THE DEVELOPMENT OF THE BENEFICIAL USES SHIPPING SYSTEM CASK

H. R. Yoshimura, G. W. Wellman, J. L. Moya
A. Gonzales, K. W. Gwinn, R. G. Eakes, W. L. Uncapher
Sandia National Laboratories
Albuquerque, New Mexico

ABSTRACT

The Beneficial Uses Shipping System (BUSS) cask is a Type B packaging currently under development at Sandia National Laboratories for the U. S. Department of Energy (DOE) in their Beneficial Uses of Nuclear Waste Program. The cask will transport radioactive source capsules (CsCl and SrF_2) to facilities such as sewage and food irradiators.

The principal design criteria for developing the BUSS cask are specified in 10CFR71. Extensive three-dimensional modeling and numerical analyses were performed to predict the effects of the impact, puncture, and fire accident conditions specified in the regulations.

The cask prototype is being fabricated, and a Certificate of Compliance is being obtained.

INTRODUCTION

The purpose of DOE's Beneficial Uses of Nuclear Byproducts Program is to develop and encourage beneficial uses of byproduct isotopes such as cesium-137 and strontium-90 resulting from plutonium production for national security needs. The Albuquerque Operations Office of the DOE has responsibility for developing and transferring technology using cesium-137, a low-energy gamma emitter. In this program, cesium-137 is used to disinfect municipal sewage sludge to satisfy U.S. Environmental Protection Agency (EPA) regulations for sludge application to lands with unlimited public access. A sludge irradiator for the City of Albuquerque was originally scheduled to start up in FY84-85 but has been delayed indefinitely. Emphasis on another project, using gamma irradiation to improve the quality of certain food products, has been increasing over recent years.

Cesium chloride or strontium fluoride capsules must be transported from the Waste Encapsulation and Storage Facility (WESF) at Hanford, WA, to commercial licensed facilities in a Type-B packaging (cask) certified by the Nuclear Regulatory Commission (NRC). Suitable existing casks may have limited remaining certification lifetimes. Sandia National Laboratories (SNL) Transportation Technology Center (TTC) has been assigned by DOE to develop the Beneficial Uses Shipping System (BUSS) cask.

OBJECTIVE

The objective of this program is to develop an NRC-certified transportation package containing up to 16 CsCl or 6 SrF_2 capsules for shipment from the WESF to irradiator sites (DOE or commercial licensees). The package is being designed to maximize payload within prescribed weights and sizes established by WESF and to serve as a safe, reliable, and efficient alternative to existing systems carrying cesium chloride or strontium fluoride capsules. The casks must be consistent with DOE policies for containment and as-low-as-reasonably-achievable radiation exposure, and they must comply with applicable regulations. A major goal of the BUSS cask development program is to obtain regulatory approval of the design through verification by means of state-of-the-art analysis techniques.

CAPSULE DESCRIPTION

The source materials for the Beneficial Uses facilities include capsules of either cesium chloride or strontium fluoride[1,2]. The capsules are presently prepared and stored at the WESF. Each source is doubly encapsulated with a 316-L stainless steel outer layer and an inner steel capsule made from Hastelloy C-276 for the strontium fluoride or from 316-L for the cesium chloride. The capsule assemblies are about 7 cm in diameter, 53 cm long, and weigh about 8 kg. A cutaway sketch of a typical capsule is shown in Fig. 1.

CASK DESCRIPTION

The major components of the BUSS cask system include the cask body and lid, basket, impact limiters, personnel barrier, and skid. Table I lists the estimated weight and overall dimensions of each of these components.

TABLE I
Weight and Envelope Dimensions of BUSS Cask Components

Component	Envelope Dimension (cm) Diameter	Height	Estimated Weight (kg)
Body and Lifting Attachments	137.8	124.5	9,300
Lid	73.3	33.0	680
Basket	50.8	58.0	730
Impact Limiters*	215.0	99.6	2,730
Personnel Barrier			140
Skid (l x w x h)	227.6 x 186.7 x 34.3		1,230
Contents (maximum)			140

Estimated Maximum Total Loaded Weight = 14,950

* (Two impact limiters are required: Envelope dimensions are for one, weight for two.)

Figure 2 shows an exploded partial view of the BUSS cask system. The cask body is constructed from a 304 stainless steel cylindrical forging. The wall and end of the cask body are a minimum of 33 cm thick. Eleven circumferential fins are provided on the outer surface for heat dissipation. Forming the cask closure is a one-piece, 33 cm thick 304 stainless steel forged lid, weighing about 680 kg. The lid is

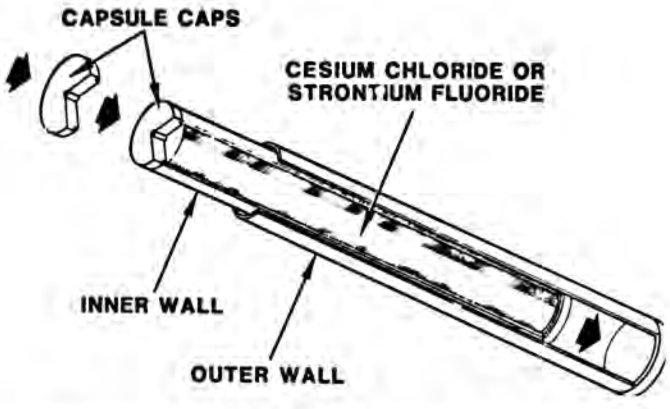

Fig. 1. Cutaway Sketch of Typical WESF Capsule

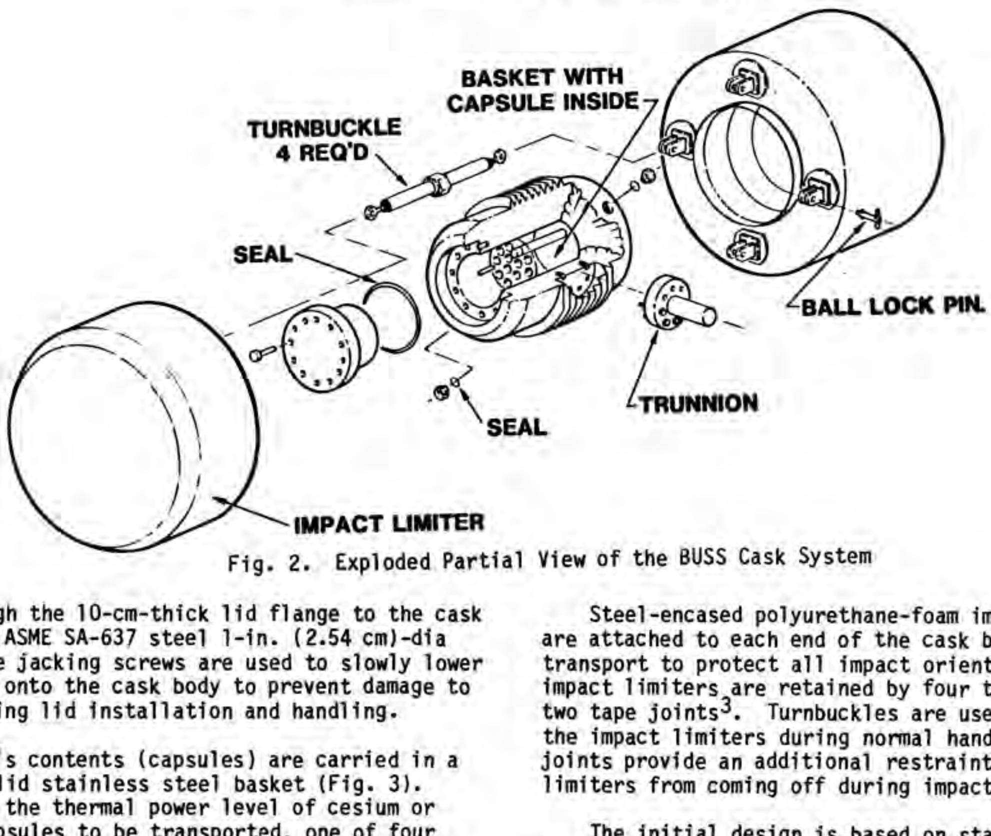

Fig. 2. Exploded Partial View of the BUSS Cask System

bolted through the 10-cm-thick lid flange to the cask body with 12 ASME SA-637 steel 1-in. (2.54 cm)-dia bolts. Three jacking screws are used to slowly lower the cask lid onto the cask body to prevent damage to the seal during lid installation and handling.

The cask's contents (capsules) are carried in a removable solid stainless steel basket (Fig. 3). Depending on the thermal power level of cesium or strontium capsules to be transported, one of four different baskets may be used. The configurations include a 4- and 6-hole design for strontium fluoride capsules and a 12- and 16-hole design for cesium chloride capsules.

Steel-encased polyurethane-foam impact limiters are attached to each end of the cask body during transport to protect all impact orientations. These impact limiters are retained by four turnbuckles and two tape joints[3]. Turnbuckles are used to retain the impact limiters during normal handling. The tape joints provide an additional restraint to prevent the limiters from coming off during impact.

The initial design is based on stainless steel for the cask body. Consideration of ferritic steel versions will be evaluated in the future.

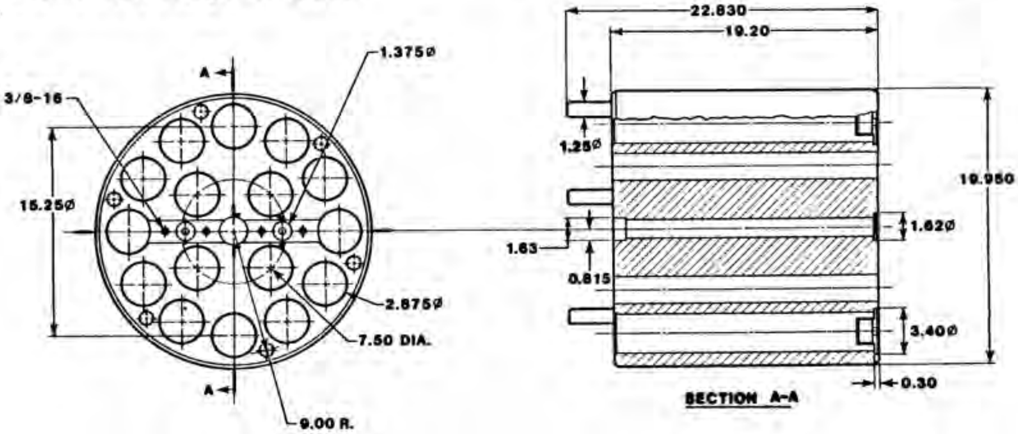

Fig. 3. Typical Basket Configuration (16-Capsule CsCl Shown)
Note: Dimensions in inches

Operational Features

The BUSS cask is suitable for all transport modes. The package should always be transported assembled; i.e., with the impact limiters and personnel barrier in place, and the assembly fastened to the skid (Fig. 4).

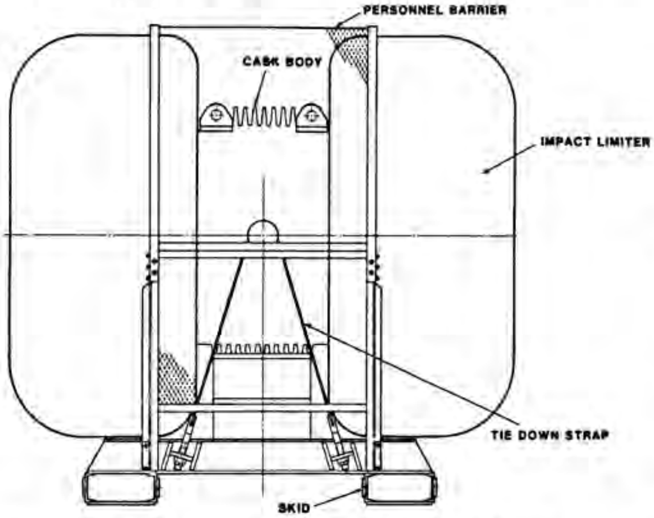

Fig. 4. Cask Assembly Showing Personnel Barrier & Skid

The cask can be dry-or wet-loaded, depending on the facility. After the cask is loaded, the cask lid and inlet port covers must be securely bolted shut. The seal of each of the closures is leak-checked by using the test ports provided.

Contents of the Packaging

The BUSS cask contains WESF capsules of melt-cast cesium chloride or pressed-filled strontium fluoride. Table II summarizes the container load limits for each type of contents.

Table II
BUSS Cask Radioactive Materials Limits

Capsule Type	Basket Capacity/ Maximum Capsule Thermal Power (No. of Capsules/W)	Thermal Power (kW)	Activity (Millions of Ci)
Cesium Chloride	16/250	4.0	0.85
(Cs-137)	12/333	4.0	0.85
Strontium Fluoride	6/650	3.9	0.65
(Sr-90)	4/850	3.4	0.56

CASK DESIGN AND DEVELOPMENT

This section describes specific tasks which led to the development of the BUSS cask. The design of the cask system included conceptual, preliminary, and final designs. Independent design reviews were held at the completion of each design phase. A BUSS cask quality assurance plan was prepared and implemented during the design and development phase.

Analysis Methods

The design process includes shielding, structural, and thermal analyses of the BUSS response to regulatory normal and hypothetical accident conditions. Results of these analyses for the final design are incorporated in the Safety Analysis Report for Packaging (SARP)[4].

The principal design criteria for containment and shielding used during development of the BUSS cask were specified in 10CFR71[5]. Of those conditions, the hypothetical accident conditions are the most stringent.

- 9-m drop onto an unyielding surface in the most damaging orientation
- 1-m drop onto a 15.2 cm dia mild steel, cylindrical flat-ended bar in the most damaging orientation
- 800°C, 30 minute fully engulfing thermal environment, with source emissivity = 0.9 and specimen absorptivity = 0.8
- 15 m immersion under water

Detailed discussions of the shielding, structural and thermal analyses follow.

Shielding Analysis

We performed detailed shielding analyses of the BUSS cask loaded with 16 cesium chloride capsules to determine the radiation environment external to the package. The 16-capsule cask was found to be a more extreme shielding problem than the system loaded with six strontium fluoride capsules. Regulatory requirements for shielding are summarized as follows:

1. Under normal transport conditions, the radiation levels at the accessible surface of the package must not exceed 200 mrem/hr. In addition, at 2 m from the accessible surface of the package, the radiation level must not exceed 10 mrem/hr.

2. After the package has been subjected to the hypothetical accident sequence of impact, puncture, and fire, the radiation level at 1 m from the accessible surface of the package must not exceed 1000 mrem/hr.

The shielding assessments included multi-energy group discrete ordinates and Monte Carlo computer analyses[6,7,8]. The radiation transport analyses of the BUSS cask were performed (1) to evaluate the shielding capabilities of the package for both normal and accident conditions, and (2) to determine the energy deposition profiles in the container for use in the thermal evaluation of the system. Separate one-, two-, and three-dimensional (1D, 2D, 3D) models were developed for both cases. Since the geometry of the cask and its contents are predicted to be virtually unchanged after the system is subjected to the hypothetical accident sequence, the same shielding analysis models were appropriate for determining dose-rate estimates for both normal and accident conditions. Table III gives the calculated results for normal operation and post-accident radiation levels for the BUSS cask loaded with 16 cesium chloride capsules.

TABLE III
Summary of Radiation Levels (mrem/hr)
for the BUSS Cask

	Normal Conditions				Accident Conditions	
	Package Surface		2 m From Surface		1 m From Surface	
	Top*	Side	Top	Side	Top	Side
Gamma	64	29	2.9	1.2	11	4.6
Neutron	NA#	NA	NA	NA	NA	NA
Total	64	29	2.9	1.2	11	4.6

* By symmetry, the radiation levels at the bottom of the package are the same as those at the top of the package.
\# Not applicable - the cask will not carry neutron-emitting material under this certificate.

When the cask is loaded with cesium chloride or strontium fluoride capsules, the estimated external radiation levels show that the cask meets the applicable shielding performance requirements specified in 49CFR173 and 10CFR71.

Structural Analysis

Structural evaluation of the BUSS cask included static and dynamic analyses of finite-element representations of the packaging. Scale models of the packaging are being designed, fabricated and subjected to structural testing to verify the analysis technique.

The principal structural members of the BUSS cask include the body, lid, and the impact limiters. Containment of the system is assured for both normal operation and accidents by the performance of the structural members, the presence of high-quality metallic seals at every opening into the cask interior, and the encapsulated contents. The primary structural members providing containment are the cask body and the lid. In combination with the impact limiters, we show that this containment boundary is virtually unaffected by subjection to the normal and hypothetical accident conditions specified in 10CFR71.(c)(7) and 10CRF71.73(c)(1).

The impact limiters attached to each end of the cask body provide a means of absorbing impact energy without transmitting large deceleration forces to the container itself. Using the impact limiters thereby decreases the mechanical loads on the cask contents. Since the impact limiters afford lower deceleration, their use also reduces both the number of bolts and the preload on the bolts which is required to keep the lid on the cask and maintain the lid seal.

All openings into the cask interior are fitted with bolted-on lids, each having a combination metallic-elastomeric double seal. The metallic constituent of the double-seal combination provides the actual seal at each cask opening. The elastomeric seals, located outboard of the metallic seals relative to the cask interior, are used to verify the leak-tightness of the metallic seals.

9-m Free Drop

We evaluated the performance and structural integrity of the BUSS cask subjected to the hypothetical-accident free-drop test with 2D and 3D finite-element analysis techniques. Three orientations at impact were evaluated: (1) end, (2) side, and (3) center of gravity over corner. The finite-element models were generated by using QMESH[9] and PATRAN-G[10]; they were analyzed with HONDOII[11] and DYNA3D[12]. The deformed shapes and stress distributions were plotted with MOVIE BYU[13]. As shown below, we predicted that the cask performance will not be degraded as a result of the free-drop test.

Table IV shows the predicted values for maximum impact limiter crush, cask body acceleration, and von Mises equivalent stress in the cask for three impact orientations.

TABLE IV.
Foam Crush and Peak von Mises Stress for the BUSS Cask in the Hypothetical-Accident 9-m Free-Drop

Orientation	Impact Limiter Crush (cm)	Cask Body Acceleration (g)	Cask Body Stress (MPa)
End	21.6	68	35.9
Side	26.2	75	14.8
Corner	32.0	49	16.5

The cask wall is stressed to values significantly less than yield (142 MPa at 205°C operating temperature) during the 9-m-drop event. Therefore, the cask is essentially undamaged when subjected to the second event of the hypothetical accident sequence, the 1-m drop onto a mild-steel pin.

1-m Puncture

We determined the structural response of the BUSS cask to the hypothetical accident puncture test with 2D and 3D finite-element analysis. The finite-element models were generated with PATRAN-G and analyzed with DYNA2D[14] and DYNA3D. The deformed shapes and stress distributions were plotted using MOVIE BYU. Accelerations were also obtained from the analysis to evaluate cask seal integrity.

To ensure analysis of the most severe accident, we evaluated puncture in three orientations: (1) cask impacting the punch on its side, (2) corner of the cask directly below the center of gravity impacting the punch, and (3) closure end impacting the punch. Each analysis was performed without the impact limiter in place to produce maximum damage to the cask. For the side punch, the cooling fins were not modeled.

In every case, we found that the cask body, or lid during closure end impact, would be plastically deformed near the impact point. The damage would be limited to a shallow circular indentation corresponding to the cross-sectional dimensions of the end of the puncture bar. Elsewhere in the cask, the material remains elastic with a peak value of von Mises stress of 103 MPa occurring in the flange area of the lid. Most of the cask material is stressed to 15 MPa or less.

We used deceleration values found in the closure (lid) region of the cask to determine inertial forces for analyzing seal integrity. The side puncture produced the maximum deceleration of all the structural impact analyses: 83 g's. Evaluation of the bolting arrangement on the cask lid indicated that the seal will maintain its integrity in all impact orientations.

Analytical results show that the cask body is only moderately stressed, with the packaging retaining its containment and structural integrity. Therefore, when the cask is subjected to the hypothetical accident thermal test, its configuration (geometry) will remain unchanged.

Thermal Analysis

We evaluated the thermal responses of the BUSS cask for normal conditions of transport and hypothetical accidents with state-of-the-art finite difference modeling techniques and pre-and post-processing software. From the geometric description of the cask, we used PATRAN-G to generate a finite element mesh model. Then we used a translator to convert the finite-element mesh into finite-difference data and Q/TRAN[15] to analyze the finite-difference model. Once the model was analyzed, an inverse translator was used to convert the data back into a finite-element representation for post-processing. We used PATRAN-G to post-process the analysis data.

Temperature Specifications for Components

The temperature limits of the construction materials for the container, basket, and capsules were established by requiring each component to maintain integrity under all thermal and structural load conditions. We selected an allowable temperature limit of 800°C for the cask body, lid and basket. This temperature is less than one-half the melting point of these materials. For stainless steel, it represents a limit below which significant corrosion effects can be minimized. For the capsules, the selected temperature limits were based on reducing the potential for significant degradation of the encapsulating material by corrosion. The strontium fluoride limit was taken as 800°C. This temperature is below the strontium fluoride eutectic temperature of 850°C for purported accelerated corrosion of the encapsulating materials. The cesium chloride temperature limit was selected as 450°C at the interface between the CsCl and the inner capsule wall. This is about 200°C below the melting point of CsCl and is a temperature at which long-term capsule corrosion studies of capsule corrosion are being performed to demonstrate acceptance for geologic disposal. The temperature limits for the seals were defined as the maximum operating temperature for the copper lid and flange seals as supplied by the HELICOFLEX Company[16]. Table V gives the temperature limits for the BUSS cask components.

TABLE V
BUSS Cask Component Temperature Limits

Component	Temperature Limit (°C)
Cask body and lid	800
Basket	800
Strontium capsule (Maximum SrF_2 temperature)	800
Cesium capsule (maximum temperature at CsCl and inner capsule interface)	450
Lid seal*	450
Port seal*	450

* The metallic component of the seal is fabricated from copper.

Thermal Evaluation for Normal Conditions of Transport

We evaluated the 2D temperature distribution within the BUSS cask under normal conditions of transport (10CFR71.71) with finite-difference analysis techniques for a variety of scenarios. Figure 5 shows the mesh used for the 16-capsule cesium chloride basket model. By symmetry, only one-eighth of the cask had to be modeled. We modeled the effects of the circumferential fins on the cask body.

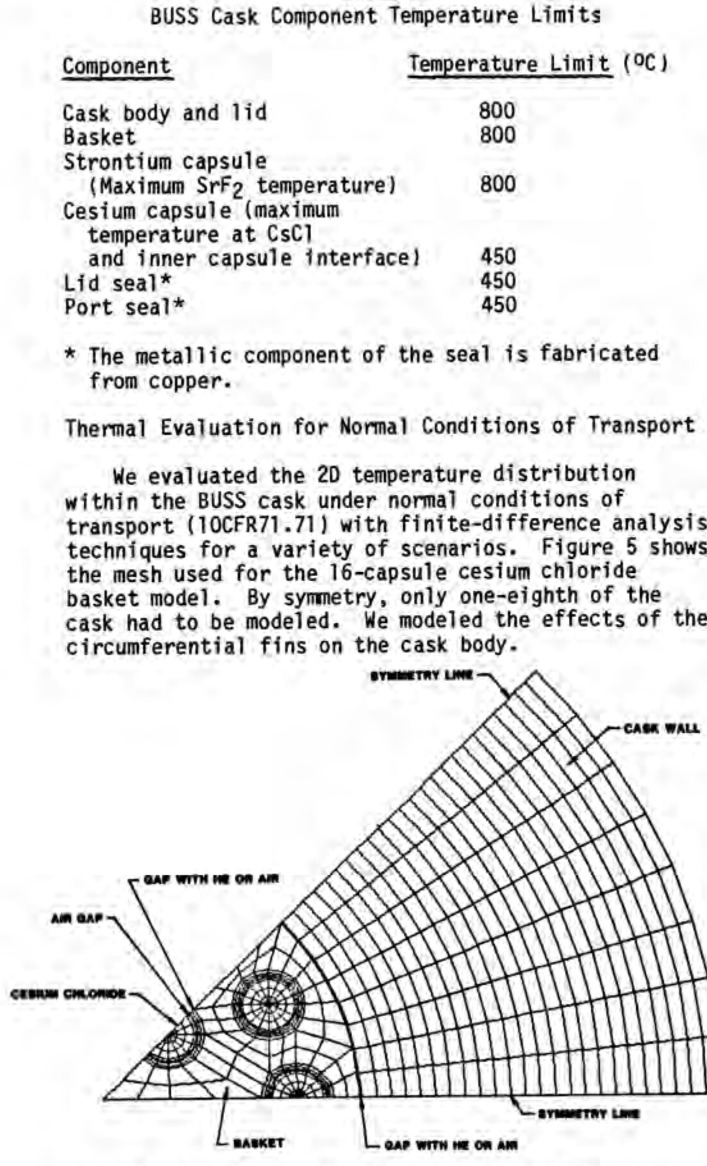

Fig. 5. Cask Finite Difference Model - 16 Capsule Basket

The gaps located between the cask wall and basket, between the capsules and basket, and between the inner and outer capsule cladding were modeled as annuli. We assumed heat was transported across the gaps only by conduction and radiation. Omitting convective transport across the gaps ensures greater predicted temperatures of the cask interior than expected under actual conditions. Heat loss from the exterior surface of the cask was modeled by assuming free convection and thermal radiation.

The thermal load of the cesium-137 in the BUSS cask was distributed throughout the interior portions of the cask based on the energy deposition profile. About 50% of the decay energy is transported to and absorbed by the cladding, the basket, or the cask wall. The remainder of the heat released during the radioactive decay of cesium-137 was deposited within the cesium chloride.

Heat released by the decay of the strontium was assumed as absorbed entirely by the strontium fluoride. This assumption is justified since strontium-90 and its daughters release most of their decay heat as readily absorbed betas. Such an assumption overestimates the capsule temperatures; some energy is actually deposited elsewhere in the cask by gamma and bremsstrahlung radiation.

Some of the results of the thermal analyses (both normal and accident) are shown in Tables VI and VII. The temperatures of the cask body, basket, and capsules are less than their allowable limits for the case of either air or helium in the gaps for those conditions representing normal transport. As shown, helium in the gaps greatly reduces the capsule temperature and thus increases the margin of safety.

We predict lower actual cask temperatures than calculated as a result of the conservative assumptions used in the analysis. The assumptions were as follows: no internal convective heat transfer, uniform annular gaps between cask components, and the omission of axial heat flow (impact limiters assumed to be perfect insulators).

Hypothetical Thermal Accident Conditions

We evaluated the thermal response of the BUSS cask under the hypothetical thermal accident conditions with finite-difference techniques. The finite-difference model used in the evaluation was essentially the same as the normal condition model described previously, except that the exterior boundary condition was changed to simulate thermal input from the fire as defined by the regulations. The steady-state temperature distribution (during normal operation) defined the initial conditions. Finally, the analysis continued beyond the 1/2 hour fire for an 8-hr cooldown period at ambient temperature to examine the possibility of further temperature increases in the package. The sealing surfaces were analyzed separately with a 3D model of the lid and a 2D model for the port seal. The initial temperature for the seal models was assumed to be the arithmetic mean of the cask inner wall temperature and the cask surface temperature.

Package Condition and Environment

The thermal test of the hypothetical accident sequence followed the 9-m free drop and the 1-m puncture tests. We evaluated BUSS cask performance with respect to the accumulated damage to the package during sequential application of these tests. The results of the structural analysis indicated that any significant damage to the system was confined to the impact limiters. Thus, we assumed an identical cask configuration to evaluate the thermal accident conditions as that used to evaluate the responses for normal conditions. Tables VI and VII present results for cesium chloride and strontium fluoride thermal calculations, respectively. Under the fire conditions assumed, the internal temperatures of the cask do not increase by more than 20°C. This is the result of the significant thermal mass of the cask body. In the analysis for cesium chloride where air was used in the gaps, the interface temperature between the source and inner cladding exceeds the allowed temperature. However, Table VI shows that the temperatures are acceptable when the gaps are filled with helium. Therefore, the cask design requires retaining helium in the system to provide enough heat transfer.

Figures 6 and 7 present some results from the transient analysis during postfire cooldown. Temperatures of the inner components of the cask do not increase during the fire, but rise later during the postfire period.

Package Performance for the Hypothetical Accident Thermal Condition

For the strontium fluoride payload, the BUSS cask would not be adversely affected by the regulatory fire test. The capsules show a temperature rise of about 20°C as a result of the fire accident conditions. Such a modest increase in temperature over a short time, as well as the corresponding negligible increase in the internal pressure, would not affect the integrity of the capsules.

TABLE VI
Maximum Temperatures (°C) in the BUSS Cask Under Normal Conditions of Transport# and Under Fire Test or During Postfire Cooldown for the Cesium Chloride Load

Location	Case I nor. acc.	Case II nor. acc.	Case III nor. acc.	Case IV nor. acc.	Allowable
Cesium Chloride*	556 (572)	529 (543)	485 (537)	451 (473)	
Inner Cladding*	437 (457)	436 (455)	367 (430)	359 (385)	450
Outer Cladding*	404 (428)	411 (433)	328 (403)	328 (358)	800
Basket	362 (391)	381 (408)	305 (368)	312 (346)	800
Lid Seal@	208 (361)	205 (361)	207 (361)	205 (361)	450
Port Seal@	208 (234)	205 (234)	207 (234)	205 (234)	450
Cask Wall (Inner)	208 (258)	205 (272)	207 (260)	205 (266)	800
Cask Surf. (Outer)	142 (461)	142 (461)	142 (461)	142 (461)	800

Ambient temperature of 38°C, Solar Flux = 200W/m^2
* Temperatures given are for the hottest capsule under normal conditions.
@ For normal conditions, seals not analyzed but set to inner cask wall temperature.

Case I. 12-Capsule Basket, air in gaps, 333 W/capsule
Case II. 16-Capsule Basket, air in gaps, 250 W/capsule
Case III. 12-Capsule Basket, helium in gaps, 333 W/capsule
Case IV. 16-Capsule Basket, helium in gaps, 250 W/capsule

Table VII
Maximum Temperatures (°C) in the BUSS Cask Under Normal Conditions of Transport# and Under the Fire Test or During Postfire Cooldown for the Strontium Fluoride Load

Location	Case I nor. acc.	Case II nor. acc.	Case III nor. acc.	Allowable
Strontium Fluoride*	755 (770)	694 (713)	474 (+)	800
Inner Cladding*	644 (660)	612 (631)	299	800
Outer Cladding*	528 (548)	520 (545)	291	800
Basket	357 (391)	401 (436)	271	800
Lid Seal	179 (361)	205 (361)	171	450
Port Seal	179 (234)	205 (234)	171	450
Cask Wall (Inner)	179 (245)	205 (271)	171	800
Cask Surf. (Outer)	123 (461)	141 (461)	141	800

Ambient temperature of 38°C, Solar Flux = 200W/m^2
* Temperatures given are for the hottest capsule under normal conditions.
+ Fire condition not calculated

Case I. 4-Capsule Basket, air in gaps, 850 W/capsule
Case II. 6-Capsule Basket, air in gaps, 650 W/capsule
Case III. 6-Capsule Basket, helium in gaps, 650 W/capsule

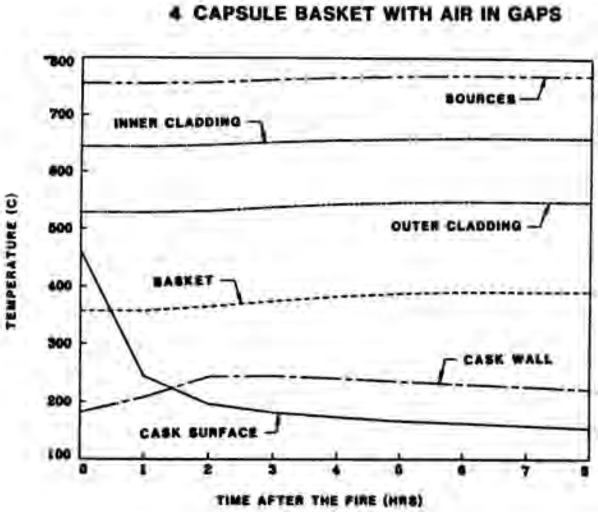

Fig. 6. Postfire Cooldown Period for Strontium Fluoride with Air in the Gaps.

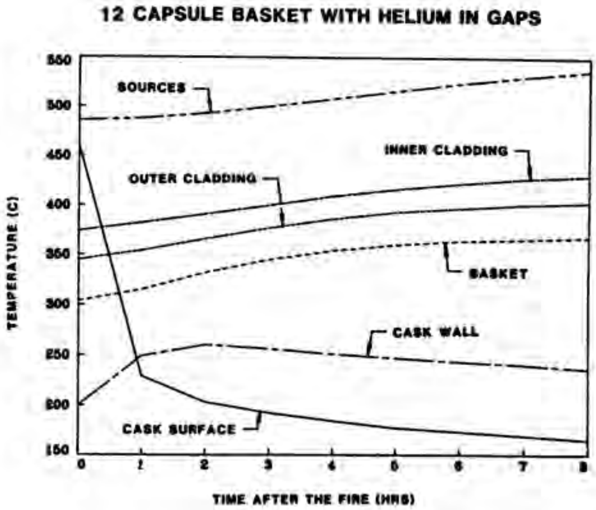

Fig. 7. Postfire Cooldown Period for Cesium Chloride with Helium in the Gaps.

For the cesium chloride payload with air in the gaps, the interface temperature between the source and the inner cladding exceeds the allowed temperature. It should be noted, however, that these allowable temperatures are very conservatively defined. The predicted temperatures are below the allowables with helium in the cask. The integrity of the system is not compromised since the cask design requires the presence of helium for enough transfer of heat.

The cask body experiences significant thermal stresses during the fire event. However, since the construction material of the cask is very ductile, the material will flow at locations where yielding is expected without undergoing stress rupture. Because cracks or thin spots will not develop in the walls of the container, the shielding and containment afforded by the system will not be degraded.

Maximum Internal Pressure in Cask

From the normal transport thermal analysis, we estimated the maximum internal pressure in the BUSS cask under normal transport conditions as about 36 psia. This estimate was obtained from Perfect Gas Law calculations.

For the fire accident thermal analysis, we predicted the temperature rise in the cask interior to occur during post-fire period and is a maximum (in capsules) of about 20°C. Using the Perfect Gas Law and the previous estimate for maximum internal pressure under normal conditions of transport, we predict the maximum internal pressure under the thermal accident conditions as 39 psia.

Since the capsules have been shown to maintain integrity under more severe pressure and thermal environments than those in the BUSS for either normal transport or accident conditions, the gases inside the cesium chloride and strontium fluoride capsules are unavailable for increasing the pressure within the cavity of the cask.

Containment

The BUSS cask containment system consists of several components. The primary and secondary containment of the radioactive contents results from rugged double encapsulation of the radioactive materials. These structures are tested to a maximum leak rate of 1×10^{-8} atm-cm^3/s. This encapsulation is supplemented by the cask structure and seals tested to a leak rate of 1×10^{-4} atm-cm^3/s. Essentially there are triple barriers to the release of the radioactive contents.

The primary function of the cask structure and seals with respect to containment is retaining helium for cavity heat-transfer purposes. Under a worst-case scenario, a design basis leakage limit of 1×10^{-4} atm-cm^3/s is low enough to insure adequate helium retention.

In conclusion, we have shown that the accident requirements of 10CFR71 do not affect the containment integrity of the BUSS cask system.

Cask Certification

A BUSS cask prototype fabricated of stainless steel is being assembled for operation. The SARP will be submitted through the DOE to the NRC to obtain a Certificate of Compliance. Following NRC certification of the stainless steel model of the BUSS, the prototype unit will be available for use.

After certification of the stainless steel body cask, certification activities for a ferritic steel body cask will commence. Investigation of applicable regulations and development of design philosophy will be a part of this activity. An amendment to the original SARP will be prepared and submitted for certification. Any design modifications suggested by users of the stainless steel cask will be incorporated into the ferritic cask.

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