NRCREP - Response to Request for Comments on the NRC LLW Program

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Subject: Response to Request for Comments on the NRC LLW Program
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Thank you for the opportunity to provide you with our comments (please see the attached pdf file) on the U.S. Nuclear Regulatory Commission's low-level radioactive waste program. These comments were compiled on behalf of Dade Moeller & Associates, Inc., with contributions from Dade Moeller, Casper Sun, Elizabeth Kavanagh, and William E. Kennedy., Jr.

Please let us know if you have any further questions or want clarification to our comments.

Best regards,

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U.S. NUCLEAR REGULATORY COMMISSION (USNRC) FEDERAL REGISTER REQUEST FOR COMMENTS ON THEIR LOW LEVEL RADIOACTIVE WASTE PROGRAM

Regarding the Current LLW Disposal Regulatory System

1. **What are the key safety issues and cost drivers and/or concerns relative to LLW disposal?**

Comment: The key safety issues continue to be long-term performance associated with ground water migration, human intrusion, and transportation. In part, engineering of both the disposal cell and the waste form can improve and assure long-term performance. The most significant cost driver stems from the lack of competition (i.e., limited licensed disposal options) and transportation costs.

2. **What vulnerabilities or impediments, if any, are there in the current regulatory approach toward LLW disposal in the U.S., in terms of their effects on:**

   a. **Regulatory system reliability, predictability, and adaptability;**

Comment: The failure of the Low Level Waste Policy Act in driving State Compacts to open regional disposal facilities has resulted in limited disposal options for LLW and has artificially increased the cost of disposal, largely through lack of competition. The system needs to be revised, even if it takes an act of Congress. See suggested regulatory revisions provided in response to Question 5.a below.

In response to this situation, there have been significant changes in the type and quantities of LLW being generated in the U.S. Further, it is likely that the characteristics of future wastes will not be the same as those currently being generated. This will be caused in part by applying new technology to waste consolidation, treatment, and compaction in an effort to reduce overall disposal costs. It is noted that the volume of LLW from materials licensees and power reactors has been a lot smaller than projected in the early 1980s; however, the specific activity is greater than first predicted. This trend has been driven by disposal costs based on total volume, not specific activity or risk.

Significant impediments to LLW disposal are continued negative public reaction and regulatory discrepancies with respect to hazardous waste disposal. Clearly identifying risks and communicating them in a consistent manner, no matter the type of waste involved, through the regulatory process would improve the reliability of siting new facilities and safely disposing LLW.

   b. **Regulatory burden (including cost); and**

Comment: In fairness, the State Compacts are faced with the difficult problem of balancing the cost of developing new facilities, which include engineered systems and costly siting and

licensing activities, against shrinking regional waste volumes. The overall impact is that the cost per cubic foot of disposal is too high to justify. Actions, by industry or through revised regulations (such as the ill fated *below regulatory concern* proposal) that reduce the quantity of waste requiring licensed disposal only increase the cost per cubic foot, making matters worse. So the best action from a cost and regulatory burden perspective is no action. The burden of the current regulatory process is evident from the historical difficulties encountered by those attempting to site and operate facilities within the confines of the State Compact process. Key examples are Nebraska, where the siting failed to produce an acceptable site resulting in litigation among Compact member States and the proposed facility operator, and California, where the Federal government failed to allow the needed land transfer to permit the licensed site to open. In both cases, industry and the Compact States invested over $100M without successfully producing a licensed site. In addition, the overall process in each case lasted over 10 years. This financial burden and the duration of the process without producing licensed, operational facilities, is a clear disincentive to both the State Compacts and industry. The goal of the USNRC should be to ease the regulatory process, give clear guidance, and improve communications so that new disposal capacity can be realized.

One approach to ease the regulatory burden might be to establish an "inherently safe quantity of radioactive material" for selected radionuclides, drawing largely on values currently found in 10 CFR 20 (Appendix C) and 10 CFR 30 (Schedule B). A summary of radionuclide-specific values from these regulations is shown in the table below. These values might be useful as a starting point, but it will require additional work and careful translation. An additional starting point might be ANSI Standard N 13.12 on clearance levels. Currently this standard is being updated to consider recent publications by the International Atomic Energy Agency (IAEA).

Table 1. Quantities of radionuclides below which labeling is not required, nor is it necessary to have a license to receive, use, transfer, own, or acquire (USNRC, 1991 and 1994).

Radionuclide	Quantity above which the radionuclide must be labeled (μCi) 10 CFR 20 Appendix C	Quantity below which a license is required to receive or use (μCi) 10 CFR 30 Schedule B
^{3}H	1000	1000
^{14}C	100	100
^{32}P	10	10
^{60}Co	1	1
^{131}I	1	1
^{137}Cs	10	10

c. Safety, security, and protection of the environment?

Comment: For the effective management and disposal of radioactive waste, it is important that a strong safety culture be instilled and maintained by those who generate the waste, those who

transport it, and those who dispose of it. Although USNRC regulations generally support the development of such an operating culture, it must originate within the regulated community. Again, the one of the most difficult aspects of LLW disposal is long-term ground water protection. Requiring modern engineering design features may ease some of the difficulty and provide for technical baseline consistency with RCRA waste disposal.

In addition, the need for security at LLW disposal sites needs to be carefully evaluated since the terrorist events of September 11, 2001. The USNRC should fully evaluate the likelihood that LLW disposal sites may pose an attractive terrorist target, keeping in mind the general public fears of radiation and radioactive materials of any kind.

Potential Alternative Futures

3. **Assuming the existing legislative and regulatory framework remains unchanged, what would you expect the future to look like with regard to the types and volumes of LLW streams and the availability of disposal options for Class A, B, C, and greater-than-class-C (GTCC) LLW five years from now? Twenty years from now? What would more optimistic and pessimistic disposal scenarios look like compared to your "expected future"?**

Comment: Multiple electric generating utilities have announced plans to construct new nuclear power plants. All of these will be advanced designs that presumably will produce less radioactive waste. At the same time, it is quite possible, in fact, almost mandatory, that the U.S. resume chemically processing of the spent fuel from both the existing reactors, as well as the new ones. Adding these wastes to those resulting from the use of radioactive materials in medicine, industry, research, and license termination will undoubtedly lead to an increase in the quantity of LLW, LAW, and VLLW, needing to be disposed. The increased quantity may be in part offset by applying new technology to reduce volume. While estimating the magnitude of the overall increase should be based on a review and evaluation of the factors that are involved, it certainly does not seem unreasonable to anticipate a 50% to 100% increase in waste volume within the next 20 years. For example, using data from the *Technology, Safety and Cost of Decommissioning* series of reports for boiling water reactor and pressurized water reactor reports (NUREG/CR-0672, 1980; NUREG/CR-0130, 1978), the potential volumes of contaminated materials requiring LLW disposal could range form about 16,000 to 17,000 cubic meters (or from about 570,000 to 600,000 cubic feet) per decommissioned power reactor. While recent decommissioning projects have allowed a large part of this volume to be disposed at RCRA facilities on a case-by-case basis, this potential volume of decommissioning waste would easily overwhelm the capacity of most existing licensed LLW disposal facilities.

4. **How might potential future disposal scenarios affect LLW storage and disposal in the U.S.; in terms of**

    a. **Regulatory system reliability, predictability, and adaptability;**

Comment: Assuming the *status quo* (i.e., no regulatory or institutional changes are made), the future of LLW disposal will only be worse in terms of limited licensed capacity combined with

increasing generation, and higher waste disposal cost. Therefore it is essential to commit to revising the regulations in a timely manner. Updating and improving 10 CFR Part 61, as described in response to Question 5.a below, perhaps following a risk-informed system as proposed by the National Council on Radiation Protection and Measurements (NCRP) in their Report No. 139 (2002), should be done to improve the regulatory system reliability, predictability, and adaptability. Future disposal scenarios should be included in the regulatory revisions, for example allowing RCRA facilities to dispose selected categories of LLW – as discussed in response to Question 5.a below. This change could streamline and improve the process, while allowing additional disposal capacity for large volume, low activity waste.

b. Regulatory burden (including cost); and

Comment: The largest regulatory burden is the uncertainty in the licensing process as it exists today, as evidenced by the failure of the Compact States to open new licensed LLW disposal facilities. Revised regulations will only solve part of the problem; there needs to be real incentives for the Compacts to do their job, without increased costs and delays. In addition to the regulatory burden is public opposition, which unless managed in an overall regulatory process, can block sites located in technically-suited areas from being established.

c. Safety, security, and protection of the environment?

Comment: It is a given that the goal of future scenarios is LLW disposal in a safe and secure manner, that assures protection of the environment. While it is difficult to quantify exactly how this might be accomplished, it is again noted that the existing safety culture goes a long way to achieving this goal. Future disposal scenarios should preserve and enhance the existing safety culture.

Can the future be altered?

5. What actions could be taken by NRC and other federal and state authorities, as well as by private industry and national scientific and technical organizations, to optimize management of LLW and improve the future outlook? Which of the following investments are most likely to yield benefits?

a. Changes in regulations;

Comment: Since the promulgation of 10 CFR 61, the U.S. Environmental Protection Agency (EPA) developed solid waste regulations for hazardous materials under the *Resource Conservation and Recovery Act* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA). Disposal sites for hazardous waste have been permitted through State agencies under RCRA based on the type, nature, and risk associated with specific waste streams. This system provides a graded approach that allows low-risk waste to be disposed at less regulated (and engineered) facilities, while higher risk waste requires additional siting and engineering restrictions. Adopting a more RCRA-like regulatory process would help ease the burden of protecting against human intrusion; failure of the

disposal system prior to achieving acceptable risk levels for the waste would require remediation under CERCLA. Efforts should be made to harmonize between LLW disposal regulations and RCRA, as discussed in NCRP Report No. 139 (2002) so that a facility permitted under RCRA (Subtitle C facilities, for example) could receive some quantities and concentrations of radioactive waste; and so that LLW facilities can receive some quantities and concentrations of hazardous waste. This approach would go a long way to addressing mixed waste issues, while providing greater disposal capacity, especially for high volume, low risk waste streams. Granted, there will need to be additional worker training, reporting, and coordination between regulators to make this happen; but from a technical standpoint it makes abundant sense to harmonize the regulatory process. For example, in April 2001, the EPA published a report (under RTI Project Number 92U-7780.002.021) which concluded that site selection, engineering designs, and post-closure/institutional controls between RCRA and LLW facilities were comparable. The EPA concluded that RCRA landfills provide similar long-term protection to NRC-licensed LLW facilities.

Title 10, CFR, Part 61 should either be completely revised, or a supplementary statement issued, based on Title 10, CFR, 61.58, which states that:

> *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 objectives of subpart C...* of Title 10, CFR, Part 61.

While these "other provisions" may help in correcting a number of the deficiencies, in Title 10, CFR, Part 61, as noted below, there is a host of changes that need to be made. For this reason, if the Commission adopts this approach, it is important that the changes being made are presented in detail and that they correct the multitude of outdated information items and voids that exist in the existing regulations. The manner in which these changes are promulgated also must have regulatory authority.

Specific changes and additions that are needed include:

- The title of the regulation should be changed to read something along the following lines:

LAND DISPOSAL OF LOW LEVEL RADIOACTIVE WASTE, LOW ACTIVITY WASTE, AND VERY LOW LEVEL WASTE.

- Low-level radioactive waste (LLRW) needs to be specifically defined; the same is true for low activity waste (LAW) and very low level waste (VLLW). The terminology should also be made consistent – if it is to be LLRW and VLLW, why is there a need to define LAW – in fact, is such a category needed?

- The dose rate limits for members of the public should be updated and replaced with risk guidance. Risk-informed approaches to LLW management would be based on the

specific radionuclide content of wastes, instead of its origin or license conditions. This approach would tailor disposal options for specific waste to the associated risks and the relevant disposal scenario. For example, rather than setting Class A, B, and C waste concentration limits based on the results of a generic human intrusion scenario, specific disposal conditions at specific facilities would be used to define waste acceptance criteria, which would differ from facility to facility based on the environmental setting and engineering controls applied. Allowing different waste acceptance criteria for different sites and facilities perhaps better reflects the ability of those sites to safely dispose waste, as is the practice for DOE disposal sites. For example, why should a site located in a remote arid location, with a large unsaturated zone, have the same waste acceptance criteria as a site with higher rainfall and potential ground water protection issues?

- The problem of "Greater Than Class C (GTCC) Waste" should be addressed. Again, using a risk informed system, many of the Class C waste streams may be acceptable for some type of near-surface disposal at selected sites, under specified disposal conditions.

b. Changes in regulatory guidance;

Comment: The present regulatory system for radioactive waste is based on punishing waste generators without any hint of leniency. If a waste generator ships a load of waste to a disposal site, and any traces of liquid are found to be present in the waste, the shipment is returned to the generator. Why is there not an opportunity for the generator and the disposal site operator to confer and resolve the issue? The Commission should encourage the disposal site operators and generators to cooperatively resolve problems that arise. The current policy of "punishment" is not constructive. This problem can be corrected through a modest modification in the procedures for implementing the regulations.

Again, none of the existing commercial LLRW disposal facilities in the U.S. was licensed by the USNRC. This makes it more important than ever that the USNRC LLW disposal regulations be up-to-date and based on state-of-the-art technologies, radiation protection terminologies, and risk limits – which will require coordination with Agreement States that have currently licensed facilities.

c. Changes in industry practices;

Comment: The first precept of waste management is to minimize generation, as described for laboratories and other small institutional generators in NCRP Report No. 143 (2003). It is likely that future wastes will not resemble those currently being generated. This will be due in part through the application of new technology applied to waste consolidation, treatment, and compaction, and in part through changing business practices. As previously noted, the volume of LLW from materials licensees and power reactors has been a lot smaller than projected in the early 1980s; however, the specific activity is greater than first predicted. This trend will likely continue if disposal cost is determined by volume, not specific activity or risk.

d. Other (name).

Comment: Perhaps a mandatory system of "traded risks" could ease the siting and licensing process. This would allow an industry to work with the community in the near-by vicinity of a proposed facility to identify ways to reduce regional risks to help compensate for the potential increased risk caused by operation of the facility. For example, street lights or other modifications to roads and highways could be made to minimize the frequency of traffic accidents. Immunization or cancer screening programs could improve public health, and radon reduction programs could reduce overall radiation risks. If required by revised regulation this type of program could improve public perception and reduce licensing battles.

6. **Are there actions (regulatory and/or industry initiated) that can/should be taken in regard to specific issues such as:**

    a. **Storage, disposal, tracking and security of GTCC waste (particularly sealed sources);**

Comment: The information that would be recorded under such a system may be potentially valuable to terrorists. Before any such system is established, a range of possible scenarios of terrorist type events should be developed, and a detailed probabilistic risk analysis performed to ensure that the full range of vulnerabilities is identified. Once this is done, a careful balance must be established so that the suggested system does not overly compromise the ability to maintain the security of these types of sources. At best, such data should be maintained under tight security.

    b. **Availability and cost of disposal of Class B and C LLW;**

Comment: There are real concerns about disposal capacity for Class B and C LLW, given the closure of the Barnwell site to states beyond their Compact. Again, developing a risk informed system, which would allow for segregation of LLW among potential future sites based on site-specific risk-informed waste acceptance criteria, may help relieve this problem.

    c. **Disposal options for depleted uranium;**

Comment: Application of a risk-informed system may provide disposal options that are not obvious today. Some waste forms and disposal sites may provide relative low-risk options for disposal of depleted uranium compared to other waste forms or sites. For example, large volume low concentration waste from military applications (depleted uranium projectiles) may be acceptable at one site, while raw metal or turnings may not be acceptable at the same site.

    d. **Extended storage of LLW;**

Comment: It may well be that extended storage should be permitted only for those LLWs that contain radionuclides with sufficiently short half-lives that storage can be beneficial in terms of significantly reducing their activity. This is consistent with storage for decay commonly used for various medical wastes where relatively short-half lived radioactive materials are used. Every effort should be made to avoid extended storage of LLWs with relatively long

radioactive half-lives since this would impose additional cost and could lead to unacceptable exposure scenarios.

e. Disposal options for low activity waste (LAW)/very low level waste (VLLW);

Comment: As discussed in response to Question 5.a above, one option would be to send such wastes to hazardous chemical (non-radioactive) waste disposal facilities. This approach would be based on the development of a system for quantifying the risk associated with each specific waste, and developing specific waste acceptance criteria for each type of facility. If this is done, it would provide tremendous benefits (and cost reductions) to many groups facing waste disposal problems. If the methods for assessing the risk associated with a specific waste were documented, it might ultimately become possible to dispose of it in any facility licensed to accept wastes with this level of risk.

Another benefit of ranking wastes (hazardous chemicals and radioactive materials) on the basis of risk would be that the total risk of so-called *mixed wastes* could be expressed on a unified basis and could be appropriately disposed.

It is interesting that the subject of *mixed waste* is not addressed in the call for comments. It should be. This is important not only relative to the disposal of wastes that contain both hazardous chemicals and radioactive materials, but it is also important in the disposal of sealed sources that contain ^{137}Cs. Because this radionuclide decays into barium, it is classified as a *mixed waste*. There are other sealed sources that come under this same category. This is a problem that needs to be addressed. Similar problems exist in the disposal of ^{3}H containing waste. Some information indicates that waste generators are paying as much as $15 per gallon to have their ^{3}H bearing liquid wastes shipped to Oak Ridge and evaporated. This would not be required under a risk-informed disposal system.

f. On-site disposal of LLW;

Comment: Although this may be an attractive option for perhaps low concentrations of relatively short-lived radioactive material, broad application could lead to sites that require licensing and maintenance far beyond the current generation. For this reason, the on-site disposal option should be limited in application.

g. Other (name);

Comment: No comment.

7. What unintended consequences might result from the postulated changes identified in response to questions 5 and 6?

Comment: As noted above, regulations that permit the extended storage of LLW or on-site disposal without sufficient restrictions could result in an unacceptable regulatory situation with potential increased costs and additional inadvertent release scenarios.

Interagency Communication and Cooperation

8. **Based on your observations of what works well and not-so-well, domestically and/or internationally, with regard to the management of radioactive and/or hazardous waste, what actions can the NRC and other Federal regulatory agencies take to improve their communication with affected and interested stakeholders?**

Comment: There is a need for waste disposal organizations to develop innovative programs to establish integrity and good will with members of the public residing in neighboring communities. One approach, which has been warmly received by the U.S. Environmental Protection Agency and the Nuclear Energy Institute, is for nuclear electric utilities and LLW disposal facility operators, to cover the costs of installing radon control systems in local public schools and residences. In addition to being a source of good will, such programs are an effective method for providing members of the public with information on the relative contributions of various radiation sources in their daily lives. The remediation of perhaps as few as 10 neighboring homes (depending on average radon concentrations) can reduce the collective dose to the population by an amount equivalent to the anticipated impacts of radionuclide releases from a LLRW disposal facility. Such a program is actively being considered by several nuclear utilities, as well as the operator of one at least one LLRW disposal facility.

9. **What specific actions can NRC take to improve coordination with other Federal agencies so as to obtain a more consistent treatment of radioactive wastes that possess similar or equivalent levels of biological hazard?**

Comment: One of the first observations to recognize is that this is not the USNRC's job alone. One of the first steps, for example, would be for the U.S. Environmental Protection Agency to make the Federal Radiation Council a more effective body and, in so doing, to revitalize its role in facilitating cooperation among the various Federal agencies in addressing radiation-related matters. Depending on circumstances, it might also be useful to encourage the U.S. Congress to pass legislation that requires that the responsible Federal agencies establish a uniform set of regulatory standards for limiting the risks that are associated with the treatment, storage, and disposal of radioactive and non-radioactive (hazardous) wastes. That is to say, all limits that are promulgated should not only be risk-informed, but should be expressed in term of risks.

The necessity and wisdom of such a change was clearly documented by the National Research Council (1995) in its report on the "Technical Bases for Yucca Mountain Standards." Their first recommendation was that an individual standard was needed. Having said that, the NRC concluded that the only remaining issue was whether to state the standard in terms of dose, health effects, or risk. After considering the factors, which are discussed in more detail below, the NRC (pages 64-65) recommended the standard be expressed in terms of risk, the reasons being:

1. "A risk-based standard would not have to be revised in subsequent rulemaking if advances in scientific knowledge reveal that the dose-response relationship is different

from that envisaged today. Such changes have occurred frequently in the past, and can be expected to occur in the future. For example, ongoing revisions in estimates of the radiation doses received by atomic bomb survivors of Hiroshima and Nagasaki may significantly modify the apparent dose-response relationships for carcinogenic effects in this population, as have previous revisions in dosimetry."

2. "Risks to human health from different sources, such as nuclear power plants, waste repositories, or toxic chemicals can be compared in reasonably understandable terms. Dose or releases have to be stated in radiation units Sieverts or Becquerels that are not easily understood by the general public and that can only be compared conveniently with other sources of radiation and radioactivity."

In concluding, the National Research Council said "we believe that a health-based individual standard will provide a reasonable standard for protection of the general public" due to releases from the proposed repository. In so doing, "we recommend that this be a risk-based, rather than a dose-based standard."

While some may say that, since the comments of the NRC were directed to the development of standards for the long-term performance of the proposed Yucca Mountain repository, they are not applicable to LLW disposal facilities. This, however, is not the case. As pointed out in the BEIR VII Phase 2 Report of the National Research Council (NRC, 2006), the lifestyles and baseline cancer rates in populations, which are key determinants in the carcinogenic risks due to radiation exposures, do not remain constant with time. This was vividly demonstrated by the changes that occurred in the rates for cancers of the stomach, colon, lung, and female breast, among the Japanese population during the period from 1950 to 1998, a time-period during which they were becoming more "westernized." (NRC, 2006, page 268). Due to the dynamic sharing of cultures through modern communication tools, i.e., the Internet and the cell phone, relatively rapid changes in the health effects per unit of radiation exposure are expected to continue to change at a relatively rapid rate. Another contributing factor is the rapid progress in developing preventive measures (vaccines) as well as cures, for various types of cancers (NCRP, 1995). Based on this information, the NRC recommendations for the proposed Yucca Mountain repository are equally applicable to LLW disposal facilities.

Additional Commentary:

In addition to the questions raised by the USNRC, we would like to provide the following additional commentary in terms of additional questions that should have been asked:

Is the USNRC LLW Program Up to Date?

The questions that have been posed by the USNRC in multiple instances portray the impression that the USNRC is not up-to-date in terms of its LLW program. This is especially obvious when one compares the status of work in that field, as contrasted to their activities related to commercial nuclear power plants. The USNRC may need to take a more prominent role in regulating LLW facilities since all of the existing LLW disposal facilities in the U.S. are being regulated by Agreement States.

The follow examples illustrate this point:

1. While the *risk-informed* approach has been applied by the USNRC in developing regulations for the commercial nuclear power field for some time, this same situation does not appear to apply in terms of their regulation of the disposal of LLRW. The record shows, for example, that the U.S. DOE conducted in late 1995, and completed in 1996, a study (under the Federal Facilities Compliance Act) in which they quantified the limitations on the characteristics, radionuclide identities, and concentrations of mixed low-level waste that could be disposed at each of the existing DOE facilities (Walchuk, Mary, 1996). These assessments took into consideration: (a) technical factors (associated with each disposal site), such as climate, hydrology, geology, topography, and seismology; (b) receptor considerations, such as nearby populations, endangered species, and sensitive environments; and (c) institutional considerations, such as site ownership, and the planned site mission. The outcome was the development of acceptance criteria for the LLRW that could be disposed at each DOE facility site.

2. Almost 4 years ago, the NCRP published Report No. 139 in which they set forth the bases for a combined radioactive and hazardous chemical wastes classification system that was risk-informed. What was the response of the USNRC? We believe this report can serve as the basis for revised regulations.

3. More than 3 years ago, the NCRP published Report No. 143, which provided definitive techniques that operators of laboratories and other small institutional generators could use in minimizing the volumes of LLRW that they generated. Has the USNRC issued a Regulatory Guide on this subject?

All three of these efforts are examples of the types of activities that the USNRC should consider in revamping is low-level radioactive waste regulatory program.

Is There a Need for a Systems Approach?

Millions of sealed radioactive sources are in use throughout the world. Hundreds of thousands of these are located in countries without the resources to ensure their security. Adding to this problem is that many such sources are not being used and are therefore idle and unwanted. Lacking a place for their disposal, licensees have no option but to store them. Compounding the situation is that the USNRC is now requiring licensees to maintain an inventory of the characteristics of each such source through their National Source Tracking System. Obviously, such an inventory would be extremely beneficial to terrorists.

One way to address this issue, in part, would be for the USNRC to encourage the development of a method for permanently disposing of the idle and unwanted sealed sources, the goal being not only to reduce possible inadvertent exposures of members of the public, but also to prevent access to these sources by terrorists. One possible national approach would be to propose that these sources be disposed in conjunction with the U.S. Department of Energy program for

recovering and storing unwanted sources, including Greater-Than-Class-C (GTC) sealed sources, recognizing that many sources (such as ^{60}Co sources are not GTC, but could potentially pose a terrorist threat). On a broader scale, the USNRC might consider leading a U.S. effort to establish a permanent disposal facility for sealed sources that would be accessible to countries throughout the world. While it would require modification of the international treaty that forbids disposal of radioactive materials in the oceans, an ideal place might be to place unwanted and non-used sealed sources in a deep hole in a specified location in one of the world's oceans.

What is the Role of Agreement States?

Agreement States are currently in the lead role of licensing low-level radioactive waste facilities. None of the existing commercial LLRW disposal facilities in the U.S. was licensed by the USNRC. This makes it more important than ever that the USNRC LLW disposal regulations be up-to-date and based on state-of-the-art technologies, radiation protection terminologies, and risk limits. This is not presently the case with Title 10, CFR, Part 61. It is urgent, therefore, that these regulations be updated.

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