidance for extended storage of GTCC LLW, a second recommendation that a DOE facility be identified for interim storage of GTCC LLW and a third recommendation that GTCC waste be ultimately isolated in a geologic repository, presumably Yucca Mountain, in fifteen or twenty years (calendar years 2003-2008). The third recommendation was caveated by the observation that other disposal alternatives, such as augured holes or an intermediate-depth repository would be acceptable. This report was followed the next year by a Commission rulemaking that required disposal of GTCC LLW in a deep geologic repository unless the Commission had approved disposal in an alternative facility [4].

Little has been accomplished in the intervening years. In 2011, the DOE published a draft Environmental Impact Statement (EIS) addressing the disposal of GTCC and GTCC-like LLW [5]. The draft EIS evaluated the impacts related to disposing GTCC and GTCC-like LLW at the Waste Isolation Pilot Plant (WIPP) and at six federally owned sites and one generic commercial site using land disposal methods. The draft EIS included an estimate that the total volume of GTCC and GTCC-like LLW is approximately 12,000 cubic meters containing 160 million curies

of activity. Three-fourths of the volume is attributed to GTCC LLW and the remaining one-fourth is GTCC-like waste. Most of the GTCC-like LLW is transuranic waste (TRU).

ENVIRONMENTAL IMPACT STATEMENT

Under the Energy Policy Act of 2005 (EPAAct) [6], the DOE is responsible for preparing an EIS that includes their “Preferred Alternatives” and a subsequent report to Congress that describes how it proposes to dispose of commercial GTCC. The EPAAct did not specifically address the disposal of waste generated by or in the possession of the DOE.

With the recent unexpected closure of WIPP, the failure of Congress to enact changes to the National Defense Authorization Act [7] to expand WIPP’s mission, and the political unwillingness to deal with difficult waste streams (e.g., waste containing ²³³U), the DOE has encountered unexpected obstacles as it proceeds with finalizing the EIS. Nonetheless, the DOE has completed a draft EIS that lists an existing commercial disposal facility (e.g., WCS), and perhaps either the WIPP or Nevada National Security Site (where the Department may be required to construct a greater-confinement, intermediate depth disposal facility) as the preferred alternatives.

After the EIS and Record-of-Decision (ROD) are finalized, Congress must approve DOE’s implementation plan, required under the EPAAct, before disposal of commercial GTCC LLW may commence. Congressional action is not needed for GTCC-like LLW because the EPAAct only addressed GTCC generated by the commercial sector, not waste generated by DOE. The DOE may have to complete a separate ROD for GTCC-like LLW to fulfill their requirements under the National Environmental Policy Act of 1969 [8].

TRANSURANIC WASTE

The legislative and regulatory history surrounding TRU is interesting. The U.S. Congress gave TRU waste its first legislative definition in the LLWPA of 1980 [9], which was later amended by the LLWPAA of 1985. The current definition of LLW, as defined by the Congress in the LLWPAA of 1985, excluded radioactive waste classified as High Level Waste (HLW), Spent Nuclear Fuel (SNF), and 11e.(2) Byproduct Materials. Because TRU waste was not excluded from the definition of LLW, by inclusion it is LLW. The Texas Health & Safety Code, Section 401.004, is consistent with the LLWPAA of 1985, in that it likewise includes TRU as LLW, by not excluding it from the definition.

However, the implementing regulations established by the NRC and Texas Commission on Environmental Quality (TCEQ) define LLW in a manner inconsistent with federal and state statutes. Despite the fact that the Congress long ago included TRU in the definition of LLW by not specifically excluding it from the definition, both the Federal regulations and the Texas regulations still exclude TRU from the definition of LLW.

One of the factors Congress considered was the need to clearly establish Federal and State responsibilities regarding TRU waste and LLW. The federal government is responsible for HLW, 11e.(2) byproduct materials, commercial GTCC and all other LLW generated by the DOE. States are only responsible for commercial Class A, B and C LLW. According to Brown [10], the U.S. Senate Environment Committee House of Representatives recognized the importance of defining TRU as LLW, stating “[The reason to define TRU as LLW was]...to make some entity responsible for its disposal. Since the Public Law addresses only LLW, unless GTCC TRU was defined as LLW, (rather than as a separate category as it had been in the 1982 NWPA) it would remain an orphan category with neither the states nor the federal government responsible for its disposal.”

WCS’ Petition for Rulemaking [11] started an important conversation that ultimately discovered an important unintended consequence regarding failure to revise the definition of waste in §61.2 consistent with the LLWPAA of 1985. The impact of the Commission’s action of not revising the definition of “waste” in §61.2 consistent with the LLWPAA of 1985 has relevance to the potential disposal pathway for certain alpha-emitting radionuclides exceeding 100 nCi/g. While the NRC has clearly defined and promulgated disposal criteria for HLW, SNF, 11e.(2) product material and LLW, the same is not the case for TRU. The NRC has not defined TRU in regulation and similarly has not established disposal criteria governing its disposal.

Based on research conducted as part of developing WCS’ Petition for Rulemaking, no documentation was discovered that shed light on the rationale or reasons why the NRC did not revise the definition of “waste” consistent with the LLWPAA of 1985. Nonetheless, the NRC’s current interpretation is that TRU is not LLW, but a separate class of radioactive waste of its own [12]. Based on this interpretation, TRU intended for disposal at a facility licensed under 10 CFR Part 61 (or an Agreement State equivalent) is effectively orphaned until a regulatory solution is undertaken, vis-à-vis a rulemaking.

INTERMEDIATE DEPTH DISPOSAL FACILITY

Waste management practices have matured considerably since the GTCC rulemaking was completed by the NRC in 1989, and especially since the inception of the NRC’s LLW rules in 1983. These practices include waste form improvements, better quality assurance, use of reinforced concrete barriers, deeper depths of disposal and more robust packaging, resulting in a greater degree of containment. In fact, the Texas Legislature had similar visions when it enacted legislation that created the Federal Waste Facility (FWF) and the Texas Compact Waste Disposal Facility (CWF) that would ultimately be designed, constructed and operated in Andrews County, Texas. It required the facility to be located in an arid region of west Texas that received on average less than 16 inches of rainfall per year. The concept that Texas Legislature envisioned was a modified version of “assured isolation”, where the waste would be placed in retrievable, steel-reinforced concrete canisters.

The TCEQ adopted the most stringent regulations to govern the design and performance of these disposal facilities, exceeding the requirements for any other facility authorized to dispose of LLW

in the U.S. For example, the FWF is constructed within the Dockum formation, which is a highly impermeable formation (hydraulic conductivity measured at $1 \times 10^{-9} \text{ cm s}^{-1}$) of clay over 600 feet thick. The nearest water table is over 600 feet below grade and is not suitable for human consumption. The depth of waste emplacement at the FWF is over 30 meters. Waste emplaced in the FWF is contained in modular concrete containers or equivalent.

The TCEQ's requirement establishing a Period of Performance of 1,000 years or "peak dose", whichever is longer, ensures that radioactive waste is effectively removed from the biosphere for at least one thousand years and more likely hundreds-of-thousands of years into the future. This requirement measures the long-term environmental performance of the site, as well as ensures that radiation doses to current and future members of the public will be much less than $0.25 \text{ mSv year}^{-1}$ ($25 \text{ mrem year}^{-1}$) and 5 mSv year^{-1} ($500 \text{ mrem year}^{-1}$) for an inadvertent intruder.

Commencement of operations at the CWF and FWF marked the beginning of a new era in radioactive waste management practices in the U.S. It's the first new low-level radioactive waste disposal facility constructed in over 40 years and the first since Congress enacted the LLWPA of 1980. The robustness of the design and geologic characteristics, when compared to any existing radioactive waste disposal facility in the country, are incomparable. The WCS disposal units, both the CWF and the FWF qualify as greater confinement, intermediate depth facilities, as envisioned by the Commission as it was contemplating disposal of GTCC in 1989.

PRELIMINARY PERFORMANCE ASSESSMENT

WCS has completed a preliminary performance assessment of the radiological impacts pertaining to the disposal of GTCC and GTCC-like LLW in the FWF consistent with the exposure scenarios and guidance provided in the NUREG-/CR-4370, *Update of Part 61 Impacts Analysis*, published in January 1986 [13]. WCS used the GTCC inventory source term provided in Table B-4 and B-7, Volume 2 of the DOE's draft EIS. This source term includes irradiated metals, sealed sources and other waste as discussed in the draft EIS.

WCS used the same probabilistic/conceptual model, parameters and radiological exposure scenarios that were used to support the major amendment to Radioactive Material License (RML) No. R04100 that was approved by the TCEQ authorizing disposal of large quantities of Depleted Uranium (DU) and removing the disposal limits for Tc-99, C-14 and I-129 [14].

The peak dose for most receptors is dominated by upward diffusion of Tc-99. The model assumes that the source inventory is equally spread over the entire inventory. If the GTCC is placed at the bottom of the cell, this upward diffusion would be greatly reduced. Note that the bottom canister layer of the FWF is greater than 30 m below the surface. With the recently approved expansion, the bottom two layers will be greater than 30 m. Future versions of the model will allow specific waste streams to be placed in the various layers of the waste. In this analysis, solubility is turned off. If solubility were turned on, the impact of the grout and the iron in the reinforced concrete would reduce the solubility of Tc-99. In addition, this upward diffusion is believed to be a very

conservative estimate due to the fact that the upper layers are very porous and dry, which may create a barrier to further upward diffusion through this upper layer where the uptake is assumed.

The increased peak dose to nearest permanent resident is dominated by the increased amount of I-129 in the GTTC waste. In the recently approved major amendment, the dose to the oil field worker was calculated to be 1.4 mrem/y from U-238 for the disposal of 400,000 m³ of DU. The increased peak dose to the adjacent resident is due to I-129. The results of the preliminary assessment are presented in Table 1.

The results of the performance assessment for the WCS FWF for disposal of all reported GTTC easily meets the performance objectives in 30 TAC Chapter 336. All GTTC can be safely disposed in the WCS FWF disposal facility.

TABLE I, Effective Dose for Certain Radiological Exposure Scenarios^a

	Nearest Permanent Resident	Ranch Worker	Oil Field Worker	Recreational Hunter	Dry Land Farmer	On-site Resident
Base-case expected inventory in FWF	8.7x10 ⁻¹¹ (8.7x10 ⁻⁹) @ 1000 y	2.3x10 ⁻⁶ (2.3x10 ⁻⁴) @ 100,000 y	1.4x10 ⁻⁴ (0.014) @ 600 y	6.6x10 ⁻⁷ (6.6x10 ⁻⁵) @ 100,000 y	2.8x10 ⁻⁵ (0.0028) @ 100,000 y	0.0016 (0.16) @ 100,000 y
All Group 1 and 2 GTTC + Base Inventory	6.8x10 ⁻⁹ (6.8x10 ⁻⁷) @ 1000 y	4.3x10 ⁻⁴ (0.043) @ 100,000 y	0.001 (0.1) @ 600 y	1.2x10 ⁻⁴ (0.012) @ 100,000 y	0.0052 (0.52) @ 100,000 y	0.26 (26) @ 100,000 y

^a Effective dose expressed in mSv year⁻¹ (mrem year⁻¹).

EPA’S ROLE IN DISPOSAL OF TRU WASTE

Under the Nuclear Waste Policy Act of 1982 (NWPA) [15], Congress charged the U.S. Environmental Protection Agency (EPA) with setting standards for the disposal of HLW, SNF and TRU. The EPA subsequently promulgated regulations establishing the requirements for disposing of these types of waste in a geological repository. The Agency also recognized that not all TRU would require disposal in a deep geological repository. Therefore, 40 CFR 191.02(i), provides some waste may be disposed in an alternate manner provided that:

- 1) The DOE has determined, with the concurrence of EPA, the waste does not need the degree of isolation required under Part 191; or
- 2) The NRC has approved its disposal on a case-by-case basis in accordance with 10 CFR 61.

NRC APPROVAL OF COMMERCIAL TRU DISPOSAL

The EPA and NRC both define waste that contains alpha-emitting transuranic radionuclides exceeding 100 nanocuries per gram as TRU waste. A review of the regulatory requirements in

effect at the time when EPA promulgated 40 CFR 191 suggests that the NRC has the regulatory authority to approve a request from a licensee seeking to dispose of TRU at an existing disposal facility licensed under 10 CFR 61 that the NRC determines provides sufficient isolation of the waste in a manner that is protective of public health.

This regulatory intent is clearly spelled out in 10 CFR 61.55(a)(2)(iv), that was promulgated by the NRC soon after Congress enacted the LLWPA in 1980. 10 CFR 61.55(a)(2)(iv) states that:

Waste that is not generally acceptable for near-surface disposal is waste for which waste form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. In the absence of specific requirements in this part, proposals for disposal of this waste may be submitted to the Commission for approval, pursuant to § 61.58 of this part [emphasis added].

The NRC allows considerable flexibility for Agreement States to adopt, choose not to adopt, or modify the language in 10 CFR 61.58, *Alternative Requirements for Waste Classification*. Some Agreement States, such as Texas, have chosen to not adopt this rule. Conversely, Washington did include a Part 61.58-like regulation that would allow it to dispose of LLW (e.g., DOE GTCC-like or TRU LLW) using an “alternative classification” process provided that certain performance objectives were met.

RESPONSIBILITIES UNDER THE LLWPAA

Under the LLWPAA of 1985, the DOE is responsible for, among other things, the disposal of LLW generated by the DOE and any other waste with concentrations of radionuclides that exceed the limits established by the NRC, as defined in 10 CFR 61.55, effective on January 26, 1983.

The federal government is also responsible for the disposal of waste exceeding the Class C limits that results from the activities licensed by the NRC under the Atomic Energy Act of 1954 (AEA), as amended, in a facility that is licensed by Commission.

The NRC has clarified their position regarding waste exceeding the Class C limits that is “owned or generated” by the DOE, as opposed to waste generated by the commercial sector as licensed by the NRC or an Agreement State. The NRC has stated, citing Section 3(b)(2) of the LLWPAA, that Congress only authorized them to license the disposal of of GTCC waste that resulted from activities also licensed by the Commission. For waste owned or generated by the DOE that exceeds the Class C limits (i.e., GTCC-like LLW), the NRC has acknowledged that the TCEQ potentially may independently license and establish regulations for the disposal of such waste at the FWF.

Before the NRC can license a facility for the disposal of GTCC waste, they must first establish regulations to ensure the disposal is adequately protective of public health and safety. The NRC has recognized the need to potentially address disposal options for commercial GTCC as part of an update to their Strategic Assessment [16]. On September 24, 2014, following a briefing on

LLW that included a discussion of the WCS Petition for Rulemaking, the Commissioners directed staff to prepare a report on the history, types and challenges for the disposal of GTCC LLW [17]. Perhaps, the NRC Commissioners will direct the staff to initiate a GTCC rulemaking in the near future that would fulfill their responsibilities under the LLWPAA of 1985.

TEXAS STATUTORY AND REGULATORY REQUIREMENTS

In 2003, the Texas Legislature amended the Texas Health and Safety Code, which allowed for the creation of both the CWF and FWF [18]. Furthermore, additional changes to the Texas Health & Safety Code were finalized that defined the framework for disposal of LLW by a private entity. With respect to GTCC, the definition of “Federal Facility Waste” was adopted consistently with the LLWPAA, but does not include any prohibitions against disposal, as follows:

Federal Facility Waste means low-level radioactive waste that is the responsibility of the federal government under the Low-Level Radioactive Waste Policy Act, as amended by the Low-Level Waste Policy Amendments Act of 1985 (U.S.C. Sections 2021b-2021j).

Furthermore, the Health & Safety Code, Chapter 401.004, defines radioactive wastes that “... is not HLW, SNF, byproduct material, Naturally Occurring Radioactive Material (NORM) waste that is not oil and gas NORM waste, or oil and gas NORM waste as LLW. The Texas legislature specifically did not exclude TRU from the definition of LLW. Accordingly, GTCC, GTCC-like and TRU waste are defined as LLW in the Texas statute and are suitable for disposal in the FWF.

Federal Facility Waste, as defined by the Texas Legislature, does not distinguish between GTCC-like and GTCC LLW. Federal Facility Waste also includes TRU since it is defined as a type of LLW in the both the Texas Health & Safety Code and the LLWPAA of 1985. Federal Facility Waste may only be disposed in the FWF.

Following the amendments to the Texas Health and Safety Code, the TCEQ undertook an extensive rulemaking to incorporate the statutory requirements into their regulations. Certain provisions of those regulations conflict with the Texas Radiation Control Act¹, and others are more stringent.

WCS believes that the TCEQ should undertake a rulemaking that would bring the existing regulations into alignment with both federal and state statutes. Moreover, changes to these regulations will ensure that disposal of GTCC and GTCC-like LLW (including TRU, GTCC LLW) waste unequivocally remains a federal responsibility. The regulations should allow for the disposal of GTCC and GTCC-like LLW at the FWF, but should specifically provide that such disposals are prohibited in the CWF. Should TCEQ elect to undertake such a rulemaking, a framework would be established that would allow a thorough technical analysis to determine if the design and features of the FWF are sufficient to protect public health and the environment.

¹ Chapter 401 of the Texas Health and Safety Code may be generally cited as the Texas Radiation Control Act.

Such a framework would allow any decision to dispose of GTCC and GTCC-like LLW based solely on the sciences.

THE TEXAS RULEMAKING

On July 21, 2014, WCS filed a petition [11] with the TCEQ seeking an amendment to the commission's rules to better align the definitions and disposal criteria in their rules with state and federal statutes and regulations. The Petition for Rulemaking was unanimously approved by the TCEQ Commissioners on September 10, 2014 [19].

The petition asserted that certain existing regulations concerning "low-level radioactive waste" and "federal facility waste" were inconsistent with the Texas Radiation Control Act and the federal LLWPAA of 1985. Under the Texas Radiation Control Act and the LLWPAA of 1985, the term "federal facility waste" includes certain low-level radioactive waste that is classified as greater than Class C low-level waste and GTCC-like LLW owned or generated by DOE. TCEQ's regulations, however, defined the term "federal facility waste" differently than the Texas Radiation Control Act by expressly excluding GTCC low-level radioactive waste from the definition. Similarly, TCEQ's definition of "low-level radioactive waste" also differed from the definition used by the United States Environmental Protection Agency.

Upon review, the TCEQ's executive director agreed [19] that the current rules were not consistent with federal statutes, regulations and policies and might create unnecessary conflicts with disposal at WCS' federal waste disposal facility. The executive director recommended further consultations with all stakeholders, especially seeking input from the DOE and NRC.

The executive director agreed that GTCC and TRU concepts and definitions were not mentioned specifically in federal or Texas statutes, and Texas rules should be revised to allow flexibility to accommodate changes in federal law, regulation and policy regarding GTCC and TRU disposal. The executive director decided that the definitions regarding GTCC and TRU in WCS' radioactive material license needed to be consistent with that of the federal agencies charged with making determinations as to what waste is "federal facility waste".

Under the Texas Radiation Control Act, the commission is empowered to license WCS to dispose of federal facility waste. The statute defines "federal facility waste" as "low-level radioactive waste that is the responsibility of the federal government under the Low-Level Radioactive Waste Policy Amendments Act of 1985." That waste includes certain GTCC LLW and GTCC-like LLW, including TRU waste. The proposed amendment was designed to correct TCEQ's regulatory definition so that it would mirror the statutory definition.

An additional amendment was proposed in conjunction with the change to TCEQ's regulatory definition of "federal facility waste" in order to emphasize and clarify that NRC's authority over GTCC LLW that "results from activities licensed by" NRC is not at all altered by the change to the definition of "federal facility waste."

Similar to the proposed amendment to align the regulatory definition of "federal facility waste" with the statutory definition, the petition for rulemaking also sought amendment to the regulatory definition of "low-level radioactive waste" to be consistent with the statutory definition. The Texas Radiation Control Act defines "low-level radioactive waste," in part, by stating a list of five radioactive materials that are excluded. The current TCEQ regulatory definition adds TRU waste to the list of exclusions. The exclusion of TRU waste is an unnecessary departure from the statutory definition because the Texas Radiation Control Act provides TCEQ the state statutory authority to authorize disposal of federal facility waste, which includes TRU waste. The TCEQ's regulatory exclusion of TRU waste in the definition of "low-level radioactive waste" could be read to restrict the disposal authorized by the Texas Radiation Control Act.

The current regulatory definition of "transuranic waste" differed in important ways from EPA's definition, and, like the current TCEQ definitions of "federal facility waste" and "low-level radioactive waste," unnecessarily restricted the authority granted to TCEQ by the Texas Radiation Control Act.

EPA excludes from "transuranic radioactive wastes" those "wastes that the Department [of Energy] has determined, with the concurrence of the Administrator [of EPA], do not need the degree of isolation required by [40 CFR Part 191]" and "wastes that the [Nuclear Regulatory] Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61." The proposed amendment sought by the petition mimics EPA's definition. These changes were important to ensure that waste that can be properly and safely disposed of at the federal waste facility was not arbitrarily prohibited because of an unnecessarily restrictive definition of TRU waste. Under federal regulations, TRU waste can become simply GTCC LLW if it fits within EPA's the regulatory exceptions.

The prohibition on the disposal of GTCC waste was deleted from the regulations because it was inconsistent with the statutory provision of the Texas Radiation Control Act that authorizes TCEQ to license a federal waste facility for disposal of all waste that is the responsibility of the federal government under the Low-Level Radioactive Waste Policy Act of 1985.

Finally, the addition of the following proposed new language was needed in order to provide TCEQ with the authority to conduct a technical analysis to determine whether accepting GTCC LLW or GTCC-like LLW at the FWF, as constructed and operated, would be sufficiently protective of public health and the environment.

The Commission may, upon request, or on its own initiative, authorize other provisions for the classification and characteristics of waste on a specific basis, if, after evaluation of the specific characteristics of the waste, disposal site, and method of disposal, it finds reasonable assurance of compliance with the performance objective specified in this chapter.

The proposed amendment would also provide a framework for alternative classification of GTCC-like LLW. The proposed language was modeled after NRC's regulation governing

alternative requirements for waste classification and characteristics, which can be found at 10 C.F.R. § 61.58. This proposed change, along with the others, ensured TCEQ has the flexibility that is authorized by the Texas Radiation Control Act.

NEXT STEPS

The NRC has recognized the need to potentially address disposal options for commercial GTCC as part of an update to their Strategic Assessment (Federal Register, 2014). On September 24, 2014, following a briefing on LLW that included a discussion on the WCS Petition for Rulemaking, the Commissioners directed staff to prepare a report on the history, types and challenges for the disposal of GTCC LLW (NRC, 2014). Hopefully, the NRC Commissioners will direct staff to initiate a GTCC rulemaking in the near future that would fulfill their responsibilities under the LLWPAA of 1985.

It is also anticipated that the NRC will clarify the type and quantity of GTCC and GTCC-like LLW that may be disposed of in the FWF in the near future. Such clarification should be helpful as the TCEQ decides on the manner in which they intend to begin drafting a potential rulemaking.

The TCEQ has begun deliberations with the NRC and DOE regarding the division of regulatory authority between the federal government and an Agreement State, like Texas, governing the disposal of GTCC and GTCC-like LLW. The TCEQ Commissioners have also directed the staff to also hold public meetings with other interested stakeholder to solicit their views and perspectives on these matters. Following the stakeholder meetings, it is anticipated that the TCEQ will publish a proposed rule for public comment in the Texas Register. Following the administrative procedures rules, TCEQ must complete a rulemaking within 180 days after a proposed regulation is noticed. A final rulemaking could be completed in 2015, or soon thereafter.

CONCLUSIONS

The waste management industry has matured considerably over the past 40 years. These practices include waste form improvements, better quality assurance, use of reinforced concrete barriers, deeper depths of disposal and more robust packaging, resulting in a greater degree of containment. The opening of the WCS disposal facilities in Andrews County, Texas, marked a significant milestone in the history of waste management in the U.S. It's the most characterized and robust facility authorized for disposal of Class A, B and C LLW in the country. The design, engineering, site characteristics, and performance requirements are more consistently aligned with those normally attributed to an Intermediate Depth Waste Disposal Facility.

Preliminary analyses were performed using the entire inventory of GTCC and GTCC-like LLW provided in the draft DOE EIS for GTCC LLW. The results from the preliminary analyses were impressive and clearly demonstrated that such waste streams would be protective of an inadvertent intruder and effectively removed from the biosphere for hundreds of thousands of years.

WCS' Petition for Rulemaking marks another significant milestone in the waste management industry in the U.S. It was unanimously approved by the TCEQ Commissioners. They agreed that the regulations were inconsistent and should better align with both state and federal legislation and regulations. The TCEQ has begun having important discussions with both the NRC and DOE and hopefully will propose a rulemaking on GTCC and GTCC-like LLW sometime in 2015.

During the research needed to prepare the Petition for Rulemaking, it became apparent that a few, but significant, inconsistencies in federal regulations existed. Most notable was the inconsistency in the definition of "waste" in 10 CFR 61.2 and its significance resulting in the observation that commercial TRU is currently orphaned in the U.S. A rulemaking by the NRC may be needed to define and propose disposal criteria for TRU.

Notwithstanding some of the challenges that still remain, a pathway that would ultimately allow for the disposal of GTCC and GTCC-like LLW appears to have emerged that will resolve a decades old problem facing the waste management community in the U.S.

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19. TCEQ Order, *Decision of the Commission Regarding the Petition for Rulemaking Filed by Waste Control Specialists LLC*, September 19, 2014.