# WORKSHOP A SUMMARY
# LOW LEVEL WASTE DISPOSAL PRACTICE

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Low-level radioactive waste is currently being disposed of by shallow land burial at five major Department of Energy (DOE) sites, and at three commercial sites. Waste generated in non-DOE operations, both fuel cycle and non-fuel cycle is delivered to the commercial sites.

Only one commercial site, at Barnwell, South Carolina is operating east of the Rocky Mountains. That site is currently receiving about 85% of the low-level waste generated in the country. Restrictions have been placed on volumes and types of waste accepted at the site, and has focused attention on the need for additional burial capacity, waste volume reduction, waste treatment, and increased waste transportation. Further restrictions at the Barnwell site, necessitated by political, technical, or environmental problems, could precipitate a major crisis in low level disposal.

Two shed light on the current status of low-level disposal, two formal presentations were made. Dr. Heyward Shealy, from South Carolina, discussed the current status of the Barnwell site, the reasons for restrictions at the site, and prospects for the future. Dr. Wilson McArthur, with Terra Corporation (and formerly with Hittman Associates) described the current status of commercial sites nationwide, problems and costs associated with waste packaging and transportation, and identified specific problem areas requiring immediate attention. Both of these papers will be included in the proceedings.

Each paper was accompanied by an extended question and answer period, in part reflecting a general lack of knowledge on low-level disposal. A great number of points were discussed and contributed greatly, I feel, to the general level of understanding.

The two papers, and subsequent discussions identified several areas of concern which require additional discussion, and should serve as a basis for further research and for development.

1) Burial Capacity -- While currently licensed burial capacity is adequate to handle low-level waste volumes through about 1990, political, transportation, and economic restrictions may impose significant obstacles to utilization of that capacity. Attention must be given to reducing waste volumes, improving efficiency of burial practices, and providing additional burial capacity in the geographic areas generating the waste.

2) Standardized Criteria -- Approval or disapproval of additional burial capacity, changes in disposal practices, or in waste composition should be guided by generally accepted criteria. Such criteria are under development by DOE and the Nuclear Regulatory Commission (NRC) and should be given close scrutiny.

3) Engineered Barriers -- The protection provided by shallow burial could be significantly improved, in some instances, by the use of engineered barriers. This includes changes in waste form, containerization, site engineering, and use of engineered structures such as concrete vaults. The advantages and disadvantages, including costs, of such engineering should be carefully evaluated.

4) Environmental Monitoring -- Insufficient attention is currently given to the design, implementation, and evaluation of environmental monitoring. Such monitoring provides the only factual measure of site performance, and is thus a key factor in the site operation. Monitoring of waste characteristics physical, chemical and radiological, is essential to identifying the source term for containment analyses. Improved or new techniques are needed for these various monitoring requirements.

5) Long-term care and Decommissioning -- The costs, procedures for, and objectives of long term care or decommissioning are ill-defined. Attention should be given to funding methods, identification of responsibilities, and extremes of possible contingencies.

6) Improved Education -- The scope, character, and long range implications of low-level disposal are not well understood by the technical or non-technical community, further education is in order at all levels of understanding. Low level disposal presents, potentially, a serious impediment to safe, acceptable operation of the nuclear fuel cycle, and to non-fuel cycle uses of nuclear material. Attention should be given to providing technically sound, politically acceptable, and economically feasible solutions to low-level waste management before a crisis develops.

Given that there were to be an accident severe enough to release radioactive materials (an assumption which statistics would indicate is extremely unlikely), the result would not be "land and homes contaminated, widespread cancer, whole towns abandoned, forever," etc. as implied by the previously quoted radio advertisement.

## DIMENSIONS OF THE PROBLEM

While such concerns of the public represent a real problem to be addressed by any transportation program for the nuclear industry, it is important to understand the entire range of problems facing the industry in the transportation of radioactive materials if the country is to address this area in a coherent manner. In large measure those problems involve the establishment, or development of, policy upon which the nuclear transportation industry can function. This policy problem contributes at least partially to the success of those who would shut down the nuclear industry through the process of preventing the transportation of its wastes. Perhaps the best example of that is the New York City ban on the transportation of spent fuel and nuclear wastes through that city. The New York City ordinance was upheld by the Department of Transportation because there was no federal policy on routing requirements as might be specified by local jurisdictions. The Department of Transportation is now in the midst of a rule making in an effort to establish a policy in this area. Similar policy problems exist in several areas of the nuclear transportation industry. Launching from these two platforms, public concern and the establishment of policy, the problems of the nuclear transportation activity quickly diverge.

One of the currently popular concerns within the industry and the government involves the capability of the hardware manufacturers/equipment suppliers/transporters to handle the projected loads within the next decade. Questions are asked concerning the capability of the American industry to provide the systems necessary for the movement of nuclear wastes. Related to this concern for capability is the definition of the relative roles of government and industry in this activity. In many cases, the interests of the two parties are in apparent conflict. On the one hand, the industry claims the capability exists to meet the problems, given a clear and dependable governmental policy. On the other hand, those charged with accomplishing specific programs in the waste management area feel a driving necessity to assure that adequate and usable transportation systems

are available on time scales necessary to meet program milestones, even though policies have not been firmly established at this point. There are numerous examples of this apparent difference in viewpoint.

Even something which might appear to be so fundamental as projections of needs or logistics, has resulted in a broadly differing set of viewpoints. We are currently aware of at least four different logistical studies upon which projections of future needs in the transportation of radioactive materials have been made and which predict rather widely different requirements. Similarly, we are aware of at least four differing published inventories of currently available U. S. certificated spent fuel casks. Without agreement on such fundamentals it is difficult to evaluate the advisability or desirability of such other efforts as system optimization or standardization. Given that a large number of new packaging systems are to be developed and produced, it may make some sense to establish certain design considerations which are different now than those incorporated into the current generation equipment. If new spent fuel shipping systems were to be developed, should these new systems be designed around five or ten year old fuel versus the current systems which were designed to transport 180 day old fuel? By such optimizations, can the total risk of nuclear transportation be even further reduced? Are there areas of standardization which would benefit not only the federal government but the industry as well? Again, decisions to such questions rest in large measure upon the magnitude of the logistical considerations.

In the area of standardization, a single standard for shipping casks, or a single standard for TRU waste containers, or a single standards for any other class of packaging for use by the industry is not a viable idea. There are already in existence too many fixed site facilities with differing capabilities and differing interfaces to make total standardization a viable option. On the other hand, in certain portions of the fuel cycle, where facilities do not exist at the present time, unification of methodologies and interfaces may be a viable alternative. Standardization in such areas as materials properties, design techniques, analytical tools, and testing methodologies could afford a savings of time and money to both the industry and the government.

When addressing the concerns of the public, there are a number of widely agreed upon activities which could benefit the entire industry and the government as well. Perhaps, the forerunner in this category is in the area of risk assessment. Because nuclear packages for the transportation of significant quantities of radioactive materials have

not experienced accidents of the severity to cause releases, there is no statistical information available for evaluating the consequences of a release from such packages. In order to avoid over-conservatism or inadvertent oversights in this area, it is important to develop information on the behavior of shipping systems beyond the requirements of the regulations. We have found, for example, that even simulated accidents providing extremely severe environments do not create damage to spent fuel shipping casks which would pose a significant threat to the public. Still, when writing Environmental Impact Statements, one must hyphothesize a release. Therefore, testing of packages must proceed to the point of failure if the postulated release is to be relatable to either accident severity levels or source term levels. The information thus generated can be utilized as baseline information for risk analysis. But, even risk analysis itself may require some modification if it is to be useful in the public perception arena. Criticism from the general public, coupled with the recent reevaluation of the WASH 1400 report by the Nuclear Regulatory Commission, indicates the need for evaluating new ways for developing public understanding of risk.

## THE DOE PROGRAM

The basic problems surrounding the transportation of nuclear materials may be categorized into four areas in an attempt to resolve the difficulties of public perception and public policy while still addressing the operational needs of the nuclear fuel cycle as it evolves. Because most people view problems in an operational sense, a coherent program in transportation, of necessity, must address the orderly development, procurement, and operation of systems to meet specific needs. Supporting this development activity is a need for broad-based technology to provide a common base for design, analysis, and evaluation of the specific systems. If these two activities are to succeed, there must be a parallel effort in developing public perception, including both an understanding of the public's concerns and an imaginative activity in risk analysis directed at addressing those concerns. Finally, policy issues should be addressed in a non-emotional atmosphere which requires sound technical information be available to the public, to the industry, and, perhaps most importantly, to the policy makers.

Recognizing this, the Department of Energy established, at the beginning of Fiscal 79, a Transportation Technology Center at Sandia

Laboratories with the charter of putting together a program to address transportation problems.

It is intended that this Technology Center provide a focus for the transportation activities within the nuclear fuel cycle. By such action, the Department of Energy gives notice to the industry, the public, and the policy makers that they intend to address the problems of transportation of nuclear materials in a manner consistent with the responsibilities held by the Department. The DOE program is not intended to supplant the activities of other federal agencies, such as DOT and NRC; private industry; or other interested groups. It is intended to provide the focal point for coordinating the programs of all of these agencies, industrial concerns, and other groups. By virtue of this coordination function, it is proposed that the efforts spent in developing answers to the problems of nuclear transportation can be applied in such a way as to maximize the results through the elimination of overlap and the filling in of gaps.

The Department of Energy stands, at least among government organizations, in a unique position. Of those organizations concerned with the transportation of radioactive materials, DOE is the only non-regulatory agency. As such, DOE can initiate efforts to inform the public which might represent conflict of interest if undertaken by a regulatory agency. Further, DOE can utilize the information it develops, and by working with the industry, propose realistic solutions to the various problems which, again, could not be accomplished by a regulatory-type agency. This centralized program is in its infancy at this time with efforts currently underway to define the on-going programs affecting transportation, to integrate these programs into a coherent fabric, and to establish those programs needed to produce a unified overall approach for the country. While details of the specific program are not included in this paper, the Technology Center would welcome any comments or input that you might have. Of particular interest would be input as to the envisioned interfaces between the transportation activity and other portions of the back-end of the fuel cycle. Given that all of those persons involved in or concerned about transportation are indeed interested in developing the necessary connective tissues for the nuclear fuel cycle and are, therefore, willing to enter into a cooperative effort in this regard, it appears that a partnership between the federal government and American industry can achieve the needed capacity on a timescale compatible with the needs of the nuclear fuel cycle.