

DOE REGULATION OF LOW-LEVEL WASTE-1988 AND BEYOND

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ABSTRACT

Throughout the U. S. Department of Energy (DOE) low-level waste (LLW) management practices are changing. The changes will modify practices whereby each DOE site has locally disposed of its LLW (mostly untreated) by shallow land burial using locally-developed waste acceptance criteria. Instead, consistent methods and standards will be applied throughout DOE for evaluating and improving LLW management at all DOE Sites. Waste generation reduction will be emphasized everywhere. Waste treatment will be used to a greater extent, to reduce waste volumes and improve waste forms. Improved waste confinement practices will be applied where warranted, to stabilize more highly contaminated waste. These and other improvements are being initiated in a program which in preparation is upgrading DOE's overall LLW management plans, regulations and guidance documents.

INTRODUCTION

DOE's management of LLW from its beginning (during World War II) to the present has been handled in a decentralized way each DOE site has been responsible for managing its own LLW, and LLW has been disposed (mostly untreated) at the site where it was generated mainly by shallow land burial. Particularly at humid sites, these disposal methods have been found to result in some undesired migration of contaminants, and in the need for protracted disposal site maintenance to correct conditions resulting from waste subsidence. This has led to re-examination of waste management practices at all DOE Sites. In some cases it has been found desirable to increase the amount of treatment being provided to waste to decrease its volume, and to stabilize the waste by solidification and by confinement within extended-life containers or vaults. In other cases it has been found desirable to change the disposal location for certain wastes from the locality where they were generated to other locations better suited for their disposal.

The above developments, along with recognition that DOE facilities have been generating larger and larger volumes of LLW each year (thereby using the remaining disposal capacity at DOE's existing LLW disposal sites at an increasing rate and also increasing the scope of future disposal site maintenance requirements) have caused DOE to decide to adopt more unified and coordinated management practices for its LLW.

The principal instrument for changing these practices will be the DOE document that governs the management of all DOE's LLW: DOE Order 5820.2 Chapter III "Manage-

ment of Low-Level Waste." Recently this document was completely redrafted to change it from the generalized guidance it presently provides, and make it a prescriptive order providing specific requirements for all phases of LLW management from minimization of waste generation through final disposal of the waste. This draft is now undergoing critical review by all affected DOE organizations.

The Chapter III draft requires that all DOE sites implement all applicable EPA standards. It provides performance objectives (including limits within those contained in 10CFR61) for disposed waste that provide for the protection of population groups, inadvertent intruders and water resources. Moreover, the requirements are written to be enforceable and auditable, and to provide flexibility to accommodate site differences and be cost effective.

Additionally, to provide guidance showing how to implement the requirements in the new Chapter III in a consistent way, the present Guidance Document for Chapter III (which now contains rather generalized guidance) is being rewritten to provide much more explicit guidance regarding such matters as radionuclide quantification, waste stabilization, and disposal site monitoring and performance assessment.

Since the above-mentioned revisions will call for many changes at DOE facilities, considerable time and resources will be required; and these must be properly planned to produce the needed changes within acceptable times and at minimum cost. To accomplish this, a draft strategic plan has been formulated and is now undergoing review. The strategic plan will guide activities and individual planning at

all DOE facilities. Lastly, to show the combined overall effects, a long range master plan has been drafted to integrate the individual DOE site plans, clarify the total needs for LLW management resources, and assist in prioritizing resources.

FUTURE LLW REGULATION HIGHLIGHTS

Waste Generation Reduction

Among the principal future regulations will be a requirement that each LLW generator conduct an auditable waste generation reduction program. Success with these programs can substantially reduce the overall expense of LLW management particularly at humid sites where a great deal of DOE's waste in the future will be encapsulated shortly after it is generated. Beneficial adjuncts to waste generation reduction will be the separation of uncontaminated waste (required), and separate disposal of waste contaminated within "below-regulatory concern" amounts (which will be permitted, subject to establishment of approved separation criteria on a site specific basis). Goals, incentives and penalties for waste generation reduction will be required, as well as regular reports on waste generation reduction performance.

Waste Characterization

The newly drafted regulations will require that LLW be characterized with sufficient accuracy to permit proper segregation, treatment, storage and disposal. Regulations will permit the concentration of a radionuclide to be determined by direct methods or by indirect methods which relate the inferred concentration of one radionuclide to another; or by radionuclide material accountability.

Characterization data are to be recorded on a manifest which thereafter will accompany each waste package, showing the waste's physical and chemical characteristics, radionuclides and their concentrations, and other pertinent information.

In the case of waste having radionuclide concentrations above limits ordinarily observed for near-surface disposal, additional engineered features are to be justified and incorporated in the disposal system, before disposal.

Treatment

The regulations will call for wastes to be treated as necessary by appropriate methods to achieve DOE's LLW management performance objectives (i.e., protect public health and safety; limit the annual committed effective dose equivalent to not exceed 25 mrem to any member of the public and as further limited by ALARA; limit any dosage to future inadvertent intruders to not exceed 100 mrem for continuous exposure or 500 mrem for a single acute exposure; and prevent the degradation of ground water resources so that applicable Federal and State water quality regulations are met.)

The regulations will also call for waste treatment techniques to reduce waste volume and provide more stable waste forms to be implemented as necessary to meet performance requirements; and will call for the use of waste treatment techniques to increase the life of the disposal facility and improve long-term facility performance, to the extent this is cost effective.

Storage

Storage is to be minimized and used only after justification, and after completion of safety analyses and appropriate NEPA documentation.

Storage of waste to allow for nuclides to decay will be accepted if justified, as will storage of wastes exceeding established limits for near-surface disposal until they can be disposed of by approved methods.

Disposal

LLW is to be disposed of on the site at which it is generated, wherever practical; or if on-site disposal capability is not available, then at another DOE facility.

Disposal of LLW containing non-radioactive hazardous components (mixed waste) shall also be accomplished in conformance with the regulations of the appropriate regional authorities under RCRA, in addition to DOE LLW disposal regulations.

Disposal Site Monitoring

Each operational or non-operational LLW facility is to be monitored by an environmental monitoring program designed to measure operational effluent releases, significant migration of radionuclides, disposal unit subsidence and changes in disposal site parameters which may affect long-term site performance.

The monitoring program is to be capable of detecting changing trends in performance sufficiently in advance to allow application of any necessary corrective action prior to exceeding performance objectives.

Monitoring also is to be used to validate or modify the models used in performance assessments.

Performance Assessment

A site specific radiological performance assessment is to be prepared and maintained for disposal of waste generated after the effective date of the new DOE 5820.2, for the purpose of demonstrating compliance with performance objectives.

For each DOE reservation an overall waste management systems performance assessment is to be prepared and maintained, supporting the combination of waste management practices used.

Performance assessments are to provide reasonable assurance that performance objectives are met at the boundary of each treatment facility, storage facility and disposal site.

Records and Reports

Historical records are to be maintained showing the amounts and types of LLW treated, stored and disposed at all locations.

Forecasts are to be issued regularly, projecting waste generation and shipments.

TIMES BY WHICH CHANGES ARE TO TAKE EFFECT

DOE 5820.2 is anticipated to be finalized in mid-1988. Phased application will apply for current LLW generators and facilities. All provisions are to be applicable to new facilities.

Review of DOE 5820.2 commenced in the last quarter of 1987 and is still in early stages. Changes can be expected.

CONCLUSIONS

DOE is changing how it regulates and manages LLW to provide greater assurance that LLW management will protect health and the environment. A "cradle-to-grave" approach is being pursued to ensure overall effectiveness.

Strategic issues are being identified and a strategic plan is being established for their resolution prior to issues becoming problems.

Although the new regulations are to go into effect during 1988, the schedule for compliance by all facilities is yet to be determined.

An integrated "corporate" approach is being developed to help ensure optimum use of resources.