

U.S. Nuclear Regulatory Commission  
Safety Evaluation by the Transportation Certification Branch  
of the Model No. 910 Packaging  
USA/9149/B( )

Encl to ltr dtd: JUN 23 1981

Summary

By application dated April 10, 1981, Technical Operations, Inc. requested approval of the Model No. 910 shipping container to be used for shipment of radiographic sources containing iridium-192 in special form. Based on the statements and representations presented in the application, we have concluded the packaging and contents meet the requirements of 10 CFR Part 71, subject to the conditions contained herein.

Reference

Technical Operations, Inc. application dated April 10, 1981.

Drawings

The packaging is constructed in accordance with Technical Operations, Inc. Drawing Nos. 91090, Sheets 1, 2, and 3 of 3, Rev. 0 and 90090, Sheets 3 and 4 of 4, Rev. 0.

Description

The shipping container is a stainless steel encased, uranium shielded radiographic device which is also designed for use as a Type B shipping container for radioactive sources in special form. The shipping container is 13.0 inches long, 7.7 inches high and 5.3 inches wide. The radioactive source assembly is housed inside a tungsten source tube. The source tube is surrounded by depleted uranium metal for shielding. The depleted uranium shield assembly is encased in a stainless steel housing. The void space between the uranium shield assembly and stainless steel housing is filled with a castable rigid polyurethane foam. The gross weight of the container is 34.0 pounds.

Contents

The contents consist of iridium-192 as sealed sources that meet the requirements of special form as defined in 10 CFR §71.4(o). The contents are limited to 30 curies of iridium-192 in special form.

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### Structural

Our review of the applicant's structural analysis indicates that the Model No. 910 package satisfies the structural requirements of 10 CFR 71 for both the normal conditions of transport and the hypothetical accident conditions. The applicant has demonstrated by analysis and by results of testing of a similar package that the subject package does meet the requirements of the normal conditions of transport. The evaluation of the ability of the package to meet the structural requirements of the hypothetical accident conditions is based upon actual test results of a similar package and comparison with the subject package. The similar shipping container was dropped from a height of 30 feet onto a flat surface, and subsequently dropped from a height of 40 inches onto a steel bar six inches in diameter and eight inches high. As a result of these tests, there was no reduction in shielding effectiveness nor loss of radioactive material. Detailed information regarding the free drop and puncture tests of the similar package is a part of the test report and is presented by the applicant.

### Thermal

The staff has reviewed the thermal analysis of the Model No. 910 package provided by the applicant for normal conditions of transport and for the accident damage conditions. The applicant's thermal analyses, test results, and conclusions were reviewed and found to be satisfactory. The applicant concluded that the package satisfies the thermal requirements of 10 CFR 71. Based on our review of the package, we concur with that conclusion.

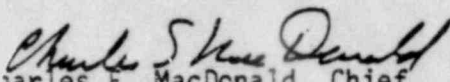
### Shielding

The applicant has demonstrated by measurements and analysis the adequacy of the depleted uranium shield for the Model No. 910 shipping container under normal and accident damage conditions for the maximum iridium-192 loading of 30 curies. The DOT normal condition of transport was shown to be satisfied by actual gamma profile measurements which gave dose rates well below the 200 mr/hr surface dose rate limit. The applicant made a radiation profile measurement of a similar package after it was subjected to the hypothetical accident conditions. These measurements show the radiation level to be well below the limit of 1,000 mr/hr at three feet from the surface of the container. By comparison the applicant concluded that the Model No. 910 would also be below the 1,000 mr/hr limit.

The above results demonstrate satisfaction of 10 CFR 71.36 which has a permissible limit of 1,000 mr/hr at three feet from the external surface of the package under accident conditions.

Conditions

The Technical Operations, Inc. Model No. 910 packaging is limited to 30 curies of iridium-192 as sealed sources that meet the requirements of special form as defined in 10 CFR §71.4(c). The source must be secured in the shielded position of the packaging by the source assembly. The components used to secure the source must be fabricated of materials capable of resisting a 1475°F fire environment for one-half hour and maintaining their positioning function. The source assembly must engage the locking device. The source assembly must be of sufficient length and diameter to provide positive positioning of the source within the depleted uranium shield assembly. The name plates must be fabricated of materials capable of resisting the fire test of 10 CFR Part 71 and maintaining their legibility.

  
Charles E. MacDonald, Chief  
Transportation Certification Branch  
Division of Fuel Cycle and  
Material Safety

Date: JUN 23 1981