



HEALTH PHYSICS SOCIETY

“Specialists in Radiation Safety”

January 30, 2006

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Dear Dr. Laetz:

I am pleased to forward information prepared by the Health Physics Society (HPS) to support the United States Government Accountability Office's (GAO) work to report to the Senate Energy and Natural Resources Committee (the "Committee") on low-level radioactive waste (LLRW) issues.

On January 11, 2006, I met with you and members of your staff via teleconference to discuss HPS draft responses to your document "Questions for Low-Level Radioactive Waste Management Experts," which we had provided to you shortly before the meeting. In addition to our discussion, I committed to finalizing our responses, including any additions or changes we felt appropriate based on our discussion, and to submit them to you in writing.

Therefore, please find enclosed HPS's written responses and information that have been prepared to respond to the GAO questions you posed to us. These responses are based on our position statement *Low-Level Radioactive Waste Management Needs a Complete and Coordinated Overhaul* (September 2005).

I sincerely appreciated the opportunity to have met via teleconference with you and your colleagues on January 11, 2006. I hope GAO will continue to rely on our expertise in radiation safety and that the enclosed information is valuable as you move forward on this important work for Congress. Please contact me if you have any further questions.

Sincerely,

Ruth E. McBurney, CHP
Enclosure



HEALTH PHYSICS SOCIETY

Specialists in Radiation Safety

HEALTH PHYSICS SOCIETY
RESPONSE TO THE
GOVERNMENT ACCOUNTABILITY OFFICE
REQUEST FOR INPUT ON
LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

30 January 2006

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United States Government Accountability Office

Questions for Low-Level Radioactive Waste Management Experts

Introduction

The U.S. Senate Committee on Energy and Natural Resources has asked the Government Accountability Office (GAO) to report on approaches to improve the system of managing low-level radioactive waste in the United States. Concerns have been raised that deficiencies in the disposal component of this system may be placing excessive financial and other burdens on those entities that generate this class of radioactive waste. In particular, the U.S. Nuclear Regulatory Commission (NRC) contends that it is now time to explore alternatives to the present system because future availability of disposal capacity and the costs of disposal remain highly uncertain, and radioactive waste generators need predictability and stability in a national disposal system.

Research Objectives

GAO seeks to identify and examine approaches to help overcome deficiencies in the low-level radioactive waste management system that affect its reliability, cost-effectiveness, and potential future safety, of which assurance of disposal availability is a primary component. GAO is currently seeking opinions from knowledgeable domestic experts in low-level radioactive waste management about ways to overcome these deficiencies. Notwithstanding operational health, safety, and security assurances, we hypothesize that a well-managed low-level radioactive waste system would ensure that:

- 1) Governmental or other designated entities provide reliable central waste storage or disposal capacity for the radioactive waste that is generated;
- 2) Radioactive waste is removed from waste generator sites to central waste storage or disposal facilities in an efficient and timely manner;
- 3) Radioactive waste generation is sufficiently monitored to determine the need for central waste storage or disposal capacity as well as to track the location and movement of radioactive wastes that pose safety and security risks;
- 4) Adequate funds are available to cover the cost of radioactive waste preparation, packaging, transport, and placement in central waste storage or disposal facilities.

Such a system is primarily oriented towards removing radioactive waste from generator sites, although a case can be made for retaining some radioactive waste at active or decommissioned nuclear power plant sites, as well as Department of Energy sites, as long as it is safe and secure.

We are also seeking input from domestic low-level radioactive waste management experts about their awareness of approaches taken by other countries to manage comparable low- and intermediate-level radioactive waste. Such approaches, on further

examination by GAO, might support actions that could be taken to improve the management of these radioactive wastes in the United States.

The following questions are intended to help guide our discussion with domestic low-level radioactive waste management experts.

General Questions

1) Do you agree that the time is right to explore alternative approaches that would make the low-level radioactive waste disposal system more predictable (reliable) and stable (cost-effective)? If not, why not?

HPS Response: As stated in our recently issued Position Statement, *Low-Level Radioactive Waste Management Needs a Complete and Coordinated Overhaul* (September 2005), the HPS believes that the timing is right to explore and implement alternative approaches to provide greater accessibility to waste generators for disposal of all classes of low-level radioactive waste (LLRW).

In our position statement, we point out that since the Low-Level Radioactive Waste Policy Act (LLRWPA) was amended in 1985 deadlines established for the development of new sites have passed, with no new sites being opened for disposal of greater than Class A LLRW. Political, judicial, and administrative obstacles have blocked the development of sites and have limited the disposal options for higher-activity classes of waste within existing sites. Disposal options for the highest-activity classes of waste are limited and may no longer exist for a majority of the states after 2008. In addition, the current regulatory framework results in excessive and overly restrictive requirements for disposal of Class A waste. The effect of these obstacles and restrictions is to interfere with optimal use of radioactive materials in medicine, research, energy production, and technology. The use of all available options, including private, commercial, and federal facilities, can facilitate the orderly, safe, and efficient disposal of radioactive waste.

Based on our review of the current state of affairs related to LLRW Management, the HPS has taken a number of positions and made specific recommendations that would facilitate disposal of all classes of LLRW in a safe and cost-effective manner. For a complete listing of our recommendations and positions on this matter, please find enclosed the referenced position statement and supporting background document.

2) Do you believe that potential safety concerns might arise in the future if waste generators in most states are denied access to dispose of their classes B and C waste after mid-2008, and no other disposal alternative comes forward? What about greater-than-class C (GTCC) waste?

HPS Response: We believe that permanent disposal rather than safe-storage is the safest and preferred long-term solution to managing LLRW. We do acknowledge that Class B/C waste currently stored at nuclear power plants does not pose a significant risk to public health. However, small volumes of Class B/C LLRW do exist at some

universities, concerns for which should not be overshadowed by focusing on the larger volumes at nuclear facilities. For GTCC, based on the draft inventory analyses conducted by the Department of Energy (DOE) in 2005 in support of the pending Environmental Impact Statement (EIS) on commercial GTCC disposal, there is no evidence that significant volumes of GTCC exist outside of that stored at the very secure nuclear power plants and the disused sealed sources that are now being collected and secured by the DOE.

However, in the context of accomplishing the preferred long-term method for LLRW management we believe that potential safety and security concerns could arise should most states be denied access for disposing Class B/C and GTCC waste in mid-2008. For Class B/C waste this is primarily a concern for sealed sources, however, if radiological facilities generate Class B/C or GTCC waste during decommissioning, with no other alternatives available they must create independent storage facilities for this material on a site that no longer has the large support complex and inherent security of an operating facility.

As discussed in a report issued by a HPS Working Group (WG) titled, *Actions Needed to Better Secure Vulnerable Radioactive Sources: A Contemporary Report Prepared by a Working Group of the Health Physics Society* (September, 2005), we identified a number of barriers that currently exist that are preventing the timely disposition of Class A, B/C, and GTCC disused sources. In fact, we believe that one of the most significant root causes currently affecting the ability to safely dispose of sources that could be vulnerable to loss or theft is the lack of availability of disposal sites and the high cost of waste disposal. Many of the findings identified by the WG were consistent with those contained in the GAO Report titled, *DOE Needs Better Information to Guide Its Expanded Recovery of Sealed Radiological Sources*, issued in September 2005 (GAO-05-967). As such, we encourage GAO to study information contained in this report to seek a better understanding of the differences in which waste streams generated by the commercial (non-DOE) sector differ from those generated by the DOE.

3) Do you believe that any lack of disposal availability for classes B and C waste after mid-2008, for at least five years, would significantly affect the use of nuclear materials by academic, industrial, medical, and government research entities? Why or why not?

HPS Response: The HPS does not believe that lack of disposal availability for Class B/C waste after mid-2008 (for at least five years) would significantly affect the use nuclear materials since these types of waste are not generated in appreciable quantities by the academic, industrial, medical, and government research entities.

4) We are attempting to identify deficiencies in the current low-level radioactive waste management system, which affect its reliability, cost-effectiveness, and potential future safety. As criteria, we hypothesize that a well managed system should have at least the four attributes previously stated. What is your opinion of these attributes as a workable model?

HPS Response: The four attributes identified by GAO form a good starting point for constructing a model of a well-managed low-level radioactive waste management system. However, the system should include and/or accommodate the following attributes that are not implicit in these four as presented:

- a. The classification and disposition of LLRW should be a risk-based system.
- b. The system should be framed so it establishes appropriate disposition (that is, secure, cost-efficient, and protective of public health) for LLRW at all levels of risk and not framed to just focus on higher risk waste.
- c. The attributes should establish disposal as the first priority in the disposition of LLRW with storage, either on-site or at a central storage facility, as a second alternative.
- d. The system should establish the priorities for managing LLRW waste. We suggest the priorities would be (1) security of high risk sources, (2) protection of human (worker and public) health and the environment, (3) accessible disposition for all LLRW, and (4) disposition methods that are cost-effective so as not to inhibit commerce, health care, research, or education.
- e. Centralized storage of waste involves additional handling and transportation, resulting in worker exposure, potential public exposure, environmental risks and costs. Therefore, centralized storage should be considered only when necessary for security reasons, or when an analysis demonstrates it provides greater protection of the worker, public, and/or environment than storage at generator sites while awaiting availability of permanent disposal facilities.
- f. Governmental or other designated entities should be responsible for ensuring reliable methods for the disposition of LLRW exist, but they do not necessarily have to “provide” those methods.

For more information on these attributes or characteristics of a waste management system, we encourage GAO to review the referenced HPS position statement, information contained in NCRP Report 139 titled, *Risk-based Classification of Radioactive and Hazardous Chemical Wastes*, and information we have provided to the United States Senate Committee on Energy and Natural Resources, the National Academy of Science, and your staff on this matter^{1,2}.

¹ Public Witness Testimony for the Record by the Health Physics Society to the Committee On Energy and Natural Resources United States Senate on Low Level Radioactive Waste Oversight, September 30, 2004

² Health Physics Society Response to the General Accountability Office Request for Input on Security of On-Site Storage of Low-Level Radioactive Waste, February 28, 2005

5) Would you revise these attributes in any way and, if so, how would you do so?

HPS Response:

A well-managed low-level radioactive waste system would ensure that:

- 1) Waste classification and disposal requirements for each type of radioactive waste should be based on its potential risk to public health and safety;
- 2) Governmental or other designated entities ensure the availability of reliable, accessible and cost effective disposal capacity for all radioactive waste that is generated, or the availability of safe storage of the waste if disposal capacity is not available;
- 3) All radioactive waste is removed from waste generator sites to disposal facilities, or is moved to a central waste storage facility if needed for security of the material or safety of the public or environment, in an efficient and timely manner;
- 4) Radioactive waste generation is sufficiently monitored to determine the need for disposal or central storage capacity as well as to track the location and movement of radioactive wastes that pose safety and security risks;
- 5) Adequate funds are available to cover the cost of radioactive waste preparation, packaging, transport, and placement in a disposal facility, or for safe storage or placement in a central waste storage facility if a disposal facility is not available. Reliable, accessible and cost effective disposal for low activity waste and financial surety for high activity waste accomplishes this.

Provision of Central Waste Storage or Disposal Availability

6) Is there a better way to distribute responsibility for providing low-level radioactive waste disposal availability than the current system established by the Low-Level Radioactive Waste Policy Act of 1980, as amended?

HPS Response: We believe that the positions and recommendations contained in the referenced position statement, supporting background document, and sources of information provided to the United States Senate and GAO describes a better way than the current system established under the LLWPAA for the distribution of responsibility for providing LLRW disposal availability for those states that do not have accessibility to a regional compact facility. These positions and recommendations should be enacted in a manner that does not penalize states that have access to regional compact facilities that were developed under the LLWPAA and in a manner that allows continued operation under the compact system as long as it is advantageous for those states.

While the LLWPAA was enacted by Congress to distribute more equitably to each state the responsibilities for developing disposal capacities for LLRW generated within each

state's borders, this legislation has unnecessarily restricted access to available disposal sites and impeded open commercial development of additional disposal facilities. Our position on this matter is evidenced by a review of provisions of the LLWPAA that established deadlines for developing new disposal sites under the framework of the interstate compact system. However, since enactment of the LLWPAA in 1985, deadlines for creating a network of new disposal sites have passed without a single new disposal facility for greater than Class A LLRW having opened. As such, the HPS agrees with the comments made by the NRC contained in the 2004 GAO report³ that it is in the national interest to begin exploring alternatives that would provide a better legal and policy framework for new options for commercial generators of LLRW.

In the written public witness testimony to the Senate Energy and Natural Resources Committee, we stated that the nation needs predictable long-term disposal options for Class B/C wastes. Given the possibility that generators of Class B/C waste that do not belong to the Atlantic Compact and all licensee that currently possess sealed sources may no longer have access to the Chem-Nuclear Systems (CNS), LLC facility in Barnwell, SC after July 2008, we believe that an alternative that should be fully explored for the short-term is allowing these wastes to be disposed of at an existing facility owned by DOE. However, for the long-term, we encourage exploring the feasibility of allowing disposal of Class B/C waste at the facility that will be developed by DOE for disposal of GTCC waste as required under the LLWPAA.

In the written public witness testimony, we also stated that while sufficient disposal capacity for Class A waste exists, a lack of competition results in excessive costs for many licensees. (We also note that recently the Governor of Utah has made statements that leave uncertain the planned expansion of the EOU facility's Class A disposal capacity. Due to the large volume of DOE Class A LLRW that goes to the EOU facility, this leaves an uncertain projection of the lifespan of the facility.) We also cited several recommendations in our position statement that would provide a way to distribute responsibility for providing low-level radioactive waste disposal availability better than the current system established by the LLWPAA. For example, we encourage GAO to report on actions that are needed to optimize the waste disposal capacities that currently exist that would allow for the disposal of low activity radioactive and mixed wastes at RCRA Subtitle C or D facilities and at uranium mill tailing impoundments.

7) What specific actions might be taken by the Congress or federal agencies to modify the current state compact system for providing low-level radioactive waste disposal availability?

The referenced HPS position statement identifies three fundamental changes in LLRW management that could be taken by Congress and federal agencies, including three changes in the LLWPAA that could be taken by Congress, and it identifies five specific

³ GAO report to the Chairman on the Energy and Natural Resources, U.S. Senate titled *Low-Level Radioactive Waste, Disposal Availability Adequate in the Short Term, but Oversight Needed to Identify any Future Shortfalls*, (GAO-04-604), issued June 2004.

recommendations that could be taken by federal agencies that would provide low-level radioactive waste disposal availability. Please see the position statement for details.

8) It appears that some other countries have no plans to develop low-level radioactive waste disposal facilities, at least for long-lived intermediate-level radioactive waste. Is developing central storage facilities for classes B, C, and GTCC waste an option for the United States? Why or why not?

HPS Response: As stated in answer to question 2, we believe that permanent disposal rather than storage is the safest and preferred long-term solution to managing LLRW. Given that safe disposal of classes B and C waste has been practiced in the United States for decades, a move to centralized, interim storage would be imprudent. However, if the alternatives provided in answer to other questions and identified in our position statement cannot be accomplished such that disposal facilities for Class B and C waste is not available, then centralized storage is an option. However, it is not evident that it is needed or that it is preferable to safe, secure storage at generator sites. As stated in answer to question 4, centralized storage of waste involves additional handling and transportation, resulting in worker exposure, potential public exposure, environmental risks and costs. Commercial centralized storage facilities incur high amounts of financial security to assure funding for ultimate disposal of the stored material as well as decommissioning costs if the company abandons the facility or cannot decommission it. These additional costs are passed on to the generators. Therefore, centralized storage should be considered only when necessary for security reasons, or when an analysis demonstrates it provides greater protection of the worker, public, and/or environment than storage at generator sites while awaiting availability of permanent disposal facilities. If central storage is justified for security reasons, we believe that centralized staging of Class B/C waste generated by non-DOE generators, prior to land disposal at one or more facilities under federal control or privately owned, located on federal land and licensed by NRC is an attractive option.

For some GTCC wastes (e.g., in situations where wastes are not safely and securely stored), centralized storage is currently being utilized. The NRC notifies the DOE, who recovers the wastes (in most cases, sealed sources) and stores them at a centralized facility, pending development of the GTCC disposal system. GTCC wastes associated with nuclear power plant decommissioning are stored near spent fuel in a secured independent storage facility on-site. It is not evident there would be any benefits by moving these few GTCC storage casks to a centralized storage facility while the much greater number of spent fuel storage casks remain on-site in the independent storage facility.

9) Can you provide examples of other countries that distribute responsibility for providing central waste storage and/or disposal availability more effectively and efficiently than is done in the United States?

HPS Response: The HPS has not studied nor evaluated LLRW management in other countries.

Efficient and Timely Removal of On-Site Radioactive Waste

10) Despite license and inspection programs to help ensure that stored radioactive waste is safe and secure, do you believe that it is now time for NRC and Agreement States to consider placing time limits on the on-site storage of these radioactive wastes at non-nuclear utility sites that will not decay in a reasonable amount of time? Why or why not? What conditions would need to be in place for regulatory agencies to take this action?

HPS Response: Time limits for on-site storage for the sake of having time limits are not recommended. Regulatory agencies should remain focused on activities that ensure waste is stored safely and securely if they cannot or are not being disposed in a timely manner. As indicated in the answer to question 4, transfer of waste from generator sites to a central storage facility should be for reasons of safety and security. If on-site storage is safe and secure, it should not be necessary to move wastes until permanent disposal facilities are available. If economically feasible disposal options are available, then there should be an encouragement to move it from storage to disposal in a timely manner. However, this should be done for good business reasons, since permanent disposal should reduce costs associated with long-term on-site storage, for reasons of good work practice, since worker and potential public exposure should be reduced by removal of the radioactive material, and for reasons of safety and security, since final disposal is safer and more secure than storage.

Given the likelihood that waste generators located in more than 30 states may not have access to the CNS facility in Barnwell, SC, after mid-2008, placing time constraints on waste storage would not be prudent. Arbitrary time limits for storage of GTCC wastes also would be imprudent, given that a disposal facility is not available.

11) Providing central storage facilities for classes B, C, and in some cases GTCC waste might be a mechanism to promote the removal of these wastes from generator sites in the absence of a disposal alternative or the high cost of disposal. Would providing this storage availability alone help encourage the efficient and timely removal of waste from generator sites?

HPS Response: It is expected that storage availability alone would be unlikely to encourage removal of waste from generator sites. If generators are fiscally responsible for all costs associated with transport, storage and future disposal, it is not apparent that prolonged centralized storage would result in reduced costs and therefore encourage “timely removal” of wastes from generator sites. Per statute, the beneficiaries of the activities that resulted in the generation of GTCC LLRW (likely, the licensees) must bear all reasonable costs of disposing the wastes. If centralized storage were selected as a component of the management and disposal system, licensees would pay for storage.

12) Are you aware of any countries that have regulations and/or incentives in place that require and/or encourage the efficient and timely removal of low-level radioactive waste from generator sites to central waste storage or disposal facilities?

HPS Response:

We are unaware of any countries that have such incentives.

13) Many other countries have clearance rules for the lower end of our class A waste. Would instituting a clearance rule, in lieu of case-by-case exemptions, be an effective way to promote the more rapid removal of these wastes from generator sites, or in some cases negate the need for on-site removal of some waste? Why or why not?

HPS Response: The HPS supports rulemaking that would allow for the clearance of wastes with inherently safe levels of radioactive materials. As such, we have issued a position statement titled, *Clearance of Materials Having Surface or Internal Radioactivity*. As discussed in our position statement and written comments⁴ to the NRC, we recommended use of the annual dose limit and the derived screening criteria contained in the American National Standard Institute/Health Physics Society (ANSI/HPS) Standard N13.12, *Surface and Volumetric Radioactivity Standards for Clearance* (ANSI/HPS N13.12, 1999). This standard was developed for ANSI under the direction of the HPS Standards Committee. The standard received consensus approval through ANSI Committee N13 on August 31, 1999. In addition, this standard is currently under revision by the ANSI N13.12 Committee, chaired by HPS representative William E. Kennedy, Jr. The revision is expected to be issued in CY 2006 and is expected to bring the standard in line with current international clearance standards.

Our recommendation is in keeping with the intent of Public Law 104-113, National Technology and Transfer Act of 1995, and OMB Circular A-119, Federal Participation in the Development and Use of Voluntary Consensus Standards. The radiological criteria contained in ANSI/HPS N13.12 provide for the health and safety of the average member of the critical group such that the effective dose will not exceed one millirem per year. The dose criteria adopted within this National Consensus Standard are consistent with the recommendations of the National Council on Radiation Protection and Measurements (NCRP) regarding limiting exposure of individual members of the public as specified in NCRP Report No. 116, *Limitation of Exposure to Ionizing Radiation*.

The HPS encourages the U.S. NRC to adopt ANSI/HPS N13.12, when revised, in lieu of using the current radiological criteria contained in NRC policy that have been used by the licensed community for the unrestricted release of materials containing residual

⁴ *Health Physics Society Comments on the United States Nuclear Regulatory Commission Rulemaking on Controlling the Disposition of Solid Materials: Scoping Process for Environmental Issues and Notice of Workshop*, dated June 13, 2003.

radioactivity⁵. The radiological criteria contained in existing U.S. NRC guidance and policy directives are based primarily on radiation detection capabilities that existed in 1974. As such, they do not provide a uniform level of protection, as would be achieved by adoption of a dose-based criteria.

We believe that it is likely that clearance rules and regulations governing streamlined disposal requirements for very low-activity activity wastes would facilitate rapid removal and eliminate the need for disposal of some wastes at LLRW disposal sites.

In June 2005 the NRC Commission voted to disapprove a proposal by the NRC staff regarding the proposed rulemaking on radiological criteria for controlling the disposition of solid materials (SECY-05-0054). The staff proposed that very slightly contaminated materials, i.e., materials that would represent a potential exposure at or less than 1 mrem/yr to some members of the public, be disposed of in certain specified controlled manners with no level below which materials could be released for unrestricted use by the public (clearance). In their votes, Commissioners McGaffigan and Lyons specifically cited the lack of a clearance of materials for unrestricted use as one reason for them to disapprove of the proposal. Commissioner Merrifield also stated he believed the unrestricted release of materials was appropriate from a science standpoint but he did not cite the lack of a clearance provision as a reason for his disapproval. The HPS agrees with Commissioners McGaffigan and Lyons that a rule for dispositioning slightly contaminated materials must have provisions for unrestricted release, i.e., clearance, of materials contaminated below a level that poses no public health or safety concerns.

We encourage GAO to seek additional information regarding implementation of clearance rules in other countries. In fact, the United States lags behind many countries in Europe that have a clearance rule to better ensure that international commerce is not adversely impacted by goods that may contain very low levels of radioactivity. The following list, providing by Gordon Linsley formerly with the International Atomic Energy Agency, contains countries that have adopted clearance rules, as well as the associated dose based release criteria.

⁵ The NRC currently allows unrestricted use of solid materials under existing policy and specifies certain exemptions for disposal of solid materials under Title 10, Code of Federal Regulations, Part 20.2002.

Country	1 mrem/y Criteria	General Clearance Levels	Case by Case Clearance
Belgium	✓	✓	
Denmark	✓		✓
Germany	✓	✓	
Greece	✓		
Spain	✓	✓	✓
France	✓		✓
Ireland	–		✓
Italy	✓	✓	✓
Luxembourg	✓	✓	
Netherlands	✓	✓	
Austria	✓		
Portugal	–		
Finland	✓	✓	
Sweden	✓	✓	
UK	✓	✓	✓

14) In the case of sealed radiological sources, would a requirement that disused sources be returned to their manufacturer or supplier, as is done in France, be an effective way to promote the more timely removal of these sources from user sites? Why or why not?

HPS Response: It is not likely that the requirement to return disused sources to their manufacturer or supplier will promote more timely removal from user sites. There is a problem in defining when a source becomes “disused” as opposed to “in storage” for an unanticipated future use. There is also a problem with such a requirement for manufacturers and suppliers that go out of business.

We believe that it would be more effective to require licensees to demonstrate financial surety to guarantee that waste disposal money will be available when a sealed radioactive source no longer serves its intended function, particularly if there is some financial incentive for the licensee to dispose of the source and get unused surety funds returned. This regulatory framework would be similar to the “decommissioning fund” that is already in place for equipment and facilities that process nuclear materials. Additional information on this topic is provided in response to Question 24.

Sufficient Waste Monitoring and Tracking

15) What are the potential benefits and costs of having a national or state-based system to track the quantities of radioactive waste in storage at waste generator sites, especially for classes B, C, and GTCC radioactive wastes?

HPS Response: For waste streams with disposal availability, tracking is currently done through the Manifest Information Management System (MIMS). For Class A wastes, it is not clear that a different or more expansive tracking system is warranted. For Class B/C waste that does not have disposal availability, or that is threatened by losing disposal availability, a tracking system would assist in the planning for managing that waste stream. For GTCC wastes, a comprehensive tracking system could provide useful information for DOE's planning and delivery of a GTCC disposal system.

16) Several countries seem to distinguish between low-level radioactive wastes produced by nuclear power plants, and low-level radioactive waste resulting from academic, industrial, medical, and government research use of nuclear materials. Are there reasons to take this approach? If so, why?

HPS Response: As discussed in our position statement on overhauling the manner in which LLRW is managed, we believe that waste containing radioactive materials should not be based on its origin or legislative statute, but instead on its potential risk to public health. As such, we do not believe that a distinction should be made whether or not waste is generated from commercial nuclear power plants versus academic, industrial, medical, and government research use of nuclear materials.

17) Are you aware of any countries that are particularly effective at monitoring and tracking the volume and duration of on-site waste storage?

HPS Response: We have not studied or evaluated the effectiveness of other countries to monitor and track the volume and duration of on-site waste storage. We are aware that France recently completed a national inventory system. The United Kingdom has an extensive inventory developed by Nirex, Ltd (a private firm) for stored waste. Other European nations, such as Belgium and the Netherlands, with small nuclear programs compared to the US have a single centralized facility, comparable to part of a single DOE site that processes and stores waste for their entire nation.

18) Is there a better way to track low-level radioactive waste that is transferred from generator sites to disposal sites than currently exists in the United States?

HPS Response: See the answer to question 15. The HPS does not have suggestions for how a tracking system would be constructed for those waste streams that warrant one.

Adequate Funding for Waste Processing, Transport, Storage, and Disposal

19) What does the claim that the low-level radioactive waste system is not cost effective mean to you?

HPS Response: We believe this claim means that the unit rate disposal costs are higher than they need be and they are high enough to affect decisions as to whether to use radioactive materials for beneficial uses or to forgo the use and the derived benefit. The HPS provided a number of examples of the high and varying cost of waste disposal to the

GAO on February 28, 2005. The source of much of this information resulted from public comments supporting EPA's effort to promulgate a rulemaking that would allow for disposal of low-activity radioactive waste (LARW) and low-activity mixed waste (LAMW) at RCRA Subtitle C facilities. Our examples also noted the variability of waste disposal fees that are charged to licensees at the Envirocare of Utah (EOU) facility in Clive, Utah in addition to the other disposal alternatives that could be made available (i.e., RCRA Subtitle C, uranium mill tailing impoundment and unrestricted release provisions under a clearance rule).

We encourage GAO to more fully examine our position statement regarding the overhaul of the current system for managing LLRW. We believe that this inquiry should address how the high costs and limited option that licensees currently have available under the constraints of LLWPAA are curtailing reliable accessibility and competition in the market place, which adversely affects the cost effectiveness of nuclear technologies.

20) Are low-level radioactive waste disposal costs higher than they should be in the United States, as compared to some other countries? If so, can you illustrate this claim?

HPS Response: The HPS does not have comparative information on disposal costs in other countries.

21) What are the most important factors affecting the cost of disposal in the United States? Can disposal costs be made more predictable?

HPS Response: The most important factors are the restrictions on disposal options and lack of competition in providing disposal options, volume of waste generated, the waste characteristics (Class), and fees and surcharges levied by local and state governments. Secondly, the specifics of facility design and operations, waste characterization, packaging and transportation costs also contribute to the total cost of disposal.

Of all these factors, the first one, i.e., lack of options and competition, is the one that drives the unpredictability of the cost. We believe if a management system as described in the HPS position statement were implemented the costs could become more predictable.

22) To what extent might the establishment of a national clearance rule for low-level radioactive waste affect the cost of disposing of these wastes? Is this a good idea?

HPS Response: The establishment of a clearance rule for radioactive materials would reduce the volume of radioactive waste requiring disposal at LLRW disposal facilities, and thus the cost. However, if the volume of waste disposed in licensed LLRW disposal facilities decreases significantly, there are capital and fixed operating costs that must be recovered and, therefore, unit charges may increase. We believe the effect of a clearance rule on waste disposal cost is unpredictable without knowing exactly what the clearance rule would allow to be cleared and without a detailed study of the issue.

However, we believe the clearance rule is a good idea based on principles of sound science, international commerce, and other factors. See our answer to question 13 for details.

23) In what ways has the reduction in waste generation affected the bottom line financial viability of developing any new waste storage and disposal facilities? Has the generation of low-level radioactive waste from year to year become more predictable?

HPS Response: The HPS isn't in a position to comment on financial viability of developing new storage or disposal facilities and has not studied or evaluated the predictability of waste generation.

Note that, although opening waste disposal to the commercial marketplace is one of the goals of the LLRW management system given in our position statement, our emphasis is on removing restrictions that prevent current disposal capacity for all radioactive materials and generators. If these restrictions are removed so these "alternative" disposal options are available there may not be a need for development of new disposal facilities.

24) Would charging some type of waste disposal fee upon the purchase of radioactive material by licensees help promote a more cost-effective disposal system and more predictable disposal costs? Why or why not? How might this be accomplished?

HPS Response: For NRC licensees, a regulatory structure, known as the "Decommissioning Fund," currently exists for some licensees that requires financial surety that includes the cost for disposal of radioactive material and contaminated process equipment and facilities. Under recently issued rules, NRC requires licensees to update the decommissioning cost estimate and associated financial assurance instruments every three years. The purpose of these regulations is to ensure that adequate funds are guaranteed for the decommissioning of nuclear facilities.

However, this regulatory structure has not been established for sealed radioactive sources, except for facilities possessing very large quantities, such as irradiators. The HPS recommends that the NRC require financial surety for disposal as a license condition for the acquisition of higher activity sealed sources, i.e., IAEA category 1, 2, and 3 sources. The purpose of this recommendation is to ensure that adequate funds are set aside for the ultimate disposal of disused sources at the time that they have outlived to intended purpose. This recommendation is outlined in the HPS Working Group's report on actions needed to better secure vulnerable radioactive sources.

We suggest this could be accomplished through the establishment of an interest bearing escrow account from which disposal costs could be covered with any remaining funds in the account being returned to the licensee upon termination of their license to hold sources.

25) Would it be advisable to alter the way that escrow fund requirements are imposed on licensed users of radioactive materials to cover the future cost of decommissioning or decontaminating their facilities? Why or why not?

HPS Response: See response to Question 24.

26) What information and steps would be required to establish a more effective escrow fund structure to ensure that sufficient funds are available to cover future decommissioning and decontamination costs?

HPS Response: See response to Question 24.

Foreign Country Selection to Examine Best Management Practices

We have already identified some reports that provide information on the low-level radioactive waste management systems in other countries, including the National Reports from the First Review Meeting of the Joint Convention on The Safety of Spent Fuel Management and the Safety of Radioactive Waste Management. We are also using various country reports from the Nuclear Energy Agency and papers from the proceedings of the 2004 radioactive waste management meeting held in Cordoba, Spain.

27) Are you aware of other sources of information that compare the low-level radioactive waste management systems of countries?

HPS Response: The International Atomic Energy Agency can provide information about radioactive waste management systems in other countries.