DISUSED SOURCES
Management and Disposition

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Overview

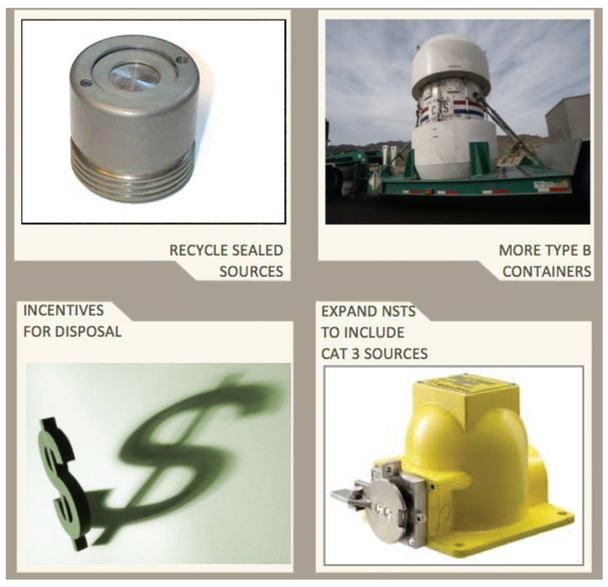
- While society derives many benefits from the use of sealed sources, the current paradigm for the management of sealed sources does not fully reflect the reality of the post-9/11 threat environment.
- There are approximately two million sealed sources and tens of thousands of disused sources in the United States. Although two federal agencies maintain sealed source databases, the exact number and location of disused sources are unknown.
- Users are reluctant to declare their sources as disused or to reuse, recycle, or dispose of their sources for a variety of reasons such as disposal cost, transportation restrictions, potential future use, and the relative ease and low cost of long-term storage.
- Some disused sources pose a threat to national security as they could be used individually or in aggregate in radiological dispersal devices (RDD or dirty bombs) or radiation exposure devices (RED). The U.S. Environmental Protection Agency (EPA) has estimated that an RDD incident in a major metropolitan area could result in 39 million cubic feet and 10 billion gallons of radioactively contaminated waste requiring disposal.
- Most licensees manage their disused sources in a responsible manner; however, despite the best intentions of licensees, the large number of disused sources presents a risk to national security.
- The U.S. Nuclear Regulatory Commission (NRC) considers only Category 1 and Category 2 sealed sources to present a national security risk, whereas the National Nuclear Security Administration (NNSA) believes that some Category 3 sealed sources pose a threat to national security. The U.S. Government should reach an agreement across agencies regarding which sealed sources pose a threat to national security.
- The regulatory framework is quite effective in protecting human health and regulators are doing a good job at implementing the system as it now exists. However, the system can and should be enhanced to address waste management and national security concerns regarding the potential for malevolent use of disused sources.
- Several of the recommendations of the Disused Sources Working Group (DSWG) constitute low-cost improvements with wide latitude with regard to methods of implementation (e.g., integrating disused source planning, management, and/or disposal into inspection routines; requiring licensees to provide use-status information, etc.). Nonetheless, the DSWG acknowledges that some of its recommendations may pose additional resource demands on Agreement States. As such, the DSWG encourages the federal government to examine potential ways to address financial needs of the Agreement States when national security concerns are at issue.
- The DSWG is not trying to prevent people from getting sources that they need, but rather to encourage stakeholders to think about the entire life-cycle from purchase through disposition.

Acquisition and Accumulation

- Sources are easy to obtain, but difficult to manage at disposition. As a result, once used for their original purpose, many sources are stored indefinitely.
- When considering the purchase of a new sealed source, the buyer is not required to consider the overall life-cycle cost of properly managing the source—which can sometimes be in the hundreds of thousands of dollars—and most do not budget for its ultimate disposal. Thus, as currently configured, the economics of sealed source ownership do not motivate owners toward prompt end-of-life disposition, resulting in thousands of sealed sources being stored indefinitely.
- The system promotes the manufacture of sources. Opportunities for reuse, recycling and disposition are being underutilized.
- The reuse and recycling of sealed sources should be promoted. A study on measures to promote the reuse and recycling of sealed sources should be conducted by an agency such as the EPA. A sealed source "exchange" program should be established to facilitate the transfer of sources between those no longer needing sources and those looking to acquire sources.
- Given the potential national security implications, the DSWG agrees with the 2010 Radiation Source Protection and Security Task Force (Task Force) Report recommendation calling for the federal government to enhance support of research and development of alternative technologies to replace the use of risk-significant sources, as well as its recommendation for a government-incentivized program for the replacement of risk-significant devices with effective alternatives. According to the 2010 Task Force Report, three types of alternative technologies could serve as replacements for certain risk-significant radioactive sources: (1) technologies that use the same radionuclide with a different chemical or physical form (e.g., replacing cesium-137 salt with less dispersible cesium-137 ceramic), (2) technologies that use a different radionuclide (e.g., replacement of cesium-137 salt with cobalt-60 metal), and (3) technologies that do not use a radionuclide (e.g., x-ray technology).

Regulatory Controls

- The fundamental purpose of the current regulatory system is to reduce people's exposure to radiation. Although it is working well overall from a health perspective, at various points, we have tried to back-fit security into the system.
- Regulators are doing their jobs within the existing framework; however, after the events of 9/11, we need to continue to enhance the system to address outstanding security threats.
- By creating a regulatory framework that promotes the reuse and recycle of disused sources, as well as encourages advanced planning and budgeting for the high costs of disposal, regulators will effectively reduce long-term storage and promote prompt disposition of disused sources.
- Regulators have indicated that they do not have the authority to require users to disposition disused sources. The NRC and the Agreement States should develop comprehensive regulations that limit the storage of disused sources to two years and authorize regulators to require the disposition of sources in storage for more than two years unless there is a demonstrated future use.
- Financial assurance should be required for all sources that pose a national security risk, which should be specifically-licensed and adequately tracked.
- The development of more stringent financial assurance requirements by the NRC and the Agreement States is crucial to ensuring that life-cycle costs are internalized and encouraging licensees to properly manage and promptly reuse, recycle, or dispose of disused sources.
- There are significant problems with the current tracking system that need to be addressed to assist regulators in reducing potential threats. Once the existing problems are resolved, the tracking system should be enhanced to identify and track all sources that pose a threat to national security.
- Regulators should revisit and address potential concerns to national security that are posed by certain Category 3 sources. For instance, well logging Category 3 sources may present a significant concern as they are highly mobile, used all around the country, and have high amounts of radioactivity. Americium may also be a significant problem as it is widely distributed in Category 3 sources.
- A previous NRC-Agreement State Working Group (NRC-AS Working Group) determined that there is a lack of oversight of General License (GL) licensees. The NRC-AS Working Group also found that regulators have not taken an· active role in ensuring that GL licensees maintain control over and accountability for GL sources and in ensuring that licensees possess, use, and transfer GL devices in accordance with the regulations. This has led to a loss of control and sometimes to improper disposal or even to orphaned and abandoned sources.
- In 2010, the Organization of Agreement States (OAS) petitioned NRC to increase the regulatory control over certain GL sources. When this came before the Commission, the additional controls failed upon a tie vote, resulting in no increased controls. However, the NRC did authorize Agreement States to increase controls on GL sources at their own discretion. Few states have enacted few controls, however, at least in part due to new state regulatory reform laws and the cost and staff time associated with amending a regulation.
- The DSWG understands that Agreement States are concerned about more resource intensive regulatory commitments; however, it appears that there are only a small number of Category 3 GL sources of concern -- i.e., NRC states that they only have 13 Category 3 GL sources.
- The return of sources to manufacturers and suppliers reduces the security threat because it results in fewer storage locations and increases the likelihood of beneficial reuse or recycle. In addition, manufacturers and suppliers often have greater knowledge of the product, more comprehensive oversight, and increased physical security in place. However, some source and device manufacturers and suppliers are accumulating large numbers of disused sources in storage. Additional regulatory oversight is needed to minimize manufacturers' and suppliers' inventories.
- Several Agreement States have developed more stringent and comprehensive regulations that should be considered as guides/models for others to follow including:
  - Oregon's comprehensive GL requirements and possession fees for each source in a licensee's possession;
  - Texas' fees on licensees to cover the cost of orphaned and abandoned source recovery;
  - Illinois' financial assurance requirement for most sources;
  - Florida's radiation protection trust fund covering costs associated with licensee bankruptcy and orphaned sources; and,
  - Colorado's comprehensive GL registration and annual self-certification program and requirement for Specific Licenses (SLs) for certain Category 3 sources that are normally generally licensed.



Reuse, Recycle and Disposal

- Devices in long-term storage are more likely to be subject to loss of control and accountability; however, users have little or no incentive to dispose of disused sealed sources. Most sources are small and require very little space to store, so users incur very little cost in storing disused sources. By comparison, disposal can be very costly. As disposal was not available for many states for some years, users are also not accustomed to including funds for disposal in their annual budgets.
- Disposal options are currently available for most disused sources manufactured and used within the U.S. In most cases, however, disposal access has not translated into actual disposal.
- Those who benefit from the use of the source should be the ones to pay for its disposition.
- Federal and private research funding organizations should require grantees to budget for the disposal of sealed sources when they no longer are needed by the grantee.
- States with disposal facilities licensed to accept Class B and Class C low-level radioactive waste should examine their waste acceptance criteria and policies, including the alternative approaches provision in the revised Branch Technical Position on Concentration Averaging and Encapsulation (CA BTP) to facilitate the disposal of certain high activity sealed sources.
- Type B shipping containers needed to transport certain high activity sealed sources are in short supply and very expensive. The NNSA should undertake a market analysis of the demand for Type B shipping containers and take additional steps to encourage the private sector to increase the supply of commercially available Type B shipping containers. NNSA should also identify several internationally-certified Type B shipping containers that would have widespread applicability to disused sources in the U.S. and submit applications to have these packages certified by NRC for domestic use. The NRC should continue to expeditiously review applications for Type B shipping containers. The NRC should aggressively notify licensees and the Agreement States well in advance of the expiration of shipping container certifications.
- The Source Collection and Threat Reduction (SCATR) program and Off-Site Source Recovery Program (OSRP) have provided and continue to provide significant contributions, including the disposition of a number of sources to the benefit of society. At times, however, these programs also create unintended incentives for users to not disposition disused sources until the government contributes toward costs that need to be addressed. There will always be a need for a program to disposition orphaned or abandoned sources, and they should continue to be adequately funded to do so, but they should eventually be transitioned more toward education and other initiatives. The Conference of Radiation Control Program Directors (CRCPD) and NNSA are important stakeholders that should provide input on how to transition SCATR and OSRP.

Summary of Similar Conclusions by Other Stakeholders

Develop and Promote Alternative Technologies to Replace the Use of Risk-Significant Radioactive Sources

- The Radiation Source and Protection and Security Task Force (Task Force) recommends that the U.S. Government enhance support of research and development of alternative technologies to replace the use of risk-significant radioactive sources and establish a government-incentivized program for the replacement of risk-significant devices with effective alternatives. *Key Recommendation 2, 2010 Task Force Report, p. v.*

- The Health Physics Society (HPS) suggests that federal and state regulatory agencies require license applicants for a new use of a Category 1, 2, or 3 radioactive source to examine alternative technologies including, but not limited to, different source forms that are technically and economically feasible and whose alternative use would result in an equal or greater net benefit than from the use of the source. *HPS Position Statement titled, "Continued Federal and State Action is Needed for Better Control of Radioactive Sources," PS021-0, Item 6, January 2006.*

Improve Life-Cycle Outreach and Develop Education Information Programs

- The HPS encourages federal and state agencies, in conjunction with radiation safety organizations like the HPS and other professional and trade organizations, to develop and implement programs to better inform all entities possessing radioactive sources about available options for source disposition. In particular, this educational effort should be directed toward licensees who have had little contact with federal and state regulators and have minimal radiation safety programs. *HPS Position Statement titled, "Continued Federal and State Action is Needed for Better Control of Radioactive Sources," PS021-0, Item 15, January 2006.*

Impose and Enforce Limitations on the Storage of Disused Sources

- The Task Force advocates that the U.S. Nuclear Regulatory Commission (NRC) and Agreement States incorporate procedures for Category 1-3 sources that include consideration of the length of time, reason for, and location of storage. *Key Recommendation 6, 2010 Task Force Report, p. 38.*

Reassess and Strengthen Financial Assurance Requirements for Sealed Sources

- The HPS supports the incorporation of a requirement into the licensing process that an acquirer of Category 1, 2, or 3 sources must provide financial surety for disposal of the sources. The establishment of financial surety is consistent with the IAEA Code of Conduct. *HPS Position Statement titled, "Continued Federal and State Action is Needed for Better Control of Radioactive Sources," PS021-0, Item 7, January 2006.*

Reassess Application of General License (GL) verses Specific License (SL), Aggregation and Categorization of Sources

- In 2010, the Organization of Agreement States (OAS) petitioned NRC to strengthen the regulation of radioactive materials by requiring a Specific License (SL) for higher-activity devices that are currently available under the General License (GL) in 10 CFR 31.5. In addition to OAS, nine Agreement States also supported this petition. *OAS Petition for Rulemaking Regarding 10 CFR 31.5 and 31.6 and Comment on Draft Proposed Rule "10 CFR Parts 30, 31, 32 and 150."*

- The HPS advocates that all Category 3 sources and greater should be subject to a Specific License. *HPS comments on Docket NRC-2008-0272, Limiting the Quantity of Byproduct Material in a General Licensed Device, September 15, 2009.*

- "Sources that fall into Category 3 and lower can be assembled into Category 2 or 1 quantities of radioactive material. Further, it may be the case that some radiation sources near the upper threshold for Category 3 pose more serious risks than other sources that fall near the lower threshold of Category 2 in scenarios other than those used to create the source categorization system." *Radiation Source and Use Replacement, National Research Council, National Academies of Sciences, page 43, note 1, 2008.*

- The Task Force recognizes that Category 3 sources can be aggregated into a "risk significant quantity." *Recommendation 9-2, 2006 Task Force Report, p. 27; Summary Table of 2006 Recommendations and Actions and 2010 Recommendations, 2010 Task Force Report, p. 46; and, 2010 Task Force Report, p. 9.*

- A 2007 Government Accountability Office (GAO) audit of the security aspect of NRC's licensing process raised concerns about the relative ease with which lower activity sources can be purchased and potentially aggregated to higher activity levels. *Testimony Before the Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, U.S. Senate, "National Security: Actions Taken by NRC to Strengthen its Licensing Process for Sealed Radioactive Sources Are Not Effective," GAO Report 07-1038T, July 12, 2007.*

- An NRC-Agreement State Working Group on the control and accountability of licensed devices examined information provided by NRC and determined that there is a lack of licensee oversight by the regulators. The working group found that regulators have not had an active role in ensuring that licensees maintain control over and accountability for devices, and in ensuring that licensees possess, use, and transfer devices in accordance with regulations. The working group further determined that both GLs and SLs have demonstrated loss of control over and accountability for devices. *NUREG-1551, "Final Report of the NRC-Agreement State Working Group to evaluate Control and Accountability of Licensed Devices," October 1996.*

- The International Atomic Energy Agency (IAEA) developed a system for categorizing radioactive sources based on their potential to cause harm to people. The system categorizes sources into five categories, Categories 1 through 5, with Category 1 being the greatest risk and Category 5 being the lowest risk. Categories 1, 2, and 3 are all classified as "dangerous" sources. *IAEA Code of Conduct and IAEA Safety Guide #RS-G-1.9, "Categorization of Radioactive Sources."*

Improve and Enhance the National Source Tracking System

- In 2008, NRC staff proposed an amendment to regulations to expand the National Source Tracking System (NSTS) to include Category 3 sources, including fixed industrial gauges (level gauges, conveyor gauges, thickness gauges, blast furnace gauges, dredger gauges, and pipe gauges); well-logging devices; medium and low-dose-range brachytherapy; and certain radiography devices. Staff also recommended inclusion in the NSTS of "sources below the Category 3 threshold, but greater than or equal to a 10th of the Category 3 threshold," based on "…the nature of the sources at 1/10 of Category 3, their potential to aggregate to Category 2, and the costs to the licensed industry and the NRC." *71 Federal Register 19,749 (April 11, 2008).* On June 30, 2009, by a 2 to 2 vote, NRC announced that the Commission "was unable to reach a decision on the staff's recommendation to issue a final rule expanding the number and type of radioactive sources" covered under the NSTS. *Press Release 09-121 titled, "NRC Commission Split 2-2 on Expansion of National Radioactive Source Tracking System," NRC, June 30, 2009.*

- In a 2008 report, GAO advocates enhanced tracking of radioactive sources by NRC and the Department of Homeland Security (DHS). *Report to the Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, U.S. Senate, "Nuclear Security: NRC and DHS Need to Take Additional Steps to Better Track and Detect Radioactive Materials," GAO Report 08-598, June 2008.*

- The HPS states that, because of the potential for unacceptable personal injury, economic, or social consequences from a mismanaged or poorly secured individual Category 3 source, NRC should be consistent with the approach of the IAEA and consider that Category 3 sources warrant inclusion in the tracking system, unless an analysis can demonstrate that the large number of such sources and the economic cost for tracking them would be overly burdensome. If the analysis demonstrates that the inclusion of all Category 3 sources is not justified on an economic basis, an evaluation should be performed as to how aggregate quantities of Category 3 sources that roll up to Category 1 or 2 thresholds can be identified and included in the tracking system or to identify if there are alternatives other than an "all or nothing" approach. For example, the analysis might identify some types of Category 3 sources that could be excluded while others should appropriately be included in the tracking system, or might identify alternatives to the NSTS that accomplish the same results for these sources. The analysis and inclusion/exclusion of Category 3 sources should not interfere with the timely implementation of the tracking system for Category 1 and 2 sources. *HPS Position Statement titled, "Continued Federal and State Action is Needed for Better Control of Radioactive Sources," PS021-0, Item 11, January 2006.*

Increase the Availability and Address Cost Issues Associated with Type B Shipping Containers

- The HPS recommends that the U.S. Department of Transportation (DOT) extend the authorization for continued domestic use of the specification containers 20WC and 6M as necessary to provide sufficient time for design, testing, and approval of replacement containers with adequate internal volume, gross weights, and cost based on requests for an extension from potential applicants for certification. HPS further recommends that NRC expedite the review and approval process for updated replacement containers. *HPS Position Statement titled, "Continued Federal and State Action is Needed for Better Control of Radioactive Sources," PS021-0, Item 13, January 2006.*

Continue to Appropriate Sufficient Orphan Sources Recovery Funds

- The HPS supports Congressional action to authorize programs and appropriate sufficient funds on an ongoing basis to maintain a robust national capability for the recovery and disposition of vulnerable and orphan sources within the United States and abroad in order to ensure the national defense and security and protection of public health and safety. *HPS Position Statement titled, "Continued Federal and State Action is Needed for Better Control of Radioactive Sources," PS021-0, Item 14, January 2006.*

For more information and to download a copy of the report, go to: www.LLWForum.org