

U. S. DEPARTMENT OF TRANSPORTATION SPECIFICATION PACKAGES EVALUATION*

J. E. Ratledge and R. R. Rawl
Transportation Technologies Group
Chemical Technology Division
Oak Ridge National Laboratory**
Oak Ridge, Tennessee 37831

ABSTRACT

Specification packages are broad families of package designs developed and approved by the Department of Transportation (DOT) for transport of certain classes of radioactive materials, with each specification containing a number of designs of various sizes. Many of the individual package designs are not supported by reasonably current safety analyses. The Nuclear Regulatory Commission (NRC) asked Oak Ridge National Laboratory (ORNL) staff to collect all related information, perform analyses, and identify alternative actions that will enable NRC and DOT to make informed decisions on whether to retain, withdraw, or modify the existing regulatory permission for the use of specification packages to transport radioactive and fissile materials. This paper presents the background, issues, and progress made in this activity.

BACKGROUND

During the late 1960s and early 1970s, the Department of Transportation (DOT) specification package system was implemented to serve as a useful and equivalent alternative to the Nuclear Regulatory Commission (NRC) and Bureau of Explosives approval systems for Type B and fissile radioactive material package designs. When a particular package design was used by a large number of organizations, the package design was added to the DOT regulations as a specification package authorized for use by any shipper. In the mid-1970s, NRC implemented its present system that issues package approval in the form of a Certificate of Compliance (CoC). Licensees who have an NRC approved quality assurance programs and satisfy certain other specified conditions are authorized to use these package designs. The specification package designs have remained essentially unchanged for 20 years in a changing regulatory environment. Changes to package designs or authorized contents under the DOT system can be accomplished by rule-making action, but there has been little updating of the designs over the years. Some efforts have been made by the Department of Energy (DOE) contractors to update the safety analyses for frequently used specification packages, but none of these updates have been submitted to DOT to initiate rule making.

Since the publication of these specifications, there have been changes in regulatory requirements and improvements in methods of testing and analysis. Additionally, contemplated revisions to the DOT and NRC regulations to bring design requirements into accord with IAEA (International Atomic Energy Agency) Safety Series No. 6, 1985 Edition would eliminate fissile classes and require resistance to a crush test for small packages meeting certain criteria. Because of these regulatory changes, the NRC and DOT initiated a review of the safety evaluations for specification packages. The review will enable them to determine the need for further testing and analysis, possible revisions to the specifications, and potential elimination of specification packages for which demonstra-

tion of compliance with current and proposed requirements is insufficient.

While the NRC and DOT transportation regulations have evolved over the years, the DOT specification package designs have remained largely unchanged. Questions have been raised as to whether these designs meet the current and proposed regulations. In order to enable NRC and DOT to develop a regulatory analysis that will support appropriate action regarding the specification packages, a study is being performed to compile all available design, testing, and analysis information on these packages. This information will be evaluated to determine whether the package designs meet current regulatory requirements (10 CFR Part 71) as they are presently applied to NRC certified package designs. The study will enable NRC and DOT to make an informed choice of alternatives on whether to retain, modify, or withdraw the existing regulatory provisions for the use of specification packages.

Subsequent to the study discussed above, alternatives will be identified to minimize the impact of regulatory action on the transportation of radioactive materials. Alternatives could include upgrading of selected package designs, industrial development of updated safety analyses for specific packages, and selective removal of packages. Public notice that this project is ongoing is an important method of ensuring that all pertinent information is considered so that the most reasonable alternatives can be developed. This study is expected to be completed in late summer 1993.

OBJECTIVE OF PROJECT

In order for NRC and DOT to develop a regulatory analysis that will lead to appropriate regulatory action regarding the specification packages, a study is underway to: (1) gather pertinent facts and data, (2) analyze the facts and data, (3) identify possible alternative actions, (4) evaluate the alternatives, and (5) identify any clearly preferred alternative. The DOT specification packages included in the study are: (1) 2R, (2) 6M, (3) 6L, (4) 6J,*** (5) 17H,*** (6) 20WC, (7) 21WC,

* Work supported by NRC funding.

** Managed by Martin Marietta Energy Systems, Inc. for the U.S. Department of Energy under contract DE-AC05-84OR21400.

*** The 6J and 17H are used as components in authorized packaging configurations for Type A fissile materials.

(8) 20PF, and (9) 21PF. Sketches of most of these specification packages are shown in Figs. 1-9.

To accomplish the objective, it is necessary to collect all available information about prior efforts to resolve specification package related issues. Information needed includes both technical data (design, testing, analyses, etc.) and use data (extent to which the packages are actually used). The technical data are being reviewed and evaluated to determine if each package design is:

1. acceptable as is, with adequate documentation and an acceptable Safety Analysis Report for Packaging (SARP);
2. acceptable, with adequate documentation that must be pulled together into an acceptable SARP;
3. missing some analyses and/or tests that must be performed to support an acceptable SARP; or
4. marginal or inadequate in design and unlikely to meet requirements

The study was initiated in May 1991 and is currently attempting to identify all users of specification packages by reviewing DOT records for approvals of the use of specification packages for international shipments and NRC records of users of approved packages similar to specification packages. Data are being gathered from the users on approximate numbers and types of shipments of radioactive materials made in the specification packages.

Shippers have been encouraged to participate in this project by providing technical and use information so that the full economic impact of alternatives can be developed and considered. Anyone who has technical or use information or knows of sources for this information is encouraged to participate so the best available documentation can be used to

evaluate the adequacy of the designs and identify viable alternative courses of regulatory action. The specification packages having the most significant uses will have their designs and available safety analyses evaluated relative to current NRC, DOT, and international regulations.

RESULTS

Based on the technical and use data received to date, it appears that only the specifications 6M, 20WC, and 21PF have significant amounts of documentation that could be used to develop a current SARP. Very little data have been recovered to determine the adequacy of the other specification packages. The technical data recovered to date resulted from searches of a few DOE contractors' records and review of DOT, DOE, and NRC records in Washington, D.C. Only two reports have been located that include past tests and evaluations of packages—one prepared by Sandia National Laboratory on the 6M package and one by Martin Marietta Energy Systems, Inc. on the 21PF package. Additional information regarding the use of Specification Packages from users is expected. The final results will be included in a report issued to NRC.

Alternatives will be included as to possible upgrading of selected package designs, industrial development of updated safety analyses for specific packages, and selective removal of packages. Attendees are encouraged to provide any technical or use data in their records that could contribute to the final evaluation of the specification packages to: Joe E. Ratledge, Oak Ridge National Laboratory, Transportation Technologies Group, Post Office Box 2008, Chinn Building, MS-6495, Oak Ridge, TN 37831-6495.

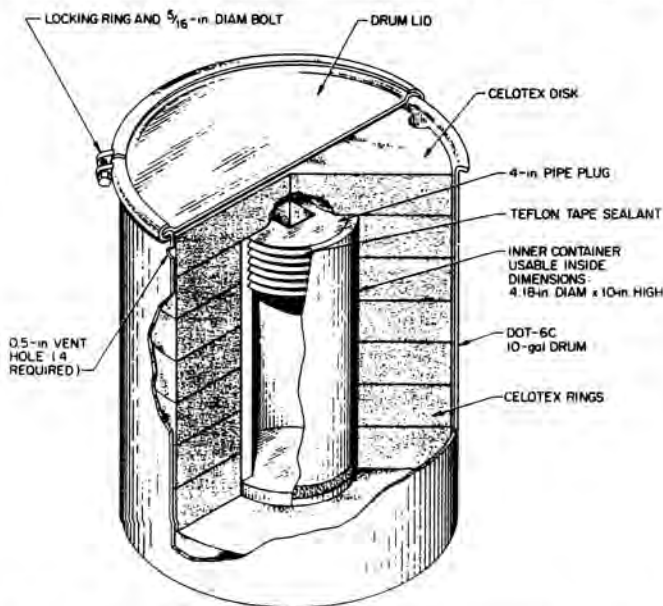


Fig. 1. Typical assembly detail, 10-gal size DOT-6M, weight = 60 lbs, Type B.

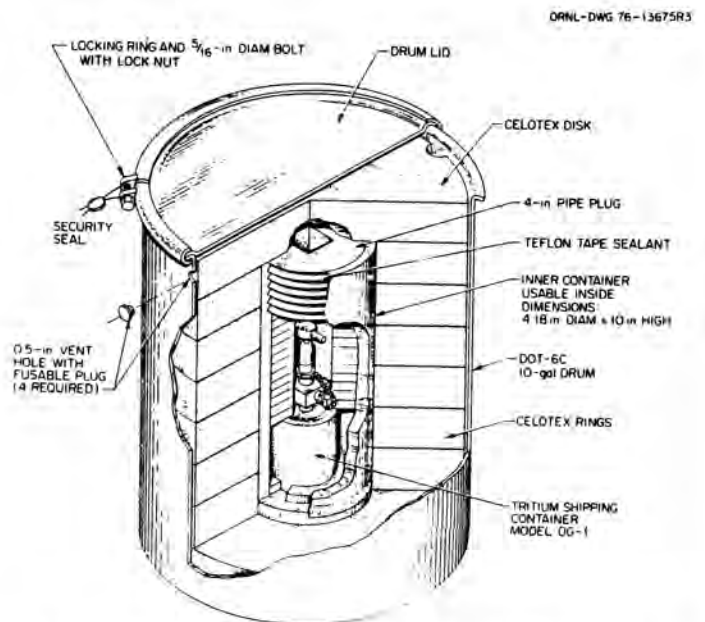


Fig. 2. Typical assembly detail, 10-gal size DOT-6M tritium trap package, Type B.

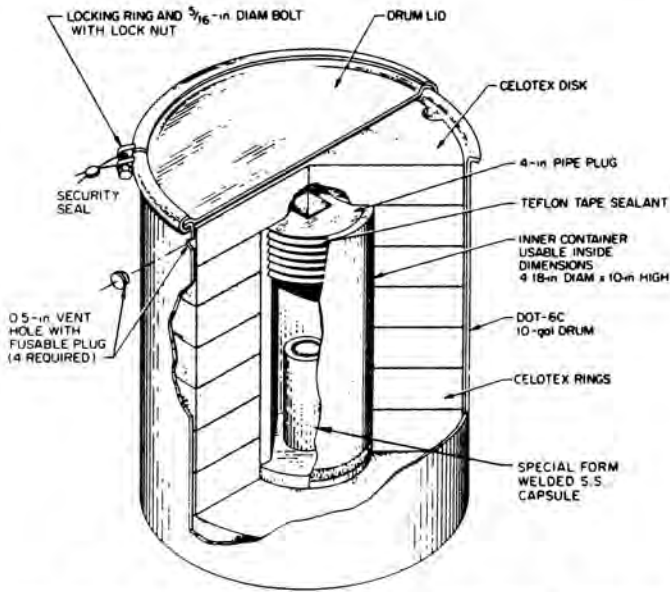


Fig. 3. Typical assembly detail, ORNL DOT-6M - special form package.

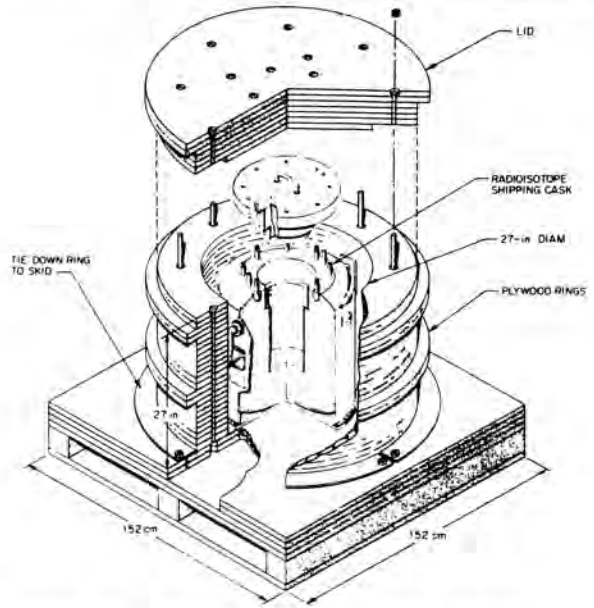


Fig. 5. DOT-20WC-5 - special form package, weight = 4000 lbs.

ORNL-DWG 76-13677

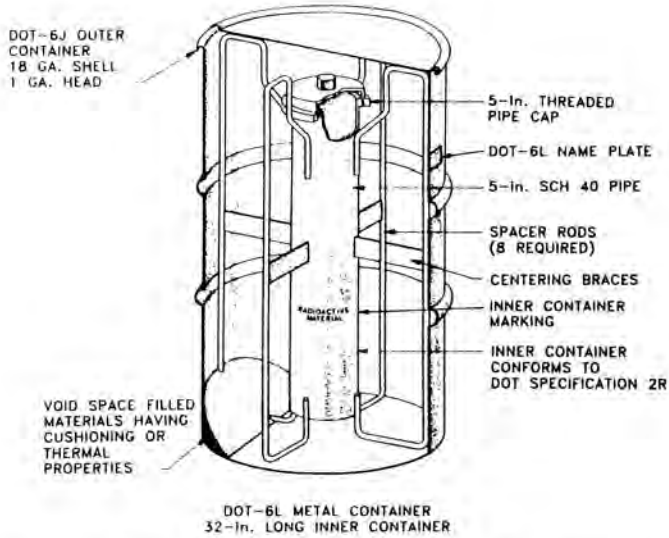


Fig. 4. DOT-6L metal container, 32-in. long inner container.

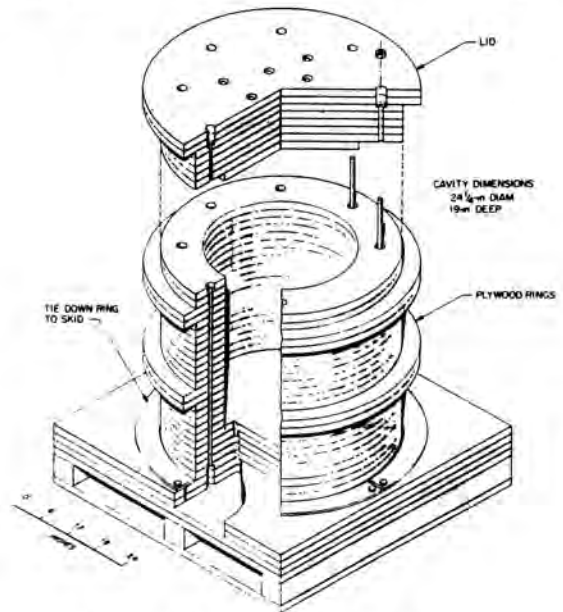


Fig. 6. DOT-20WC-4 - fire shield.

