

Workshop D

WASTE PACKAGING CRITERIA

L. Andrews, Chairman  
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## LOW-LEVEL WASTE PACKAGING - A MANAGERIAL PERSPECTIVE

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### INTRODUCTION

Within the past year, the seriousness and urgency of problems associated with low-level waste packaging have been emphatically brought to the attention of waste generators and the public. The chronology of events is well known. In mid-summer, 1979, the Beatty, Nevada, waste disposal site was closed as a result of the receipt of a leaking container from a Mid-West utility. Last September, the Hanford site was closed due to the receipt of improperly packaged shipments. In a sense, problems associated with low level waste packaging seem to have precipitated the high level of public and political concern over the location and operation of the country's three existing low-level waste burial sites.

As a result of packaging violations, three electric utilities and two industrial generators of nuclear waste have been denied access to burial sites over the past seven months. Low-level waste packaging clearly is an area that demands a higher level of managerial attention than it has heretofore received.

The purpose of this paper is to emphasize managerial responsibility for assuring that facility waste is properly packaged. Specifically, existing packaging regulations are summarized, several actual violations are reviewed and, lastly, some recommendations are made to assist managerial personnel in fulfilling their responsibility to ensure that low-level waste is packaged safely and properly before shipment to the disposal site.

### PACKAGING REGULATIONS

The principle Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC) regulations related to waste

packaging and shipment are contained in title 49 and title 10, respectively, of the Code of Federal Regulations. Other requirements are contained in each waste disposal sites possession license and additional "site criteria". A summary listing these requirements is attached as Encl. 1.

The application of these regulations can be considered to fall into two functional areas under the general category of waste packaging. These areas include waste classification and the actual waste packaging.

### Waste Classification

Radioactive waste is classified on the basis of form and hazard level. In general, the classification includes determining the material transport group, form, quantity, etc. An excellent outline of a decision tree related to complying with DOT regulations on classification is included as Encl. 2. Additional information is contained in the DOT publication entitled, "A Review of The Department of Transportation Regulations for Transportation of Radioactive Materials."

### Waste Packaging

Waste packaging, in a narrow sense, includes selection of the proper shipping container, container loading and preparation of the container for shipment. Containers are selected on the basis of hazard level and must meet the specifications of 49 CFR 178. Container loading includes ensuring, for example, that biological waste containers are lined properly and that approved absorbent materials are utilized. Preparation of the container for shipment includes verifying that radiation and contamination levels are within limits, that the shipment is loaded properly and that all required paper work and certifications are completed.

## PACKAGING VIOLATIONS

During the period of September - December, 1979, 1,675 shipments were received at the Chem-Nuclear Barnwell Disposal Facility. Of this total, 282 waste discrepancy reports were prepared, 42% of which were directly related to waste packaging violations.

A summary of violations is included in Encl. 3.

The following incidents are representative of the more serious discrepancies:

#### Contamination

In December, two casks were received at the Barnwell site containing in-core detectors. The casks had been loaded underwater and should have been completely drained after their removal from the fuel pool. In fact, the casks were not completely drained and the drain plugs were not reinstalled tightly. As a result, two areas of the trailer were contaminated to greater than 1,000,000 dpm/100cm<sup>2</sup> and one area showed fixed contamination of 250 mr/hr.

#### Broken Boxes

Late in 1979, a wooden box included as part of an LSA shipment was broken open by the vibration of a piece of heavy equipment packed within it. When the trailer was opened, the contaminated piece of equipment was lying on the floor under the broken box. The box obviously did not meet the strong tight container specifications of 49 CFR 173.392 c.

#### Radiation

An eastern utility made a shipment late last year that exceeded allowable radiation levels. Two instruments utilized by the utility before shipment read 10 mr/hr and 15 mr/hr respectively at the 6 foot distance. The utility elected to believe the lower reading only to learn later at the burial site that the reading actually was 15 mr/hr, a violation of DOT shipping regulations.

#### Radiation

A different twist on the radiation level problem involved a utility that properly packaged a full-load LSA shipment. After the load left the site, the load was adjusted in the van by the shipping company to meet certain legal weight requirements. Due to the repositioning of a hot package, radiation levels on contact with the side of the van reached 400 mr/hr. Despite the fact that the shipper packaged the shipment properly, the shipper was held directly responsible for violating the DOT shipping regulations.

## MANAGEMENT RESPONSIBILITY

The high number of packaging/shipping violations that continue to be noted will result in increasing penalties by those states licensing burial sites and by federal authorities. Perhaps of even more significance is the fact that continued violations by waste generators will make it even more difficult to persuade states to license new sites and, in fact, may even jeopardize the continued operation of the three existing sites. Clearly, waste generator managerial personnel have a responsibility to ensure that their organizations maintain themselves in strict compliance with all waste packaging and shipping requirements.

In order to address some of the problems noted, it is recommended that managerial action be considered in four areas; personnel staffing, training, procedure development, and quality assurance.

### Personnel Staffing

In any operation, success is frequently dependent upon the motivation and ability of those personnel who supervise and who carry out assigned duties. In years past, it has been noted that personnel assigned to radwaste operations are too often considered step-children within the organization. The "best and brightest" are not assigned to what is sometimes considered a "dead-end" position. If this is true within an organization, perhaps it is time that some of these practices be re-evaluated.

Personnel staffing may be a problem at both the supervisory and working level. Does the Radwaste Engineer have the potential to be Plant Superintendent? Could the Radwaste Supervisor ever expect to be promoted into a supervisory position within Operations or Maintenance? What does a radwaste operator have to look forward to? The answers to these questions could indicate that a problem exists. It may be time to examine the role of radwaste personnel within the organization.

### Training

Personnel within the radwaste organization require formal training just like operators, technicians and maintenance per-

sonnel. In today's environment, on-the-job training alone is not enough.

It is recommended that formal training and retraining be conducted for all personnel assigned to the radwaste operation. The training should not only cover NRC and DOT requirements but also state burial license requirements and the facility procedures developed to comply with these requirements. Actual incident reports involving improper packaging and shipping should be reviewed and field trips to the waste disposal site should be considered. At power plants conducting training in accordance with ANSI N18.1, it may be desirable to make formal radwaste operation training the responsibility of the station Training Supervisor.

### Procedures

Regulations related to the packaging and shipment of low-level radioactive waste are relatively complex. The federal regulations are complex by their very nature and loaded with cross references. To make matters worse, regulations are promulgated by two separate overlapping agencies of the federal government. Once federal regulations have been complied with, a packager has to verify compliance with the disposal site regulations which vary in some degree from site to site.

One way to verify compliance with all regulations is to develop packaging and shipping procedures that comply with applicable regulations. Typically, the vast majority of a facility's waste will fall into three or four general categories. By researching all regulations, a relatively high assurance can be achieved that routine shipments are packaged properly. Detailed checklists can be utilized to great advantage in verifying that a waste package is ready for shipment.

One important aspect of radioactive waste packaging and shipping procedures is ensuring that the procedures are maintained up-to-date. A formal system should be set up to monitor changes in federal and state regulations related to radwaste. Over the past year, numerous industry groups including the Atomic Industrial Forum, American Nuclear Society, Electric Power Research Institute and Nuclear Regulatory Commission have sponsored meetings or workshops to address current problems in the radwaste area. In order to remain informed on current issues, it's quite worthwhile for radwaste generators to be represented at these meetings.

## Quality Assurance

A radwaste organization staffed with trained personnel and operating in accordance with approved procedures should be able to assure that low-level waste is packaged and shipped properly. In order to visibly demonstrate managerial interest in the radwaste area and, in fact, verify that regulations are complied with, it is recommended that radioactive waste packaging and shipping be covered in the facility's quality assurance program.

The Atomic Industrial Forum Subcommittee for Low-Level Waste is currently developing a program that can be used to audit a facility's radwaste packaging and shipping operation. Chem-Nuclear has made recommendations to the AIF related to program content which include the following general areas:

### 1.0 Organization

- 1.1 License Status
- 1.2 QA Manual
- 1.3 Personnel Training
- 1.4 Procedures

### 2.0 Operations

- 2.1 Container Type
- 2.2 Container Markings
- 2.3 Isotopic Analysis
- 2.4 Material Type
- 2.5 Transport Group Classification
- 2.6 Shipping Checklist
- 2.7 Biological Waste
- 2.8 Container Acceptability
- 2.9 Cask Shipments
- 2.10 Packaged Waste Shipments
- 2.11 Packaged Waste (other than LSA sole use or casks)

### 3.0 Records

- 3.1 Fissile Material
- 3.2 QA Records
- 3.3 Survey Records
- 3.4 Reports

Complete copies of a suggested audit checklist will be made available at the "Waste Management '80" meeting.

## CONCLUSIONS

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Radwaste packaging and shipping is a managerial rather than a technical problem. In the past, the entire area has too often been considered a stepchild within the waste generation facility. Proper managerial attention in the areas of personnel staffing, training, procedure development and radwaste shipping quality assurance is likely to go far in reducing the number and seriousness of radwaste packaging and shipping violations. In so doing, a facility will be able to maintain access to licensed burial sites and improve the probability that additional low-level burial sites will be licensed in the future.



Enclosure 1. Packaging and Shipping Regulations

10 CFR 71 "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions"

- A. General Provisions
- B. Licensing Applications
- C. Package Standards
- D. Operating Procedures

49 CFR 107 "Hazardous Material Program Procedures"

- A. General Provisions
- B. Exemptions
- C. Pre-emption
- D. Enforcement

49 CFR 171 "General Information, Regulations and Definitions"

49 CFR 172 "Hazardous Materials Table and Hazardous Materials Communications Regulations"

- A. General
- B. Table of Hazardous Materials, Their Description, Proper Shipping Name, Class, Label, Packaging and other Requirements.
- C. Shipping Papers
- D. Marking
- E. Labeling
- F. Placarding

49 CFR 173 "Shippers - General Requirements for Shipments and Packaging"

- A. General
- B. Preparation of Hazardous Materials for Transportation
- C. Poisonous Materials, Etiologic Agents and Radioactive Materials, Definitions and Preparation

49 CFR 177 "Carriage by Public Highway"

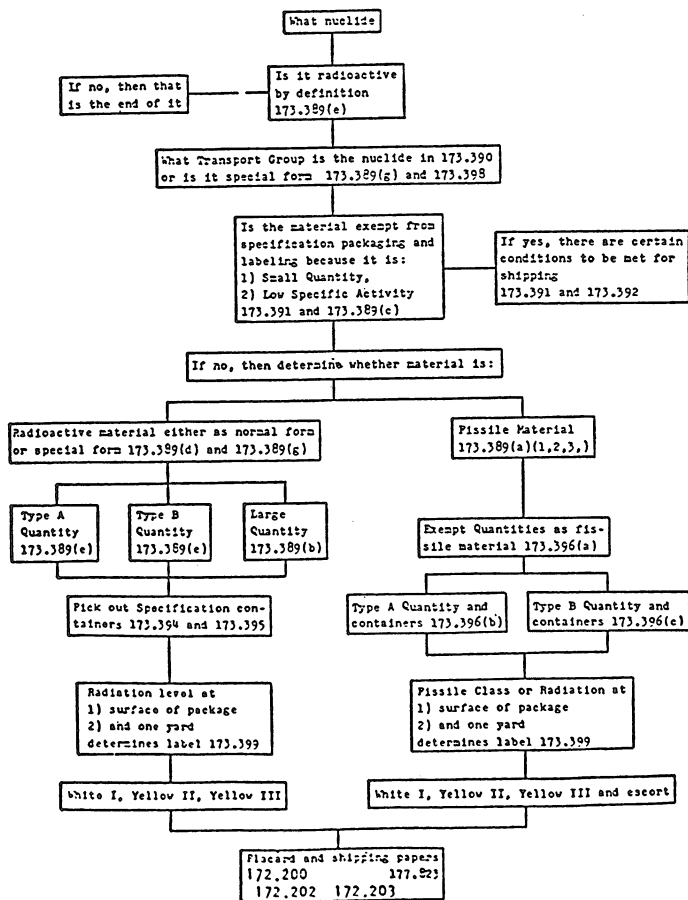
- A. General Information and Regulations
- B. Loading and Unloading
- C. Loading and Storage Chart of Hazardous Materials
- D. Vehicles and Shipments in Trouset, - Accidents

49 CFR 178 "Shipping Container Specifications"

(Contains a variety of container specs)

## Enclosure 2.

### Outline of DOT Regulations for Shipment of Radioactive Materials



Enclosure 3. Barnwell Discrepancies

	<u>September 1979</u>	<u>October 1979</u>	<u>November 1979</u>	<u>December 1979</u>	
Shipments	358	485	457	375	
Discrepancy					<u>Total</u>
Contamination*	6	12	14	6	38
Excess Radiation*		1	1	1	3
Water in Cask/Drum*	11	23	15	1	50
Improper Loading*	3	7		3	13
Improper Bracing*		1	1	2	4
Improper Cont. Closure*			2	1	3
Bolts Too Tight*			2		2
Loose Material*			2	3	5
Errors in Cubic Ft.	27	28	17	48	120
Incorrect RSR	12	8	3	3	26
Cask Design Spec.	4	3			7
Rejected Shipments	2	2	3	3	10
Improper Weights			2		2
Total Discrepancies	65	85	61	71	282

\*Packaging/Shipping Related