

PICKER CORPORATION

6671 BETA DRIVE/CENT. BLDG.
MAYFIELD VILLAGE, OHIO 44143

PDR 71-9011

January 22, 1980

Office of Hazardous Materials Operations
U. S. Department of Transportation
Washington D. C. 20590

Attention: Mr. R. R. Rawl

Dear Mr. Rawl:

We wish to amend our IAEA Certificates of Competent Authority numbers USA/5796/B and USA/9011/B changing the certificate from the 1967 to the 1973 IAEA regulations.

We have compared the 1967 edition of IAEA Regulations and 10CFR part 71 to the 1973 edition of the regulations and determined the only change is the addition of a water spray.

Accordingly we have conducted an engineering study relative to the water spray tests. Enclosed is a copy of the study, copies of Certificates of Compliance and copies of our Certificates of Competent Authority.

Your expeditious help in processing this amendment will be greatly appreciated.

Sincerely,

C.A. Pengov

C.A. Pengov
Safety Officer
Special Systems Division
Picker Corp

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cc: R. Arndt-AMS *
W. Ashby *
D. Churchill *
(8) Charles Mac Donald
W. Mog *
R. Novacek *
J. Stickney *

CAP: dab

*-those with cover sheet only

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PICKER CORPORATION

6671 BETA DRIVE/CENT. BLDG.
MAYFIELD VILLAGE, OHIO 44143

TO: C.A. Pengov
FROM: W.F. Mog
DATE: January 21, 1980
SUBJECT: Evaluation of Overpack Containers

Enclosed is a report which demonstrates that the Picker Corporation overpack containers 181361, 181375 and E-MEH-00-00004 comply with the IAEA, 1973 Safety Standards.

WFM:lcl

PICKER

EVALUATION OF OVERPACK CONTAINERS

181361

181375

E-MEH-00-00004

TO

COMPLIANCE

WITH

IAEA, 1973 SAFETY STANDARDS

BY

WALTER F. MOG, P.E.

JANUARY 21, 1980

I. PURPOSE

The purpose of this application is to demonstrate that the overpack containers 181361, 181375 and E-MEH-00-00004 comply with the IAEA, 1973 Safety Standards. Previously these overpack designs were in compliance with the 1967 IAEA Standards. The difference between the two Standards is that the 1973 edition requires a water spray test, Section VII paragraph 711, which was not required in 1967. Previously these overpacks have been approved by the NRC and DOT for shipment within the continental USA. Copies of these certificates are included in the appendix. In these applications and subsequent approvals it was shown that the above overpacks comply with the free drop, compression, penetration and thermal tests. This report will demonstrate that these three overpacks will also comply with the water spray test and are to be acceptable for over seas shipments as indicated in the 1973 edition of the IAEA Safety Standards.

II. CONSTRUCTION

All three overpacks are of the same basic construction. The outer jacket is made up of 1/4" structural steel elements which are welded together to form a rectangular parallelepiped which the longest side is 41 inches. A 16 gauge steel plate encloses all six sides of the rectangular parallelepiped. An inner-jacket is comprised of hard maple wood which is laminated together with steel tie rods. Six of these laminated assemblies, which are treated with wood preservative, comprise the inner-jacket (reference drawings are attached in the appendix). The nominal 3 5/8" thick lamination assemblies provide the thermal bearer to satisfy the 30 min. 1475°F exposure which is required by the NRC. The only exposed wood are two skids which are on the bottom of the container which enable a fork lift truck to transport the package which weighs approximately 4000 lbs.

III. APPROACH

Three approaches were explored to verify that the overpacks comply with the water spray test. They are as follows:

1. Two overpacks, 181375 and 181363 were sent to an independent test lab, Herron Testing Labs Inc., and subjected to the water spray test. Their report is included in the appendix.
2. An analytical evaluation was made to determine the effect on the possible wood expansion due to the absorption of water which was absorbed in the spray test.
3. Hard maple wood samples were submersed in water for one hour and five hours to measure the amount of water absorption. Three sample pieces of wood were used in this experiment. They are as follows:
 - a. Wood block A - Which is hard maple with no preservative.
 - b. Wood block B - Which is hard maple with the ends covered with rubber cement.
 - c. Wood block C - Which is hard maple painted with a wood life preservative.

IV. RESULTS

The independent testing lab reported that the average increase in weight of the container was less than 20 lbs. after the water spray test was conducted. This analysis was done by weighing the overpack assembly before and after the water spray test. It does not indicate that all of the water was absorbed by the wood inner-jacket. A portion of the water may have been absorbed, but more than likely most of it flowed to the bottom of the container. However, if we make the assumption that 20 lbs. of water, which has a volume of 554 cu. in., is completely absorbed in the wood it would result in only a 2.8% (554/19572) expansion of the wood. The total volume of wood is 19572 cu. in. It seems even hard maple wood has some porosity. The expansion of the wood would be less than 3%, but even if the wood expanded 3% the linear expansion of the wood would not create a stress condition to such a magnitude that it would create any significant distortion to either the wood inner-jacket or the welded steel outer jacket. Neither overpack exhibited any physical stress damage during the water spray test conducted at Herron Labs.

Calculations indicate that the 2.8% expansion would create an expansion of the typical wood laminated assembly of 32.5 in. in length to 32.78 in. If the wood was in the free state, an approximate expansion of 1/4 inch would occur; but since the wood is bolted together and could also be resisted by the weldment the free expansion does not take place.

The design clearance between the wood assemblies and metal frame is 1/2 in. Therefore if full expansion were to take place 0.22 in (.50 - .28) clearance would remain.

The results of the wood block immersion tests are as follows:

Block A - Hard maple, no preservative - 1 hour:

Average percentage increase in thickness, 0.6%	$\left(\frac{.011}{1.636} \right)$
Average percentage increase in width, 0.2%	$\left(\frac{.008}{3.499} \right)$
Average percentage increase in length, 0.00%	$\left(\frac{.002}{11.977} \right)$

Block B - Hard maple with ends covered with rubber cement - 1 hour:

Average percentage increase in thickness, 0.2%	$\left(\frac{.004}{1.635} \right)$
Average percentage increase in width, 0.2%	$\left(\frac{.006}{3.484} \right)$

No measurable increase in length

IV. RESULTS

Block C - Hard maple, painted with wood life preservative - 1 hr. test:

Average percentage increase in thickness 0.3% $\left(\frac{.005}{1.620} \right)$

No measurable increase in width

No measurable increase in length

The five hour immersion test indicate that water absorption increases are negligible.

V. CONCLUSION

The results indicate that the water spray tests have no detrimental effects on the overpacks 181161, 181375 and E-MEH-00-00004 for the following reasons:

1. If all the 20 lbs. of added water which was tested in the Herron Testing Lab. test was absorbed in the wood the 2.8% free expansion would leave almost a 1/4" clearance between wood inner jacket and the steel weldment.
2. The water spray tests produced no detrimental effects on the two overpacks which underwent physical examination.
3. The hard wood maple block samples which were immersed in water for one hour had only a minimal increase (less than 1%) in expansion in all directions.

Therefore it can be concluded that the overpacks 181361, 181375 and E-MEH-00-00004 comply with the 1973 IAEA Safety Standards. Insomuch as the water spray evaluation indicates negligible effects with respect to other evaluations such as free drop, compression, penetration and thermal which were shown to comply with NRC regulations when the certificates of competent authority were issued on October 28, 1977.

APPENDIX

1. Certificates of Competent Authority USA/5796/B and USA 5011/B.
2. Report from Herron Testing Laboratories
3. Calculations
4. Test Data of Wood Block Samples
5. Drawings



DEPARTMENT OF TRANSPORTATION

MATERIALS TRANSPORTATION BUREAU

WASHINGTON, D.C. 20590

IAEA CERTIFICATE OF COMPETENT AUTHORITY

Type B Fissile Radioactive Material Package Design

Certificate Number USA/5796/B

(Revision 1)

This establishes that the packaging designs described herein, when loaded with the authorized radioactive contents, have been certified by the National Competent Authority of the United States, as meeting the regulatory requirements for Type B packaging for radioactive materials as prescribed in IAEA¹ Regulations and §§ 49 CFR 173.393b and 173.394(c)(2) of the USA² Regulations for the transport of radioactive materials.

I. Package Identification - Picker Models Nos: 181375 and 181361.

II. Packaging Description - Packaging authorized by this certificate consists of an overpack that provides impact and thermal protection for teletherapy head assemblies or source exchange assemblies. The cubical overpacks are constructed from 2" by 4" maple panels bolted together and covered with 16 gage steel panels with opening limiting steel straps and angles. Model 181375 is approximately 37" x 40" x 41" with a gross weight of 3325 pounds and Model 181361 is approximately 39" x 39.5" x 48" with a gross weight of 4000 pounds.

III. Authorized Radioactive Contents - The authorized contents consist of large quantities of Cobalt-60 as special form packed in a secondary container and limited to a maximum of 13,680 curies and a decay heat load of 200 watts.

IV. General Conditions -

a. Each user of this certificate must have in his possession a copy of this certificate.

b. Each user of this certificate, other than the Picker Corporation, Cleveland, Ohio shall register his identity in writing to the Office of Hazardous Materials Operations, Materials Transportation Bureau, U. S. Department of Transportation, Washington, D. C. 20590.

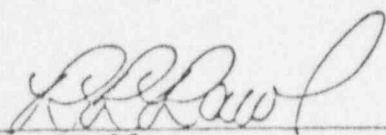
c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.

V. Marking and Labeling - The package must bear the marking USA/5796/B as well as the other marking and labels prescribed by the USA Regulations.

VI. Expiration Date - This certificate, unless renewed, expires on December 31, 1980.

This certificate is issued in accordance with the requirements of the IAEA and USA Regulations and in response to the October 20, 1977 petition by Picker Corp., Cleveland, Ohio and in consideration of the associated information provided in U. S. Nuclear Regulatory Commission Certificate of Compliance No. 5796.

Certified by:

for 
A. W. Grella
Chief, Technology Division
Office of Hazardous Materials
Operations
Materials Transportation Bureau
U. S. Department of Transportation
Washington, D. C.

10/28/77
(DATE)

¹"Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials, 1967 Edition" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

²Title 49, Code of Federal Regulations, Parts 100-199, USA.



DEPARTMENT OF TRANSPORTATION
MATERIALS TRANSPORTATION BUREAU
WASHINGTON, D.C. 20590

IAEA CERTIFICATE OF COMPETENT AUTHORITY

Type B Radioactive Material Package Design

Certificate Number USA/9011/B

This establishes that the packaging design described herein, when loaded with the authorized radioactive contents, has been certified by the National Competent Authority of the United States, as meeting the regulatory requirements for Type B packaging for radioactive materials as prescribed in IAEA Regulations and 49 CFR 173.393b, 173.395(c)(2); 46 CFR 146.19-100; and 14 CFR 103 of the USA², 3, 4 Regulations for the transport of radioactive materials.

I. Package Identification - Model No. E-MEH-00-00004.

II. Packaging Description - Packaging authorized by this certificate consist of a steel encased wooden overpack containing a teletherapy head assembly and measuring 36" X 36" X 41" with a maximum gross weight of 4000 pounds.

III. Authorized Radioactive Contents - The authorized contents consist of large quantity radioactive material n.o.s., as not more than 13,680 Ci of Cobalt-60 which must meet the requirements of special form as defined in 49 CFR 173.389(g) and with a decay heat load of not more than 200 watts.

IV. General Conditions -

a. Each user of this certificate must have in his possession a copy of this certificate.

b. Each user of this certificate, other than Picker Corporation, Cleveland, Ohio shall register his identity in writing to the Office of Hazardous Materials Operations, Materials Transportation Bureau, U. S. Department of Transportation, Washington, D.C. 20590.

c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.

V. Marking and Labeling - The package must bear the marking USA/9011/B as well as the other marking and labels prescribed by the USA Regulations.

VI. Expiration Date - This certificate, unless renewed, expires on January 31, 1979.

This certificate is issued in accordance with the requirements of the IAEA and USA Regulations and in response to the January 6, 1976 petition by Ticker Corporation, Cleveland, Ohio, and in consideration of the associated information provided in U.S. Nuclear Regulatory Commission Certificate USA/9011/B (Appendix A).

Certified by:

A. W. Grella
A. W. Grella
Chief, Technology Division
Office of Hazardous Materials Operations
U.S. Department of Transportation

January 1, 1979
(DATE)

¹"Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials, 1967 Edition" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

²Title 49, Code of Federal Regulations, Parts 100-199, USA.

³Title 46, Code of Federal Regulations, Part 146, USA.

⁴Title 14, Code of Federal Regulations, Part 103, USA.