WASTE MANAGEMENT
REFORM OPPORTUNITIES
OFFICE OF ENVIRONMENTAL MANAGEMENT
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Purpose

This paper is intended to summarize the key opportunities that can form the basis of a strategic dialogue on opportunities to re-engineer the DOE's radioactive waste management system.

Background

DOE Order 435.1, *Radioactive Waste Management*, provides the overall policy and framework for management and disposal of DOE's radioactive waste streams. As DOE's designated lead organization for waste management, the Office of Environmental Management (EM) "owns" the Order and its associated Manual and Guide and leads DOE's waste-related policy initiatives, strategies and corporate management boards. In addition to DOE Order 435.1, numerous state and Federal laws and regulations, enforceable regulatory agreements, and other DOE orders also affect DOE's waste management projects and approaches. Within this complicated framework, DOE/EM has developed complex-wide management and disposal strategies for each of the major radioactive waste streams – low level and mixed low level waste (LLW/MLLW), transuranic (TRU) waste and high level waste (HLW).

High level waste is radioactive waste resulting from the reprocessing of spent nuclear fuel, requiring disposal in a geologic repository due to the high concentrations of long-lived and short-lived radionuclides. Transuranic waste contains man-made elements heavier than uranium, which have very long radioactive half-lives, and thus require long-term isolation. Low-level radioactive waste (LLW) is radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, byproduct material from uranium enrichment, or naturally occurring radioactive material. Mixed low-level radioactive waste is LLW containing hazardous waste, typically hazardous chemicals. Many of the needed processing and disposal facilities for the different waste types have been or are being constructed.

However, the required time and cost to develop and implement this disposition system are quite extensive. Additionally, elements of the current framework present significant constraints and challenges to successful implementation. Opportunities exist to optimize and streamline DOE's current waste management approaches to safely dispose of the wastes, while reducing DOE's costs, improving schedule and ultimately increasing stakeholder and regulatory acceptance of the disposal plans.

These strategic initiatives require careful evaluation and coordination with numerous stakeholders, and considerable leadership, management attention and time will also be required. To a limited extent, efforts are already underway on some of these initiatives.

Also, in the commercial and industrial sectors, many of these same initiatives are being evaluated and pursued.

- **Increase investment in waste characterization and segregation to drive disposal plans to the lowest possible – while still safe and compliant – disposal path.** DOE experience shows that the unit cost for waste disposal increases as waste classes change. It is more costly to dispose of HLW than TRU waste; TRU waste is more costly to dispose than LLW; LLW disposal costs much more than sanitary (common residential, construction, or commercial waste) or hazardous (e.g., waste containing toxic chemicals or heavy metals) disposal.

    - Minimize total volume of HLW requiring geologic disposal at Yucca Mountain. This could be accomplished through more efficient separation of the low-radioactivity waste from the HLW, in particular radioactive liquid tank wastes and associated equipment after being emptied and decontaminated. Also through use of a risk-based approach to tank waste retrieval. DOE has statutory authority to do this for Idaho National Laboratory and Savannah River Site, but further collaboration with regulators would be necessary for improved efficiencies.

    - Minimize total volume of waste requiring geologic disposal as TRU waste at the Waste Isolation Pilot Plant (WIPP).

    - Maximize use of DOE "authorized release" process and commercial "bulk survey for release" process to dispose of lower activity wastes as non-radioactive wastes. The authorized release process allows waste with very little or no measurable radioactivity to be disposed in a non-radioactive waste disposal facility provided that it is protective of the public and the environment. If the waste meets release requirements, DOE may also send very low-activity radioactive waste to certain commercial firms to characterize, process, and dispose under their radioactive material license at non-radioactive waste disposal facilities.

- **Pursue statutory/legislative changes to support waste disposal strategies**. Various laws affect the details of DOE's waste management plans. Limited changes to these laws could resolve existing programmatic risks and could facilitate acceleration and cost savings.

    - WIPP Land Withdrawal Act (LWA) dictates that only transuranic waste generated from atomic-energy defense activities, e.g. generated from the production of nuclear weapons, can be disposed at WIPP. A modification to the LWA statute could permit non-defense origin TRU waste to be disposed at WIPP. Or, the LWA could be modified in the future to permit use of WIPP for disposal of other than TRU waste streams. These other wastes could include sealed radioactive sources used in industry, medicine, and academia that are no

longer used and pose a proliferation risk, Greater-Than-Class C[1] LLW (pending completion of the Greater-Than-Class-C low level waste Environmental Impact Statement), or even HLW, if the proposed repository at Yucca Mountain is significantly delayed. It is possible that future TRU waste generation rates may require the volumetric limits within the LWA to be revisited.

- The Nuclear Waste Policy Act (NWPA) contains a statutory limit to the total volume of HLW and spent nuclear fuel (SNF) that can be disposed at Yucca Mountain. The Department's Office of Civilian Radioactive Waste Management leads all efforts related to Yucca Mountain and has previously proposed that this limit be revised. DOE-EM has a direct stake in this matter, as only 1/10th of the current capacity is reserved for DOE-owned HLW and SNF. This allocation is inadequate to dispose of the EM's HLW and SNF inventory.

- Legislative language may be needed to resolve the uncertainties related to disposal of specific waste forms, such as the sodium bearing and calcine wastes at Idaho or the liquid TRU waste stored in tanks at the Office of River Protection. The historic processing and co-mingling of these waste streams results in some uncertainty on their appropriate waste classification. If they must ultimately be managed as HLW and disposed at Yucca Mountain, significant additional cost and schedule investment will be required. Technological issues with regard to waste form as well as regulatory issues would need to be addressed in order to dispose of these materials as TRU.

- Legislation may be required to resolve the uncertainty of tank closures at West Valley and the Office of River Protection and to provide statutory authorities comparable to what exists for Idaho and Savannah River Site.

- Legislative clarifications may be needed to support implementation of DOE's statutory responsibilities related to citing a disposal facility for GTCC LLW. Per the Energy Policy Act of 2005, DOE must provide a report to Congress on any actions or decisions required of Congress to support GTCC LLW disposal. This report is due following the completion of the GTCC LLW Disposal Environmental Impact Statement that is under development.

❖ **Revision of the waste classification system.** Today, the United States' waste classification system is largely based on waste origin or statutory definition, rather than the hazards that the wastes present. For several years, subject matter experts and review groups (e.g., National Academy of Sciences, Health Physics Society) have offered proposals that a risk-based waste classification system be developed. A risk-based classification system would facilitate development of disposal strategies, facilities and systems that ensure the protection of the public and environment, while potentially minimizing many of the hazards that workers and the public face through

[1] GTCC waste is LLW resulting from U.S. NRC-licensed activities with radionuclides that would be dangerous to humans beyond 500 years.

the required waste treatment, transport and disposal activities required under the current framework.

A statutory change to the waste classification system would be needed to resolve much of the uncertainty and controversy associated with potential on-site disposal plans for lower-activity, lower-risk waste streams. The most significant processing and isolation plans would be reserved for those waste and materials streams that truly present the greatest hazard. Importantly, a risk-based classification system could resolve much of the confusion and apparent inconsistency in treatment and disposal methods that are posed by the current framework. A national dialogue on possible waste classification changes would require close coordination with the US Environmental Protection Agency, the US Nuclear Regulatory Commission, States, industry and the academic/scientific community.