

RECENT DEVELOPMENTS IN RADIOACTIVE WASTE MANAGEMENT
in the
UNITED STATES

**Report Presented by the U.S. Delegation
to the
NEA Radioactive Waste Management Committee**

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MAJOR ACCOMPLISHMENTS DURING 1985

United States nuclear waste management programs have made significant progress during the year (1985). Some of the major accomplishments are listed below:

- The Mission Plan for the Civilian Radioactive Waste Management Program was sent to Congress by the DOE in July, 1985.
- Environmental Assessment drafts were completed for potential sites for the first repository and, late in the year, were undergoing final revision.
- Preliminary drafts of a proposal for a Monitored Retrievable Storage facility were completed; issuance to the Congress is scheduled for early 1986.
- Drafts of the Transportation Institutional Plan and Transportation Business Plan were issued for comment.
- The President concluded that, based on recommendations from the Department of Energy, plans and actions should proceed to dispose of defense high-level wastes in the commercial waste repositories.
- For the second repository, a screening methodology report and a draft of an Area Characterization Report were prepared for release.
- The Environmental Protection Agency issued its standards for Management and Disposal of Spent Fuel, High-level and Transuranic Radioactive Waste (40 CFR Part 191).
- The Nuclear Regulatory Commission has started to revise its regulations to be consistent with the EPA Standard and the requirements of the NWPA.
- The Congress has started work on revised legislation which would apply to the low-level waste disposal sites to be selected by the States.
- Radioactive operation of the pilot-scale HLW vitrification system at Hanford was begun.

-A non-radioactive, full-scale prototype of the waste vitrification plant at West Valley was operated.

-Progress continued on construction of the Defense Waste Processing Facility at Savannah River, design and construction reaching the 93% and 20% completion stages, respectively.

The level of effort required to prepare documents such as those listed above has been extensive. The Nuclear Waste Policy Act of 1982 (NWPA), which established a comprehensive national program for establishing facilities to store and dispose of high-level radioactive wastes, also requires that opportunity be given for review and comment on drafts of the documents by the Congress and state legislatures, various federal and state agencies, Indian tribes, special interest groups and the general public. In the final revision of the Mission Plan, about 2300 individual comments were considered. For the drafts of the Environmental Assessments about 22,000 comments were received.

DEPARTMENT OF ENERGY ACTIVITIES

DISPOSAL OF HIGH-LEVEL WASTES

OCRWM Mission Plan

The "Mission Plan for the Civilian Radioactive Waste Management Program" consists of three volumes with Volume I divided into two parts. Part I of Volume I describes the overall goals, objectives, and strategy for the disposal of spent nuclear fuel and high-level waste. It also describes the other components of the waste management program: Federal Interim Storage; Transportation; the proposal for Monitored Retrievable Storage (MRS); and the program management system being implemented by the Office of Civilian Radioactive Waste Management. Part II presents the detailed information required by the NWPA: key issues and information needs; plans for the test and evaluation facility; the principal results obtained to date from site investigations; information on the site-characterization programs; information on the waste package; schedules; costs; and social and economic impacts. Volume II contains the record of DOE responses to public comments and Volume III contains the actual public comments.

Transportation

Transportation is an integral and essential part of the projected U.S. DOE waste management system. The Transportation Plan will contain the Transportation Business Plans and modifications to the Transportation Institutional Plan that will result from the comment process. The OCRWM is currently planning to develop the equipment and services necessary to ensure safe and economic transportation for its waste management system. A new transport cask for both truck and rail is planned with increased

payload capability to reduce the overall number of shipments required. These casks will be designed to the standards and specifications set forth by the U.S. Department of Transportation and the Nuclear Regulatory Commission. Throughout the development, DOE intends to use contracts with private industry to maximum practical extent.

Quality Assurance

Quality assurance (QA) is of key importance to the Civilian Radioactive Waste Management Program. It is essential to the NRC licensing process that OCRWM be able to document satisfactory control over the quality of each activity. Under the DOE system of decentralized project management, each major project is required to implement and maintain a rigorous QA program. However, it is also essential that project-level QA activities be coordinated and integrated by DOE Headquarters. A comprehensive program-wide QA management program has been initiated, and a QA management plan has been issued.

Consultation and Cooperation

The NWPA contains extensive requirements for consultation and cooperation with affected States and Indian Tribes. Experience has shown that the involvement of States and Indian Tribes assists in ensuring accomplishment of program objectives. While more detailed institutional relations plans are being developed, OCRWM has implemented a number of enhancements to its outreach program: telephone and electronic systems are being established to enhance communications to the public; an OCRWM bulletin is published to keep the public informed; the OCRWM has provided materials for public reference sections in libraries, established docket files, and opened information offices in local areas affected by the program. In addition: OCRWM is updating and expanding the information made available about the program and is providing more timely and comprehensive responses to public inquiries; frequent public information meetings are held at the local, regional and national levels to provide interaction on sensitive issues and alternative solutions; states and Indian tribes are provided monetary grants to assist in their review of the DOE program and proposed actions.

Nuclear Waste Fund

The Nuclear Waste Fund continues to grow, with the receipt of \$1.425 billion from a single payment from utilities for spent fuel generated prior to April 7, 1983, and receipt of an additional \$403 million in 1984. Receipt of \$1,178 million is anticipated in 1985. An assessment of the adequacy of the 1 mil per Killowatt-hour indicated that there is no present need to change the fee.

First Repository

The NWPA stipulated that disposal of high-level wastes is to

occur in geologic repositories and that the federal government will accept wastes for disposal beginning in 1998. Draft environmental assessments (EAs) were written in 1984 for nine potentially acceptable sites in six states: Louisiana, Mississippi, Nevada, Texas, Utah, and Washington. The U.S. DOE held public hearings in each of those states and received extensive comments on the draft EAs.

The National Academy of Science (NAS) has reviewed the site selection methodology and elements of the application of the methodology. The NAS supported the methodology being used for ranking the sites and recommended that additional review be made of the application of the methodology to the ranking process. This review will be completed before the Environmental Assessments are issued and before the recommendation is issued as to the three sites to be selected for detailed site characterization.

In response to another requirement of the NWPA, the President has determined that defense and commercial high-level wastes should be disposed of in the Civilian Repository. Under discussion are equitable terms of payment into the Nuclear Waste Fund for disposal of defense waste.

Second Repository

For a second repository a screening methodology report was issued in April '85. Final Regional Environmental Characterization Reports, Regional Geologic Characterization Reports and final Region to Area Screening Methodology Documents have been issued on 235 crystalline rock regions based on comments received from earlier drafts. The information in these reports will be used to screen the regions to approximately 15-20 candidate areas located in approximately four to six states. This area screening process is to be documented in an Area Recommendation Report, a draft of which will be issued early next year.

SPENT FUEL MANAGEMENT

The NWPA authorizes the DOE to encourage the most efficient use of existing at-reactor storage facilities and to expedite the addition of new at-reactor storage capacity. It also provides for Federal Interim Storage if requested by a utility whose eligibility has been certified by the NRC under 10CFR, Parts 1 and 53, and for the study of the need for and feasibility of a Monitored Retrievable Storage (MRS) Facility.

For the expansion of at-reactor storage capacity, the DOE pursues cooperative activities with utilities that have expressed a high degree of interest in specific technologies. These programs consist of licensed and unlicensed cooperative demonstrations at either federal or utility sites or both for the dry storage of unconsolidated or consolidated fuel in various storage casks and for unconsolidated assemblies in concrete horizontal vaults, in-pool consolidation and dual purpose shipping storage casks. The DOE also provides generic research and development activities to

support those demonstrations and to provide data and information bases so that the NRC may, by rule, approve one or more technologies for use at the sites of commercial nuclear power reactors.

The study of Monitored Retrievable Storage (MRS) is to culminate in the submittal of a proposal to Congress in January '86 to construct a MRS facility. Careful analysis of the possible options has shown that increased confidence and improved performance can be achieved by utilizing a system integration approach. Analyses to date continue to reinforce the tentative conclusion that a MRS facility fully integrated into the overall waste management system offers significant improvements in: 1) transportation efficiency (spent fuel consolidated and packaged at a MRS facility would reduce the number of cross-country shipments to the repository, with reduction in potential environmental and public impacts); and 2) reliability and flexibility of operations, through the availability of a facility that can regulate the flow of waste to a repository. Three potential sites in Tennessee are being studied for the MRS.

TREATMENT OF HIGH-LEVEL WASTE

Extensive work is underway to solidify liquid high-level wastes as a borosilicate glass form at the defense sites and the West Valley site. In 1984, ground was broken for the Defense Waste Processing Facility at Savannah River; operation of the facility is expected in 1989. At West Valley, the vitrification facility has been operated non-radioactively and radioactive operation will begin in 1987.

MANAGEMENT OF LOW-LEVEL WASTES

Disposal by shallow-land burial continues to be the principal method for disposing of low-level wastes for both the government and commercial sectors in the U.S. Wastes from government operations are disposed of on site; those from commercial operations are sent to one of three commercially operated burial grounds. Interest in engineered disposal systems is growing, however, particularly for humid areas of the country. The Savannah River, Oak Ridge and West Valley sites of the U.S. DOE are being considered for engineered disposal in the future. Several states have instituted requirements that disposal be done using engineered systems. Increasing use of compaction and incineration is resulting from the rising cost of disposal. The first barrels of waste fixed in bitumen, only recently introduced into the United States, were placed into a shallow-land burial site in 1985. The states, which by law were to have established new low-level waste disposal capacity in the U.S., with regional disposal centers the recommended approach, may now be given an extension until 1990 before having to place their disposal facilities in operation. A bill is under consideration by the Congress on low-level wastes which would require all states to have formed a

compact with other states by July 1, 1986 or to decide to handle their own low-level wastes. If adopted, states must file site applications for federal and state licensing approval by January 1990. Licenses must be granted by 1993.

MANAGEMENT OF ALPHA-CONTAMINATED WASTES

These wastes arise largely through weapons production activities and are to be transferred to the Waste Isolation Pilot Plant (WIPP), an experimental waste repository in salt in the southwest United States. This facility has been under construction since 1981. Two shafts have been drilled to the storage level, 2,150 feet below the surface and several thousand feet of drifts have been mined for characterizing the formation and installing test equipment. In September 1984, the National Academy of Sciences issued a final report that assessed the scientific and technical adequacies of WIPP and its operational philosophy. The report concluded that "the geology revealed by shaft sinking and excavation of drifts and the preliminary measurements generally confirm the geologic expectations derived from surface exploration and bore holes." The facility will begin receiving alpha-contaminated wastes in 1989.

MANAGEMENT OF SURPLUS FACILITIES AND FORMERLY UTILIZED SITES

Orderly management of surplus facilities is underway in the Civilian and Defense programs of DOE. The approach maximizes reuse of the facility, optimizes state-of-the-art decommissioning techniques, disposes of surplus facilities according to priorities, transfers decommissioning technology to US industry and collaborates with foreign and international decommissioning programs. The program forecasts the decommissioning of 348 facilities, grouped into 74 projects, by the end of the first decade of the next century.

Currently, the DOE is preparing to dismantle the nuclear portion of the Shippingport Atomic Power Station, with completion planned in 1990. Shallow land burial of the intact reactor vessel at a federal site is being planned. Other current projects include a plutonium-238 facility, where equipment is being decontaminated and removed, and a uranium processing facility that is being decontaminated and demolished. These and other facilities are providing valuable experience for the later decommissioning of commercial facilities.

MANAGEMENT OF URANIUM MILL TAILINGS

The Uranium Mill Tailings Remedial Action Project (UMTRAP) of 1978, Public Law 95-604, authorizes the DOE, in cooperation with the affected States and Indian Tribes, to carry out a remedial action program at 24 inactive uranium processing sites. The purpose of the remedial actions is to stabilize and control uranium tailings and other residual radioactive materials located at the sites and to clean up an estimated 4,500 contaminated

commercial and residential properties in the vicinity of these sites. A substantial research and development effort was completed in 1984 on radon barrier materials, measures to prevent ground waste contamination and ground cover to prevent ground water contamination.

Work at the first site, at Canonsburg, Pennsylvania, is essentially complete. Work is underway at the sites at Salt Lake City, Utah, and Shiprock, Mexico. The tailings and contaminated soil at the Salt Lake City site are being moved to a new disposal site, at Clive, Utah. This move, which involves about 3 million tons of material, is about 30 percent complete. At Shiprock, New Mexico, where the tailings are being moved back approximately 300 feet to protect against possible meander of the San Juan River, site remedial action is approximately 20 percent complete and is scheduled for completion by December 1986.

CURRENT MILESTONES

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DOE planning schedules include the following near-term milestones (to 1990):

The Office of Civilian Radioactive Waste Management (OCRWM):

- Issue Project Decision Schedule 12/85
- Issue draft Area Recommendation Reports, second repository 1/86
- Issue Transportation Business Plan 12/85
- Submit Fee Adequacy Report to the Congress 1/86
- Submit Monitored Retrievable Storage proposal to the Congress 1/86
- Issue Environmental Assessments, first repository 2/86
- Nominate five sites for consideration as first repository; recommend three to the President 2/86
- Issue Transportation Institutional Plan 4/86
- Issue final Area Recommendation Reports, second repository 5/86

Remedial Action and Waste Technology:

- Begin West Valley waste solidification 1987
- Complete Shippingport decommissioning 1990
- Complete Uranium Mill Tailings Remedial Action project (UMTRA) 1990

Defense Waste and Byproducts Management:

- Begin emplacement of radioactive waste in WIPP 1988
- Commence "hot" operations at the Defense Waste Processing Facility, Savannah River (DWPF) 1989

ENVIRONMENTAL PROTECTION AGENCY (EPA)

The U.S. EPA recently issued its radionuclide release standard (40 CFR 191) for high-level nuclear waste storage and disposal. Part A of the standard limits exposure of the public from the management of spent fuel and high-level waste prior to disposal. These limits are comparable to those implemented earlier for uranium fuel cycle facilities: 25 mrem whole body, 75 mrem to the thyroid, and 25 mrem to any other organ. Part B limits both exposures to the public and releases to the accessible environment after emplacement of the wastes. The public exposure limits in Part B are the same as for Part A while the release limit in Part B requires that the disposal system be designed to provide a reasonable expectation that cumulative releases of radionuclides to the accessible environment for 10,000 years after disposal shall not exceed a prescribed amount.

NUCLEAR REGULATORY COMMISSION

The DOE is maintaining close liaison with the NRC in order to assure that the appropriate information is available for licensing of high-level waste repositories. Procedural agreements have been prepared to guide DOE-NRC interactions. Periodic briefings and reviews are used to keep NRC abreast of ongoing activities. NRC representatives are assigned at each potential repository site that is under investigation, to maintain cognizance of site exploration activities. Preparations are underway for NRC Quality Assurance audits of DOE activities.

The U.S. NRC activities on high-level waste management emphasize four principal areas:

1. Amendments to the NRC rules to bring conformance with NWA requirements. Two examples--
 - amendments to licensing procedures (12/85)
 - definition of high-level waste (advance notice, early 1986).
2. NRC/DOE consultation and guidance program on licensing procedures.
3. Development of generic guidance (NRC technical positions, e.g. quality assurance, in situ testing methods, waste package reliability assessments).
4. Development of independent models and codes, to allow NRC assessment of DOE models.

INTERNATIONAL COOPERATION

The Administration continues to support U.S. cooperation in international nuclear activities, to the extent that financial and manpower resources permit. Examples of current DOE and NRC international waste management activities are: participation in

NEA and IAEA workshops, advisory groups, etc.; cooperation with the European Communities in developing and testing materials characterization methods; participation in the Stripa, HYDROCOIN, ISIRS, thermochemical data base and decommissioning projects coordinated by the NEA; discussions with the AECL (Canada) on a joint underground research laboratory (URL) program; discussions with NAGRA (Switzerland) to identify cooperative studies for granite repositories; fabrication of high-activity waste glass canisters for a demonstration in the Asse Mine in Germany; U.S./FRG discussions of waste disposal criteria and standards; and implementation of the NWPA requirement that the U.S. offer technical assistance to non-nuclear weapon states in the areas of spent fuel storage and disposal. This assistance has now been requested by nine countries.

FUTURE WASTE MANAGEMENT MEETINGS IN THE U.S.

Scheduled 1986 meetings in the U.S. that may be of interest to RWMC delegates include:

- Conference on All Aspects of Low-Level Waste (February 28-March 1, Chicago; sponsored by the State of Illinois);
- Waste Management '86 (March 2-6, Tucson, AZ);
- Third International Symposium/Workshop on Irradiated Fuel Storage (April 8-10, Seattle; co-sponsored by U.S. and FRG);
- Third International Symposium on Ceramics in Nuclear Waste Management (April 27-May 1, Chicago; sponsored by American Ceramics Society);
- American Nuclear Society Annual Meeting (June 15-20, Reno, NV);
- International Topical Meeting on Waste Management Decontamination and Decommissioning (September 7-12, 1986, Niagra Falls, New York. Sponsored by American Nuclear Society).
- Joint meeting of ANS and AIF (November 16-21, Washington D.C.).

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