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OAK RIDGE LOW LEVEL WASTE
MANAGEMENT TASK FORCE SUMMARY

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Introduction

New facilities are required in the next five years to manage low level radioactive wastes (LLW) produced on the Oak Ridge Reservation (ORR). The Central Waste Disposal Facility (CWDF) was planned to provide the needed additional facilities beginning in late 1985. The CWDF was planned as a shallow land burial facility to dispose of non-stabilized LLW.

However, comments on the CWDF Draft Environmental Impact Statement (DEIS) received from the State of Tennessee, the Environmental Protection Agency, and the Nuclear Regulatory Commission identified major issues related to the treatment of alternatives as required by the National Environmental Policy Act, and the potential for unacceptable groundwater contamination resulting from shallow land burial of non-stabilized waste.

The Oak Ridge Low Level Waste Management Task Force (Task Force) was formed to develop the information needed to respond to the DEIS comments and to facilitate development of a LLW management system which will perform in an environmentally acceptable manner at a reasonable cost. The Department of Energy, Martin Marietta Energy Systems, Inc., the State of Tennessee, and the Environmental Protection Agency are represented on the Task Force Advisory Committee. Martin Marietta personnel are responsible for carrying out the Task Force activities.

A series of initial and detailed evaluations are being conducted to develop the basic environmental performance and cost information needed to compare several LLW management approaches and arrive at a proposed system for development. The evaluations are targeted for completion by October.

Initial Evaluations and Results

The purpose of the initial evaluations was to provide the basis for identifying and ranking the alternatives to be considered in the detailed evaluations. Several processing, waste form, and disposal/storage facility alternatives were identified for further evaluation based on experience and literature surveys. An evaluation methodology was applied to these alternatives which included: scoring of each alternative against a broad set of environmental and operational performance, safety, and cost criteria; multiplying each score by a weighting factor; and summing the weighted scores to produce a "figure of merit" which reflected the ranking of each alternative.

The waste streams from the three plants on the ORR were reviewed and a data base of existing characterization information was created. The review included evaluations of waste volumes, the basic physical character of the stream and its amenability to processing, determination of the radionuclide concentrations in the streams, and consideration of the performance of the waste form.

A general review of the geological formations present on the Reservation and the results of past site selection studies were conducted. Criteria for the selection of new sites for shallow land burial and greater confinement disposal/storage facilities were developed and will be utilized as part of a site selection study to be conducted during the detailed evaluations.

The following conclusions were reached during the initial evaluations:

- The geologic and site selection study review highlighted the fact that available sites on the ORR present limitations which emphasize the importance of waste performance and disposal/storage facility performance in determining the environmental acceptability of candidate systems.
- The waste characterization, processing, waste form, and storage/disposal facility evaluation indicated that waste performance was the key item in determining environmental acceptability.
- Waste performance was felt to be best measured in terms of the contribution by the waste to the total source term which is a function of the mix of radionuclides present, the concentration of the radionuclides, and the waste form performance (i.e., resistance to leaching or intruder exposure).
- It is anticipated that information will be available by October to support evaluation of the extremes in cost/performance alternatives, but it is likely that additional information, primarily relating to waste performance, will be needed before a performance/cost optimized system can be designed and/or operated.

Plans For Detailed Evaluations

A number of detailed studies are planned to be conducted over the next four to five months. The information developed in these studies will be used as the basis for evaluating the performance/cost aspects of a number of different LLW management systems. Following is a brief description of the currently planned activities.

Efforts will be directed at developing additional waste stream characterization information, particularly waste radionuclide concentrations and waste form performance.

Waste streams will be evaluated to identify those streams which make a major contribution to the overall source term. Segregation and remote monitoring (spectroscopy) will be evaluated as potential components of a waste characterization system. Candidate waste streams for leach testing will be identified during these investigations. Leach tests of selected as received wastes are planned. The EP Toxicity test will be used as the initial screening test, with analysis of both radioactive and hazardous components planned. Additional flow through leach tests and larger scale field lysimeter tests will be considered for selected wastes identified in the screening tests. Consideration will be given to leach testing of stabilized waste forms. Field experience with operating burial grounds will be reviewed to determine if any waste performance information can be obtained.

Evaluations of two processing/facility "bounding" cases will be performed. The first case will represent a maximum volume reduction scenario. Waste streams will be evaluated for compatibility with volume reduction techniques (primarily incineration and super compaction) and resulting volume reductions estimated. This information will help to establish the minimum disposal/storage facility size for use in site selection evaluations. The second case will represent a maximum stabilization scenario. Waste streams will be evaluated for compatibility with stabilization techniques such as grouting, vitrification, etc. and resulting volumes will be estimated. This information will help to establish the maximum facility size for use in site selection evaluations. In addition, cost/performance optimized cases will be evaluated as additional waste characterization and performance information is developed. Cost estimates for the systems to be included in the detailed evaluations will be developed.

Pathways models will be used to evaluate the transport and predict the doses resulting from releases from the systems being considered. The current pathways model for the CWDF site will be evaluated to reflect DEIS comments received and additional information developed by the Task Force. Sensitivity evaluations will be performed to determine the effect on predicted doses when the source term and site conditions (such as soil depth) are varied. The intruder scenario is also being re-evaluated. Pathways models for use with other sites will be developed.

Site requirements will be developed based on consideration of waste management system requirements and site selection criteria that have been developed for shallow land burial and greater confinement disposal. A site selection process will be conducted to identify potential sites for the LLW management facilities.

Results of the maximum stability evaluation described earlier will be used to develop an estimate of the performance (source term) expected with this approach. This information, plus the source term information used in the current CWDF pathways analysis, should establish the bounds of performance expected from the systems to be evaluated by the Task Force. As additional waste characterization and performance data is developed, source terms for other more cost optimized systems will be developed.

A number of special studies will also be performed including:

- Samples will be collected at a number of groundwater sampling wells on the proposed CWDF site and analyzed for uranium content. This information, plus other monitoring data, will be used as a basis for evaluating the uranium background levels encountered on the ORR.
- Evaluation of potential transportation and disposal impacts will be developed for shipment of the LLW off-site to a generic "wet" and "dry" site for disposal. In addition, the disposal of the wastes via ocean dumping will be evaluated. Argonne National Laboratory will prepare these evaluations.
- An evaluation of the feasibility of using an existing burial ground as a site for a new LLW management system will be performed.

Documentation

The results of the Task Force activities will be documented in a report to be prepared in the October time frame.