

**Public-Private Dialogue to Address the National Security Concerns Associated with Disused Radioactive Sealed Sources and the Current Sealed Source Disposition Landscape<sup>1</sup>**  
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Abigail Cuthbertson\*, Olin T. Hale\*\*, and David W. Martin\*\*\*

\*Office of Global Threat Reduction (GTRI), National Nuclear Security Administration, U.S. Department of Energy;

\*\*Nuclear Sector Specific Agency, Office of Infrastructure Protection, U.S. Department of Homeland Security;

\*\*\*Nuclear Sector Specific Agency, Office of Infrastructure Protection, U.S. Department of Homeland Security/Energetics Incorporated.<sup>2</sup>

**ABSTRACT**

36 states currently have no disposal access for sealed sources classified as low-level radioactive waste. Due to their highly concentrated activity and their portability, some of these sources could be used—either individually or in aggregate—in radiological dispersal devices commonly referred to as “dirty bombs.” Although the *Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPAA)* imposes upon States and regional compacts the obligation to provide for the disposal of Class A, B, and C waste generated within their borders, progress on siting new disposal facilities has been minimal since the Supreme Court struck down the “take-title” negative incentive in the *LLRWPAA*. In February 2009, a public-private sector Removal and Disposition of Disused Sources Focus Group was created by the Nuclear Sector Coordinating Council and Nuclear Government Coordinating Council under the Department of Homeland Security’s Critical Infrastructure Partnership Advisory Council (CIPAC) framework to address the national security concerns raised by the lack of sealed source disposition options. The Focus Group includes representatives from the wide variety of public and private sector stakeholder groups impacted by the issue.

**INTRODUCTION**

During their service lives, radioactive sealed sources provide numerous essential medical, industrial, and research applications. However, due to their highly concentrated activity and their portability, some of these sources could be used—either individually or in aggregate—in radiological dispersal devices commonly referred to as “dirty bombs.” While the impact of a dirty bomb would ultimately depend on the type of sealed source or sources used, the type and amount of explosive employed, the location (i.e., urban or rural) of the attack, and other environmental factors, recent studies indicate that the damages could be in the billions of dollars

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<sup>1</sup> This paper represents the views of the authors, but does not necessarily reflect their respective agencies’ or organizations’ positions.

<sup>2</sup> Abigail Cuthbertson is the Federal lead for the GTRI Off-Site Source Recovery Program; Olin T. Hale is the Co-Chair of the Nuclear Government Coordinating Council’s Radioisotopes Subcouncil. David W. Martin is employed by Energetics Incorporated and provides contractor support to the Nuclear Sector Specific Agency.

and have significant human health impacts. [1-4] For this reason, prevention of a dirty bomb attack is recognized as a National security imperative.<sup>3</sup>

The closure of the low-level radioactive waste (LLRW) disposal site in Barnwell, South Carolina in July 2008 to out-of-compact waste has increased concerns in the public and private sectors about the security of disused radioactive sealed sources without a disposal pathway. In 2005, the Government Accountability Office (GAO) raised concerns related to Barnwell's impending closure and noted that "domestic and international experts contend that the lack of disposal availability for unwanted sealed radiological sources makes them more vulnerable to abandonment, misplacement, and theft that would pose a safety and security risk." [6] With the implementation of those restrictions, these concerns have become more acute. In February 2009, a public-private sector Removal and Disposition of Disused Sources (RDDS) Focus Group was created by the Nuclear Sector Coordinating Council (NSCC) and Nuclear Government Coordinating Council (NGCC) under the Department of Homeland Security's Critical Infrastructure Partnership Advisory Council (CIPAC) framework to address the national security concerns raised by the lack of sealed source disposition options.<sup>4</sup> The Focus Group includes representatives from the wide variety of public and private sector stakeholder groups impacted by the issue.

This paper describes the evolution of LLRW policy in the U.S. since 1985, the current sealed source disposal landscape, and the conclusions reached by the RDDS Focus Group in December 2009.

## **U.S. LLRW DISPOSITION POLICY SINCE 1985**

Proper disposition of radioactive sealed sources at the end of their service lives is widely regarded as a fundamental element of radioactive sealed source security.<sup>5</sup> However, low-level waste disposition policy in the United States has faced numerous challenges in maintaining disposal access for all LLRW generators, including sealed sources users. Faced with a looming shortage of disposal sites for low level radioactive waste in 31 States in 1985, Congress enacted the *Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPA)*, which amends

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<sup>3</sup> See Conklin, Craig W. and Phillip L. Liotta, "Radiological Threat Assessment and the Federal Response Plan: A Gap Analysis" for a synopsis of Federal government efforts after September 11, 2001 to assess the risks posed by a radiological attack. [5]

<sup>4</sup> Homeland Security Presidential Directive-7 (HSPD-7) and the National Infrastructure Protection Plan (NIPP) provide the basis for the National effort to protect the Nation's Critical Infrastructure and Key Resources (CIKR). This effort is carried out through an unprecedented partnership between the public and private sectors in each of the 18 CIKR Sectors. CIPAC provides a legal framework under which public and private sector organizations can share information and coordinate public and private sector efforts to maintain and improve CIKR security and preparedness. The Nuclear Reactors, Materials and Waste Sector partnership is led by the NSCC, which is comprised of representatives from private sector Nuclear Sector CIKR stakeholders, and the NGCC, which is comprised of representatives from public sector Nuclear CIKR stakeholders. The Nuclear Sector consists of a wide variety of assets, systems, networks, and functions, including the Nation's nuclear power plants, 32 research and test reactors, and radioactive materials used commercially in the United States.

<sup>5</sup> For example, the International Atomic Energy Agency *Code of Conduct on the Safety and Security of Radioactive Sources*, IAEA/CODEOC/2004, page 5, indicates that the objectives described in the Code of Conduct should be achieved "through the establishment of an adequate system of regulatory control of radioactive sources, applicable from the stage of initial production to their final disposal, and a system for the restoration of such control if it has been lost." [7]

the 1980 *Low-Level Radioactive Waste Policy Act*. [8] The *LLRWPA*, among other things, imposes upon States the obligation to provide for the disposal of Class A, B, and C waste generated within their borders, or within borders defined by multi-state “regional compacts.” The *LLRWPA* assigns the Federal Government responsibility for disposal of “greater- than-class C” (GTCC) low-level radioactive waste.

The *LLRWPA* furthermore contained three provisions, including both positive and negative incentives, to encourage States or regional compacts to create additional disposal capacity.<sup>6</sup> From 1986 to 1991, the three regional compacts with sited disposal facilities –the Southeast Compact, the Northwest Compact, and the Rocky Mountain Compact– applied the surcharge and access restriction incentives authorized by *LLRWPA* according to the milestones specified in the legislation to encourage creation of additional disposal capacity.[9] By 1991, 7 out of 10 of the regional compacts had met the first three of the five milestones for developing new disposal facilities, having filed a complete license application or having received a gubernatorial certification that the state or regional compact would provide for the disposal of its waste. [10] However, in June 1992, the United States Supreme Court struck down the third incentive, the *LLRWPA*’s “take-title” provision, that was due to take effect on January 1, 1993. [11] By 2000, none of the 10 regional compacts remained on track to develop a new disposal facility [10], and only the Texas Compact has made significant progress in the years since.<sup>7</sup>

## **THE CURRENT SEALED SOURCE DISPOSAL LANDSCAPE**

From 1993 to 2008, only two LLRW disposal sites accepted LLRW from states outside of their regional compacts.<sup>8</sup> The mixed waste facility in Clive, Utah, which was established outside of the regional compact system, has accepted Class A waste from across the nation since 2000. [10] However, because the Clive facility does not accept any sealed sources, the LLRW disposal facility in Barnwell, South Carolina has provided the only disposition pathway for Class A, B, and C sealed sources for nearly two decades. Barnwell accepted Class A, B, and C waste, including sealed sources, from across the nation from its establishment in 1971 until July 2008.<sup>9</sup>

The decision by the State of South Carolina, which was originally a member of the Southeast Compact, to discontinue acceptance of out-of-compact waste at the Barnwell facility as of July 1, 2008 came after twice postponing the restriction date. However, in December 1999, the South Carolina Nuclear Waste Task Force adopted a resolution that recommended the Governor enter

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<sup>6</sup>*LLRWPA* at § 4(d)(1).

<sup>7</sup> In Texas, a site at Fort Hancock was selected by the State in 1987, but a State court issued a permanent injunction against the selection in 1991. A Sierra Blanca site was then selected, but a 1992 license application for the site was rejected by State Court in July 1998. In 2003, the Texas legislature designated a second geographic area in Andrews County as acceptable for a new disposal facility. The licensing process for that facility is still underway.[10]

<sup>8</sup> Diffuse radium-226 is still considered naturally occurring radioactive material (NORM) for purposes of disposal, but discrete Ra-226 sources are now considered “byproduct material” in accordance with the Energy Policy Act of 2005 (EPACT) and the NRC and compatible Agreement State regulations. However, EPACT excluded discrete radium-226 sources from the definition of LLRW, and some compact regulations still consider radium-226 containing waste as NORM. Disposal of radium-226 is therefore available to all states at the Richland, WA facility up to 1.2 Ci per source.

<sup>9</sup> It is important to note, however, that Barnwell’s waste acceptance criteria have always excluded most Class B and C sealed sources.

into negotiations with the Atlantic Compact (which at the time consisted of Connecticut and New Jersey) to define the terms and conditions for South Carolina's membership in the Compact. The Task Force Report recommended that "such an agreement should . . . give the state a legal means to accept waste from only three states, instead of continuing to open the disposal site to every state in the nation." [12] The resolution noted that "if waste volumes received at the Barnwell facility continue at current levels, South Carolina's nuclear power reactors will have no place to dispose of their waste when they decommission in thirty years." [12] The 1999 decision stipulated a 2008 restriction date in order to allow time for alternative disposal pathways to be created elsewhere. However, by July 1, 2008 no additional disposal pathways had been created.

The LLRW facility at Barnwell now accepts LLRW, including sealed sources, from Atlantic Compact states only (Connecticut, New Jersey, and South Carolina). The South Carolina Task Force Report did not specifically address the subset of waste comprised of radioactive sealed sources and was not asked to consider the safety or security implications of the decision on the states that would lose access to commercial disposal once the compact restrictions were applied. The Northwest Compact facility operated by American Ecology in Richland, Washington currently accepts many Class A, B and C sealed sources from the 11 states within the Northwest and Rocky Mountain Compacts.<sup>10</sup> Sealed source waste generators in 36 states must store their LLRW disused sealed sources pending the creation of new disposal pathways.<sup>11</sup>

On September 10, 2009, the Executive Director of the Texas Commission on Environmental Quality (TCEQ) signed the final Radioactive Material License for the disposal of Class A, B and C LLRW at Waste Control Specialist's (WCS) facility in Andrews County. The license authorizes WCS to operate two separate facilities for the disposal of Class A, B and C LLRW – one for the Texas Low-Level Radioactive Waste Disposal Compact (which is comprised of Texas and Vermont), and the other for waste designated as a federal responsibility under section 3(b)(1)(A) of the *LLRWPA*.<sup>12</sup>

## **TRENDS AND CHALLENGES IN SEALED SOURCE DISUSE**

The DOE National Nuclear Security Administration's Global Threat Reduction Initiative (GTRI) has a mission to reduce and protect vulnerable nuclear and radiological materials located at civilian sites worldwide. To achieve this mission, GTRI's Off-Site Source Recovery Project (OSRP) removes excess, unwanted, or orphaned radioactive sealed sources that pose a potential risk to public health, safety, and national security. The initial scope of the project included only GTCC sources. However, since the September 11 attacks, the mission has expanded to address

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<sup>10</sup> The American Ecology-operated commercial disposal facility in Richland, Washington serves the Northwest Compact states (Alaska, Hawaii, Idaho, Montana, Oregon, Utah, Washington and Wyoming) and the Rocky Mountain Compact states (Colorado, Nevada and New Mexico). At present, 36 states are without a commercial LLRW sealed source disposal option.

<sup>11</sup> Diffuse radium-226 is still considered naturally occurring radioactive material (NORM) for purposes of disposal, but discrete Ra-226 sources are now considered "byproduct material" per the NRC and compatible Agreement State regulations. However, the 2005 Energy Policy Act has excluded radium-226 sources as LLRW, and some compact regulations still consider radium-226 containing waste as NORM. Disposal of radium-226 is therefore available to all states at the Richland facility up to 1.2 Ci per source.

<sup>12</sup> The Department of Energy has sole discretion in deciding whether to utilize the WCS facility for the disposal of waste designated as a federal responsibility under section 3(b)(1)(A) of the *LLRWPA*.

broader public safety and national security requirements. In addition to disused GTCC sources, the expanded OSRP mission now includes recovery of a wide range of sources that, when designated as waste, would be classified as Class A, B, C, and GTCC low-level radioactive waste. GTRI prioritizes the recovery of registered disused radioactive sealed sources based on threat reduction criteria developed in coordination with the Nuclear Regulatory Commission (NRC).

The Conference of Radiation Control Program Directors (CRCPD) and GTRI have also collaborated to recover disused and orphaned sources through the Source Collection and Threat Reduction (SCATR) Program. SCATR's goal is to collect unwanted sealed sources that pose a potential threat to public health, safety, and national security. The CRCPD SCATR program is limited to non-actinide<sup>13</sup> sources less than 10 curies in activity. Examples of sources that would be eligible for the SCATR program include medical brachytherapy sources such as cesium-137 and radium-226, low activity sources that exceed the NRC 120-day half-life limit for decay-in-storage, long half-life industrial sources, and calibration sources. Since its inception in 2007, the SCATR program has recovered 5,100 disused sources totaling approximately 76 Ci.<sup>14</sup>

In total, GTRI and its partners have been able to recover more than 24,000 sources representing over 700,000 curies from more than 700 sites in the United States. GTRI/OSRP stores recovered sources pending disposal. However, because GTRI/OSRP has limited storage options for no-disposal-pathway sealed sources it recovers, its ability to store the sources it recovers is directly linked to the availability of disposal pathways.

In the course of its source recovery activities, GTRI/OSRP has identified three primary disposal-related challenges:

- **Challenge 1** – Lack of disposal for high-activity beta/gamma sources (primarily cobalt-60, cesium-137, and strontium-90) in wide use primarily in medical and industrial irradiation and power generation applications. Commercial disposal facilities have activity limits below those found in many of these types of devices, even when the sources are not GTCC.
- **Challenge 2** - Lower-activity beta/gamma sealed sources in the 36 states without disposal access. These sources are used in a wide variety of medical and industrial applications. This challenge in particular has been exacerbated by the State of South Carolina decision to close the Barnwell disposal facility to out-of-compact LLRW.
- **Challenge 3** – Sealed sources using foreign-origin americium-241, plutonium-238, and plutonium-239. There is a significant increase in the amount of foreign-origin radioactive material incorporated into U.S. manufactured sources used by U.S. licensees because the U.S. no longer produces these radionuclides. U.S. manufactured sealed sources containing foreign-origin material that exceed the thresholds for Class C disposal do not currently have a disposal path in the U.S.

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<sup>13</sup> Actinide sources include Americium, Plutonium, Curium, and Californium.

<sup>14</sup> CRCPD also receives funding from the NRC for the CRCPD Orphan Source Program. Under the program, CRCPD recovers lower-activity unwanted beta/gamma sources. This program deals exclusively with “orphan” sources that no longer have a licensed owner.

## PUBLIC-PRIVATE DIALOGUE ON SEALED SOURCE SECURITY

Following the implementation of the Barnwell restrictions in July 2008, awareness and concern with regard to the implications for sealed source security increased substantially. In September of 2008, the Nuclear Sector and Government Coordinating Councils convened a public-private Sealed Source Security Workshop to address this and other sealed source security challenges. During the Workshop proceedings, three stakeholder groups in particular expressed concern with regard to the lack of disposition options for sealed sources:

- Sealed source device manufacturers and users who no longer had a disposal option for lower-activity beta/gamma sources since the closure of Barnwell;
- State regulators who feared that desperate sealed source owners might increasingly abandon disused sources;
- GTRI/OSRP representatives who noted that the backlog of disused sources voluntarily registered through their website ([osrp.lanl.gov](http://osrp.lanl.gov)) had grown exponentially since the 2008 Barnwell closure.

While the closure of Barnwell to out-of-compact waste exacerbated concerns with regard to the national security implications of the lack of sealed source disposal options, the challenges identified by GTRI/OSRP and presented at the Sealed Source Security Workshop broadened the dialogue beyond the lack of sealed source disposition challenges resulting from the Barnwell restrictions.

The concerns presented at the Sealed Source Security Workshop led the NSCC and NGCC to form the Removal and Disposition of Disused Sources Focus Group (“RDDS Focus Group”) in February 2009. Because this complex national security challenge involves stakeholders from all levels of government and the private sector, RDDS Focus Group membership was expanded beyond the membership of the NSCC and NGCC, to include sealed source manufacturers, distributors, users, storage and disposal companies, regulators, other Federal and State officials, and LLRW compact members. The objective and deliverables of the RDDS Focus Group are to:

- Develop a clear, concise, single message on the potential national security concerns presented by the lack of commercial disposition options for sealed sources (Problem Statement);
- Convey that not all low-level radioactive waste is a potential national security concern; only a small subset;
- Investigate and recommend immediate and long-term options to address the concern (Solutions).
- Develop a message delivery strategy to include target audience and the NSCC-NGCC participants who will deliver the message (both Problem Statement and Solution).

The RDDS Focus Group, chaired by the authors of this paper, has met once or twice per month since February 2009. From the beginning, RDDS Focus Group participants recognized that given the complex nature of the current LLRW disposal landscape as set forth in the *LLRWPA* and described here, consensus on the precise character of the challenge and recommended solution would be difficult. However, through robust dialogue, information sharing, and hard work, the Focus Group released Part 1 of the deliverable in December 2009, titled “Sealed

Source Disposal and National Security: Problem Statement and Solutions Set.” [13] The twenty five page document includes a description of the problem, including the three disposal challenges articulated above, a consensus problem statement, and a broad solution set from which specific recommendations will be selected.

## **FOCUS GROUP FINDINGS – PROBLEMS STATEMENT AND SOLUTION SET**

One of the most significant accomplishments of the Focus Group is the articulation of a consensus problem statement despite the broad range of public and private interests represented in the Focus Group. Among the 49 RDDS Focus Group participants who affirmed the Part 1 deliverable and who are listed therein are nine state regulators, representatives from ten federal agencies, representatives from two Compact Commissions and two professional organizations, as well as representatives from 13 companies involved in sealed source manufacturing, use, storage, and disposition. The ability of the Focus Group to achieve consensus among such a broad spectrum of key participants on issues fraught with decades of political contention underscores the seriousness of the sealed source security and disposition problem and will help to inform those decision-makers ultimately responsible for implementing a solution.

The Problem Statement, which illuminates the link between the lack of disposal options for disused sealed sources and the national security concerns associated with the threat of radiological dispersal devices or “dirty bombs,” reads:

The lack of disposal pathways for radioactive sealed sources, which make up less than 1% of all low level radioactive waste by volume and activity, poses a national security concern. During their service lives, these sources have numerous essential and beneficial medical, industrial, and research applications. However, due to their high activity and portability, some of these sources could be used either individually or in aggregate in radiological dispersal devices commonly referred to as “dirty bombs,” resulting in economic impacts in the billions of dollars and significant social disruption. Every year, thousands of sources become disused and unwanted in the United States. 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, only 14 states currently have commercial sealed source disposal access, and there are significant political, statutory, and regulatory challenges associated with the creation of commercial disposal access for the remaining 36 states.

In addition to the adoption of a problem statement, the Focus Group also identified 14 “Disposal/Management Alternatives” ranging from recycle and decay in storage to a number of options involving existing and new Federal and commercial disposal facilities. As demonstrated in Table I below, for each alternative, the Focus Group identified which of the disposal challenges the solution would positively impact, as well as both advantages and challenges of implementation of the solution. Taken together, these alternatives constitute a solution set from which specific recommendations can be selected and described in Part 2 of the deliverable. The Focus Group began work on Part 2 in December 2009 and is on target to submit the recommendations and messaging strategy to the NSCC and NGCC by June 2010.

**Table I – RDDS Focus Group Solution Set<sup>a</sup>**

Disposal/ Management Alternative			Advantages	Implementation Challenges <sup>b</sup>
1	Commercial, for-profit Class A, B, and C disposal facility w/DOE GTCC facility	<ul style="list-style-type: none"> <li>• Shared site, construction, and operations aspects for efficiency</li> <li>• Limit public/political concerns to one site</li> <li>• Would address disposal challenge #1 and #2</li> </ul>	<ul style="list-style-type: none"> <li>• Possible separate regulatory authorities/requirements for each facility (if located in an Agreement State)</li> <li>• Economic viability challenged by limited waste volumes</li> <li>• Could require Federal legislation and/or appropriations</li> <li>• Would require compact approval to accept out-of-compact waste</li> </ul>	
2	Co-disposal of foreign-origin Am-241, Pu-238 and Pu-239 sources with domestic sources	<ul style="list-style-type: none"> <li>• Disposal of waste is based on the same physical, chemical, and radiological characteristics</li> <li>• Would address disposal challenge #3</li> </ul>	<ul style="list-style-type: none"> <li>• Could require case-by-case review and/or legislative changes</li> <li>• Could raise questions concerning the propriety of expending public resources for the benefit of the private sector</li> </ul>	
3	Physical destruction and down-blending for disposal as Class A LLRW	<ul style="list-style-type: none"> <li>• Would comply with waste acceptance criteria (WAC) at the Clive facility, which is the only commercial disposal facility with no compact limitations</li> <li>• Would address disposal challenge #2 and possibly a subset of challenge #1</li> </ul>	<ul style="list-style-type: none"> <li>• Destruction of sealed sources may increase the risk of environmental or occupational contamination</li> <li>• Down-blending to meet waste acceptance criteria may be opposed by regional, state, or local stakeholders</li> </ul>	
4	Concentration averaging of LLRW to allow management as GTCC waste by DOE	<ul style="list-style-type: none"> <li>• Technically viable for many sealed source waste classes</li> <li>• Would address subset of sources in disposal challenge #1 and #2</li> </ul>	<ul style="list-style-type: none"> <li>• Could be construed as inconsistent with the division of responsibilities between the Federal Government and the states as envisioned in the LLRWPA</li> </ul>	
5	Increase decay-in-storage horizon to facilitate management of short half-life sealed sources	<ul style="list-style-type: none"> <li>• Could decay sources to Class A level and perhaps exempt levels removing the need for Class B or C disposal access</li> <li>• Technically viable for shorter half-life material, including cobalt-60</li> <li>• Would address subset of sources in disposal challenge #1 and #2</li> </ul>	<ul style="list-style-type: none"> <li>• Solution limited to relatively short half life sealed sources</li> <li>• Expensive life cycle cost</li> <li>• Requires fairly long-term (50 yr) security</li> <li>• Potentially significant institutional concerns with long-term LLRW storage</li> <li>• Does not solve the lack of disposal options for sealed sources of any class in 36 States</li> </ul>	



Table I – RDDS Focus Group Solution Set<sup>a</sup>

Disposal/ Management Alternative		Advantages	Implementation Challenges <sup>b</sup>
6	Targeted emergency disposal access per NRC authorization to address immediate security need via 10 CFR Part 62, “Emergency Access To Non-Federal And Regional Low-Level Waste Disposal Facilities”	<ul style="list-style-type: none"> <li>• Possible stopgap solution for small, specific waste stream in extreme emergency with no other alternative</li> <li>• Would address subset of sources in disposal challenge #1 and #2</li> </ul>	<ul style="list-style-type: none"> <li>• NRC’s implementation regulation, 10 CFR Part 62 establishes a formidable threshold for justifying that an emergency exists that cannot be mitigated by other means</li> <li>• The rule is intended to be very limited in time and waste streams</li> <li>• In over twenty years there have been no requests for implementation</li> </ul>
7	Case by case exemption by existing compacts for disposal of discrete numbers of high-risk sealed sources	<ul style="list-style-type: none"> <li>• Relatively immediate solution for part of the sealed source disposal problem</li> <li>• Would address subset of disposal challenge #1 and #2</li> </ul>	<ul style="list-style-type: none"> <li>• Regional, State, and local stakeholders may object</li> <li>• Case by case exemptions for the large number of sources without disposal access would be administratively burdensome</li> </ul>
8	Range of DOE GTCC disposal alternatives addressed in draft GTCC Environmental Impact Study	<ul style="list-style-type: none"> <li>• Would likely involve a relatively small physical “footprint”</li> <li>• Would address subset of sources in disposal challenge #1 and #2 and all sources in disposal challenge #3</li> </ul>	<ul style="list-style-type: none"> <li>• Scope of GTCC EIS limited to GTCC waste</li> <li>• Multiple year process before construction could begin</li> <li>• Timeline is highly dependent on Congressional action</li> </ul>
9	Develop/expand Federal/State/compact consolidated storage facility	<ul style="list-style-type: none"> <li>• Provides short-term, temporary solution for spectrum of problematic radioactive sealed sources</li> <li>• Would temporarily address sources in disposal challenge #1, #2, and #3</li> </ul>	<ul style="list-style-type: none"> <li>• Only temporary solution</li> <li>• Responsibility of storage and disposition of Class A, B and C could transfer back and forth between Federal and state jurisdiction</li> <li>• Additional life-cycle cost could be significant (paid by whom?)</li> <li>• Would not address the reality that storage facilities do not want to store no-disposal-pathway waste</li> <li>• Shortage of space is not a major obstacle for existing Federal storage facilities</li> </ul>
10	Develop/expand commercial consolidated storage facility	<ul style="list-style-type: none"> <li>• Short-term solution potentially available now</li> <li>• Waste remains under NRC/Agreement State regulatory control pending disposal</li> <li>• Would temporarily address sources in disposal challenges #1, #2, and #3</li> </ul>	<ul style="list-style-type: none"> <li>• Only temporary solution</li> <li>• Questions about ultimate disposition of Class A, B, and C sealed sources remains</li> <li>• Significant added life-cycle cost</li> <li>• Would not address the reality that storage facilities do not want to store no-disposal-pathway waste</li> </ul>

Table I – RDDS Focus Group Solution Set<sup>a</sup>

Disposal/ Management Alternative		Advantages	Implementation Challenges <sup>b</sup>
11	Encourage/expand sealed source recycling programs	<ul style="list-style-type: none"> <li>• Fewer political or legal obstacles to implementation</li> <li>• Would temporarily address a subset of disposal challenges #1, #2, and #3</li> </ul>	<ul style="list-style-type: none"> <li>• Only certain sources can be effectively recycled</li> <li>• Only a short term solution for those sources that can be recycled</li> </ul>
12	New Federal disposal facility exclusively for all radioactive sealed sources, including Class A, B, C, and GTCC	<ul style="list-style-type: none"> <li>• Permanent disposal of all classes of sealed sources</li> <li>• Small footprint</li> <li>• Potentially fewer institutional challenges (especially if on pre-existing federal facility)</li> <li>• Would address subset of disposal challenge #1 and #2</li> </ul>	<ul style="list-style-type: none"> <li>• Would require statutory and regulatory changes</li> <li>• Could raise questions concerning the propriety of expending public resources for the benefit of the private sector</li> <li>• There may be State/local opposition with regard to the siting of the new facility</li> </ul>
13	Open currently operating DOE LLRW disposal facilities for commercial LLRW	<ul style="list-style-type: none"> <li>• Immediately available disposal capacity</li> <li>• Immediate, permanent security provided for Class A,B, and C sealed source waste streams</li> <li>• States relieved of statutory responsibility</li> <li>• Would address sources in disposal challenge #1, #2, and #3</li> </ul>	<ul style="list-style-type: none"> <li>• Would require statutory and regulatory changes</li> <li>• Could raise questions concerning the propriety of expending public resources for the benefit of the private sector</li> <li>• Could be opposed by host states and compacts</li> </ul>
14	New, “full service” commercial disposal facility developed outside of the compact restrictions	<ul style="list-style-type: none"> <li>• Permanent disposal for Classes A, B, and C LLRW</li> <li>• Traditional regulatory structure</li> <li>• Would address sources in disposal challenge #1, #2, and #3</li> </ul>	<ul style="list-style-type: none"> <li>• Economic incentive (e.g., business risk/reward) for assuming the risk is likely decades away</li> <li>• Political challenges to development remain the same as during attempts to implement LLRWPA over the last two decades</li> <li>• Would likely entail legislative changes</li> </ul>
15	Remove legal and regulatory restrictions that apply to currently operating commercial disposal sites	<ul style="list-style-type: none"> <li>• Sufficient actual disposal capacity absent restrictions</li> <li>• Permanent disposal for Classes A, B, C LLRW</li> <li>• Traditional regulatory structure</li> <li>• Would address subset of disposal challenge #1 and #2</li> </ul>	<ul style="list-style-type: none"> <li>• No incentive for host states to change status quo</li> <li>• No foreseeable dynamic for change</li> <li>• Legislative changes would be necessary</li> <li>• Existing host States have indicated that they may close sites if compact authorities to restrict waste are eliminated</li> </ul>

Table I – RDDS Focus Group Solution Set<sup>a</sup>

Disposal/ Management Alternative		Advantages	Implementation Challenges <sup>b</sup>
16	Utilize EPA Regulated Hazardous Waste Disposal Facilities under the Resource Conservation and Recovery Act (RCRA) to accept sealed sources, taking into consideration the half-life of the radionuclide and post-closure care period	<ul style="list-style-type: none"> <li>• Currently in place at some RCRA disposal facilities for accelerator produced radioactive materials.</li> <li>• Would address disposal challenge #2</li> </ul>	<ul style="list-style-type: none"> <li>• Regional, State, and local stakeholders may object</li> <li>• Legislative changes necessary</li> <li>• Most sources require licensing per the Atomic Energy Act (AEA). It is unclear if RCRA facilities could meet AEA Part 61 licensing requirements.</li> <li>• Thus far, no RCRA facility operators have sought AEA Part 61 license</li> <li>• For some short half life waste, it may be possible to remove some AEA requirements through exemption process, but radiation protection rules are immutable.</li> </ul>
a	This table taken from <i>Sealed Source Disposal and National Security: Problem Statement and Solution Set</i> , Table 4, pages 15-18. [13]		
b	There could be technical, regulatory, legal, and/or political challenges to some of the sealed source waste management alternatives provided in Table I beyond those listed under “Implementation Challenges.”		

**PATH FORWARD AND CONCLUSION**

The Focus Group Part 1 deliverable informs several other ongoing efforts addressing the lack of disposition options for LLRW and sealed sources. In 2006, *The Interagency Radiation Source Protection and Security Task Force’s (“Task Force”) 2006 Report to Congress and the President (“Task Force Report”)* noted that “either a lack of legal disposal path or high costs because of a lack of adequate disposal options is causing some licensees to store their unused or unwanted sources until the disposal situation improves. Providing adequate disposal for these sources will have a much greater effect on reducing the total risk of long-term storage (by reducing the number of sources in long-term storage) than any additional changes to the storage requirements.” [14] The Focus Group’s broad-based, public-private statement on the issue will provide important input to the 2010 update of the *Task Force Report*.

Finally, the Focus Group will continue its efforts to fully explore and evaluate the potential options above and seek to “down-select” from these, providing the NSCC and NGCC recommended options and the appropriate messaging strategy for working with stakeholders to implement a solution. However, consensus solutions will not come easily. The history of LLRW policy in the U.S. would portend that greater specificity in identifying solutions results in increasingly contentious dialogue. That being said, a year ago one might well have argued that such a broad group of people from across the sealed source stakeholder community would not have been able to articulate a consensus problem statement and solution set. The Focus Group

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has now accomplished this critical first step and has developed a unique forum for continuing work on the issue. In the coming months, the Focus Group will continue to reach out to new members to ensure that it is approaching the next tasks assigned to it by the NSCC and NGCC with as much information as possible. The task at hand is not easy, but it is a national security problem in critical need of a solution, and the RDDS Focus Group is committed to addressing the challenge.

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