Request for Additional Information
Revalidation Review
Docket No. 71-3090 – CAC N° L25036
Model No. LEUPA

LEUPA

Type B(U) Package for Contain Fissile Substances

The following document contains answers to the "RESUBMITTAL OF REQUEST FOR ADDITIONAL INFORMATION FOR THE MODEL NO. LEUPA PACKAGE".

GENERAL INFORMATION

G.1

Revise Section 1.1.4, "Definitions," of Document No. 0908-LE00-3BEIN-023-A, "Safety Report," to include a brief description with the main materials of construction, sub-components, and safety function of the following components of the Model No. LEUPA:

a. container of inner cans,
b. containment system,
c. external cover,
d. inner can,
e. inner cover,
f. intermediate cover,
g. thermal insulation,
h. neutron absorber,
i. elastomeric gaskets, and
j. stainless steel-graphite spiral gasket.

The applicant provides high-level definitions of items a. and c. to f, but nodefinitions of items b. and g. to j. These components seem to comprise the maincomponents of the Model No. LEUPA that the applicant is relying on for the safe transport of radioactive material. Therefore, these components should be clearlydefined in Section 1.1 .4 of the application.The staff needs this information to evaluate the adequacy of the design of theModel No. LEUPA package.This information is needed to confirm compliance with paragraph 807 of theTS-R-1.

ANSWER

The following terms that describe all the components that affect the safety of the package are added to the section “Definitions”:

1.1.4 Definitions

1. LEUPA: Type B(U) package for transport of radioactive material (uranium compounds) in solid state, with type LEU uranium (enrichment lower than 20% in U235 atoms).
2. Inner Container: Container where the radioactive material is housed. It is made of stainless steel and cylindrical. Its cover is threaded to preserve the load.
3. Container of Inner Cans: Cylindrical container where the inner cans are housed. It is completely made of stainless steel and is designed according to ASME Section III, Division 1, Subsection NB.
4. External Cover: External cover of LEUPA. It is fixed to the package by six (6) M12 bolts.
5. Intermediate Cover: Cover that separates the external cover of the container of inner cans. Has in its interior a Kaolite 1600 chamber, which acts as a thermal insulator. It is fixed to the package by six (6) M12 bolts.
6. Inner Cover: Cover that isolated the container of inner cans. Has in its interior a cadmium chamber. It is fixed to the package by eight (8) ¾" bolts. Its design is a standardized blind flange able to resist pressures of 150 Psi.
7. Containment system: Containment barriers between the load and the outside, and it is divided into three parts:
    a. Container of Inner Cans: This is a container designed according ASME Section III, Division 1, Subsection NB.
    b. Cadmium Chamber: A chamber of double wall stuffed with cadmium surrounds the container of inner cans. This barrier is also composed of a chamber that is located in the blind flange of the container of cans, surrounding the entire load with cadmium. The cadmium is of high purity, acting as neutron absorber.
    c. Kaolite Chamber: Surrounding the cadmium chamber, to the outer cover is a space which is filled by a thermal insulator, Kaolite 1600. This material withstands maximum temperatures of 871°C. The intermediate cover also has a kaolite chamber, completely wrapping the load with thermal insulator.
8. Elastomeric Joints: Seal the package with the intermediate and external covers. They are made of nitrile and are 5 mm thick. They protect the load from dirt and humidity.
9. Graphite spiral gasket: Seal located between the blind flange and the container of inner cans. Seal the internal and external load pressures, because it has double support (RWI type). It resists 150 lbs and its standard is ASME B16.20

G.2

Provide the translated versions of all the documents related to the application for the revalidation of the Model No. LEUPA package. (All documents should be entirely translated to the English language).

The staff noticed that some documents submitted as part of the application for the revalidation of the Model No. LEUPA contained information and text in Spanish without the proper translation. Some examples of these documents are as follows:

Document No.	Example of Information Needing Correction(s)
0908-LE00-3BEIN-023-B, Revision B *0908-LE01-3BEIN-024-B Revision: B*	Diagrams (translation and readability) Table 3, "Contingencies and contention barriers to assure sub-criticality (as established in paragraph 671 of the Standard), " and Section 7.4, "Results."

Note: The examples provided in these questions do not include all the items that the applicant needs to revise in order for the staff to review the revalidation request for the Model No. LEUPA.The applicant should review and revise the application to ensure that the translated documents include the proper technical and non-technical terminology, the appropriate references (in English), and the diagrams and drawings are adequate for the review (proper translation and font\drawing size).

The staff needs this information to evaluate the adequacy of the design of the Model No. LEUPA package.

ANSWER

A new information packet is sent, with all the documents revised and corrected.

G.3

Revise the English translation of the application to include the identification number and corresponding revision of the documents translated to English referenced in the application for the Model No. LEUPA.

In some instances, documents submitted as part of this application referenced the Spanish version of documents or drawings instead of the translated version of the documents. Note that the application and documents submitted as part ofthe revalidation process must be fully translated into English.

The staff needs this information to evaluate the adequacy of the design of the Model No. LEUPA package.

ANSWER

Documentation was revised in response to the last RAI, and it was found that the translation of the LEUPA's approval certificate refers to documents in Spanish version; therefore, the new translation of the certificate that is sent, includes the identification number of documents in English version. This translation does not include revision numbers of the documents, because the original version of the certificate issued by the Nuclear Regulatory Authority (ARN) does not. Below, revision numbers of documents mentioned in the certificate are shown:

- 0908-LE00-3BEIN-026-B
- 0908-LE00-3BEIN-017-B
- 0908-LE00-EDEIN-019-B

G.4

Revise the English translation of the application submitted for the revalidation of the Model No. LEUPA package to include the applicable revision Nos. of the drawings and documents throughout the documents related to this application.

The references to engineering drawings in the application should include the corresponding revision No. to ensure that the packaging is designed, fabricated, and tested as approved for transporting the authorized radioactive material. The same principle applies to documents that constitute the licensing basis to the Model No. LEUPA package.The staff needs this information to evaluate theadequacy of the design of the Model No. LEUPA package.

ANSWER

The documents, manuals, specifications, reports and drawings attached to the information package, reference documents without revision number, because by the methodology of the company, it is assumed that it always refers to the latest revision in the valid file base. Therefore, the revision number is not added in the documentation references.

A comprehensive list including the current revision numbers of all valid documents and drawings is shown below. If a document, mentions a reference without revision number, the next list will indicate which is the referenced version:

DOCS

0908-LE00-3BEIN-023-C - Safety Report
0908-LE02-3BEIN-008-B - Tests Final Report
0908-LE01-3BEIN-024-C - Criticality Analysis
0908-LE00-3BEIN-017-C - Operation Manual
0908-LE00-2BEIN-015-B - Thermal Analysis
0908-LE00-3BEIN-025-B - Radiation Protection Program
0908-LE00-3BEIN-026-B - Inspection and Maintenance Manual
0908-LE00-EDEIN-019-B - Quality Management Program for the LEUPA Package
0908-LE01-3BEIN-011-B - Calculation Report
0908-LE01-3BEIN-012-B - Verification of Lifting Points of the LEUPA Package
0908-LE01-3BEIN-013-B - Manufacture Specifications
0908-LE00-3DEIN-018-C - Transport Manual
0908-LE01-3BEIN-025-B - Analysis of the LEUPA Package –Restraint for Transport
0908-LE01-3BEIN-026-B - Analysis of the LEUPA Package – Impact Test
0908-LE02-3BEIN-002-B - LEUPA Specification of Approval Tests for Type B(U) Package for Fissile Materials
0908-LE02-3BEIN-003-B - Analysis of the LEUPA Package – Drop Position Causing Most Damage
0908-LE02-3BEIN-004-A - Analysis of the LEUPA Package – External Pressure
0908-LE02-3BEIN-006-A - LEUPA Specification for the Assembly of the Type B(U) Package for Approval Tests
0908-LE00-EBEIN-001-A - Database for the Design of LEUPA Package

0908-LE02-3BEIN-007-A - Independent Review of Doc. 0908-LE01-3BEIN-024-B – Criticality Analysis
0908-LE01-3BEIN-028-A - Dose Rate Calculations
0908-LE01-3BEIN-027-A - Calculation Line for LEUPA Sub-Criticality Analysis

DRAWINGS
0908-LE01-3AEIN-004-B - Package General Assembly
0908-LE01-3AEIN-005-A - Package – Main Body Container of Inner Containers
0908-LE01-3AEIN-006-A - Package – Main Body Cadmium Chamber
0908-LE01-3AEIN-007-A - Inner Container
0908-LE01-3AEIN-008-A - Packaging Intermediate Cover
0908-LE01-3AEIN-009-A - Packaging External Cover
0908-LE01-3AEIN-010-A - Packaging Main Body
0908-LE01-3AEIN-015-A - Packaging Main Body Type A &B Sheets
0908-LE01-3AEIN-016-A - Packaging Main Body Flange
0908-LE01-3AEIN-017-A - Packaging Main Body Warning Plate
0908-LE01-3AEIN-018-A - Packaging Main Body Name Plate
0908-LE01-3AEIN-019-A - Packaging Main Body Design and Manufacture Plate
0908-LE01-3AEIN-020-A - Set of Joints Rubber Supplements
0908-LE02-3AEIN-001-A - Immersion Test Containers
0908-LE02-3AEIN-003-A - Indenter for Testing According Paragraph 724
0908-LE02-3AEIN-004-A - Indenters for Testing According Paragraphs 727 B) & 735 B)
0908-LE02-3AEIN-005-A - Plate for Testing According Paragraph 727 C)
0908-LE02-3AEIN-006-A - Disposition of the Indenters on the Target
0908-LE02-3AEIN-009-A - Piping for Aspersion Test
0908-LE02-3AEIN-012-A - Quick Release Hook for Drop Tests
0908-LE02-3AEIN-013-A - Fixing Elements Anchorage
0908-LE02-3AEIN-014-A - Fixing Elements Wedge
0908-LE02-3AEIN-015-A - Fixing Elements Clamping Over

CRITICALITY SAFETY

Cr-1

Provide a benchmarking analysis of the MCNP5 program with the selected cross section library as well as the area of applicability of the selected benchmark experiments and an upper subcriticality limit (USL). The benchmarking analysis should include the following:

a. the resulting bias and bias uncertainties, and
b. corresponding corrections to the calculated k_{eff} values.

The applicant's criticality safety analysis does not include a discussion about the benchmarking of the MCNP5 program in order to calculate an appropriate USL for the criticality analyses. In response to the previous RAI, the applicant provided independent calculations using a different code and a different cross-section library to provide independent support for the MCNP results. However, these independent calculations do not meet the intent of a benchmarking analysis, namely since they do not establish a USL.

This information is needed to confirm compliance with paragraphs 671 (a), 677,678, 679, 680, 681, and 682 of the TS-R-1.

ANSWER

The benchmarking analysis of the MCNP5 program with the selected cross library is presented in document 0908-LE01-3BEIN-027-A, "Calculation Line for LEUPA Sub-Criticality Analysis".

The benchmarking analysis was carried out following the reference SSG-26, "Specific Safety Guide", Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, IAEA, 2012.

This analysis includes both the bias and bias uncertainties, and the corresponding corrections to the calculated k_{eff} values.

The Upper Subcritical Limit (0.9350) is established in document 0908-LE01-3BEIN-027-A, "Calculation Line for LEUPA Sub-Criticality Analysis".

During the criticality Analysis performed at 0908-LE01-3BEIN-024-C, "Criticality Analysis" the k_{eff} results are lower than the USL.

Cr-2.

Describe the acceptance tests conducted to verify the presence and distribution of neutron poisons during and after the fabrication of the package.

The application does not include information explaining how the applicant ensures that cadmium is present, uniform, and free from voids in order to performits safety function. In response to the previous RAI, the applicant provided quality control data sheets that are intended to show cadmium is adequately constructed and stated a procedure implicit in the drafting of these data sheets.

However, this procedure is not in the SAR.

This information is needed to confirm compliance with paragraph 501 of the TS-R-1.

ANSWER

Below it is described the Cadmium casting method, and its acceptance criteria:

Cadmium casting method:

1. Measure the weight of the empty Cadmium chamber.
2. Fill the chamber completely with water and measure its weight again. Then empty the chamber.
3. Dry the chamber.
4. Heat the chamber at a temperature of 250°C and cast the molten Cadmium through the holes in the chamber designed for this purpose, up to the top.
5. Once Cadmium solidified, measure the weight of the chamber.
6. Knowing the weight of the chamber with water, the weight of the chamber with Cadmium and density of each substance (Cadmium and water), by a simple calculation, it could be found the efficiency of Cadmium filling. The calculation is shown below:

Determination of the volume to fill:

Piece weight (Pw) (Kg)	61.700 Kg
Piece weight + Mass H2O (Pw + MH2O) (Kg)	68.350 Kg
H2O mass (Pw + MH2O)-M_p (Kg)	6.650 Kg

Measuring mass of Cd casted:

Cast Cd mass + mass piece (M_{cd+p}) (Kg)	117.850 Kg
Mass calculation cast Cd = M_{cd+p}-M_p (Kg)	117.850 Kg – 61.700 Kg = 56.15 Kg

Calculation of cast efficiency:

Cd density :8.65 gr/cm3	H_2O density : 1 gr/cm3
Theoretical Mass Cd = M_{H2O} x Dens.Cd / Dens H_2O = 6.65 Kg x 8.65 gr/cm3 / 1gr /cm = 57.52 Kg	
Efficiency cast E = Mass cast Cd / Theoretical mass Cd x 100 = 97.6 %	

Acceptance criteria of the casting Cadmium:

According to the following conclusion of the Doc. No. 0908-LE01-3BEIN-024 “Criticality Analysis”:

Manufacturing Error: Cadmium is not filtered in Cadmium Chamber

1. The variation of the effective multiplication factor was studied in the extreme cases analysed in previous sections, considering that cadmium, due to an unforeseen error in manufacturing, does not filter into the cadmium chamber.
2. The table below shows the cases evaluated, the name of the MCNP input file (as reference), and the effective multiplication factor (k_{eff}) obtained together with its SD, and the final result obtained as k_{eff} plus three times SD.
3. The column identified as “# Cycles” is the total number of KCODE cycles done, each of them issuing two thousand five hundred (2500) fission neutrons.
4. It can be seen that the worst case is again that in which the inner cans are flooded with water (1000 g), the thermal insulator is dry (100/0) and the density of water in the empty spaces is insignificant. This case, for which the highest effective multiplication factor was obtained, shows sub-criticality is assured by large.

Several cases without cadmium in the cadmium chamber

Case	# Cycles	k_{eff}	SD	k_{eff}+3SD
100/0	2000	0.44659	0.0003	0.44749
1.0	2000	0.41667	0.0003	0.41757
1000.0	2000	0.81006	0.0004	0.81126
100/0 - 1E-5	2000	0.81428	0.0004	0.81548

Considering this and based on previous study, in case there are errors in the casting Cadmium, it would not cause problems in terms of subcriticality, a void content lower than or equal to 10% was defined as acceptable.

Therefore, if the calculation of Cadmium cast efficiency in each piece is over 90%, the procedure and that piece are defined as acceptable.

Moreover, as the k_{eff} still low even in the case of absence of Cadmium, checking the homogeneity of the voids distribution is considered redundant.

Cr-3

Provide a single package (i.e., isolated package) evaluation.

In the criticality analysis, the applicant considers an array of packages under normal conditions of transportation (NCT) and hypothetical accident conditions (HAC). However, in Section 7.1 of the criticality analysis, the applicant notes that the TS-R-1 standard requires the assurance of subcriticality for an isolated package, but the application does not include an analysis of an isolated package.

This information is needed to confirm compliance with paragraphs 677, 678, 679, and 680 of the TS-R-1.

ANSWER

The evaluation of the single package under normal conditions of transportation and hypothetical accident conditions is included in document 0908-LE01-3BEIN-024-C, "Criticality Analysis".

SHIELDING EVALUATION

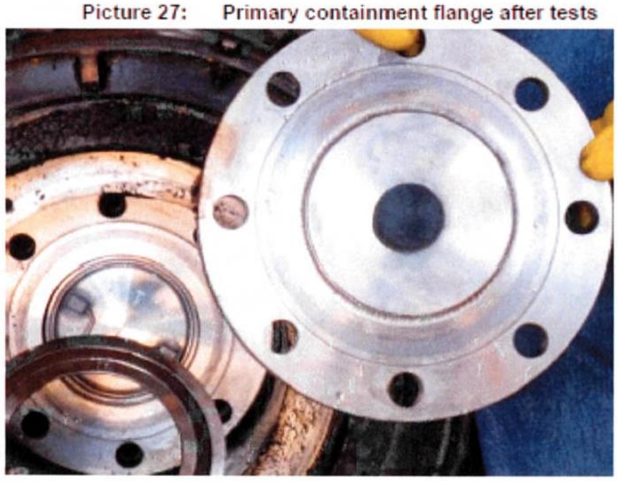
G-Sh-1

Revise the application's description of the "Primary Containment Lid/Flange."

The previous question regarding this item has not been adequately answered.

The figure of concern is Picture 27 of the "Tests Final Report" document (shown here).

Picture 27: Primary containment flange after tests



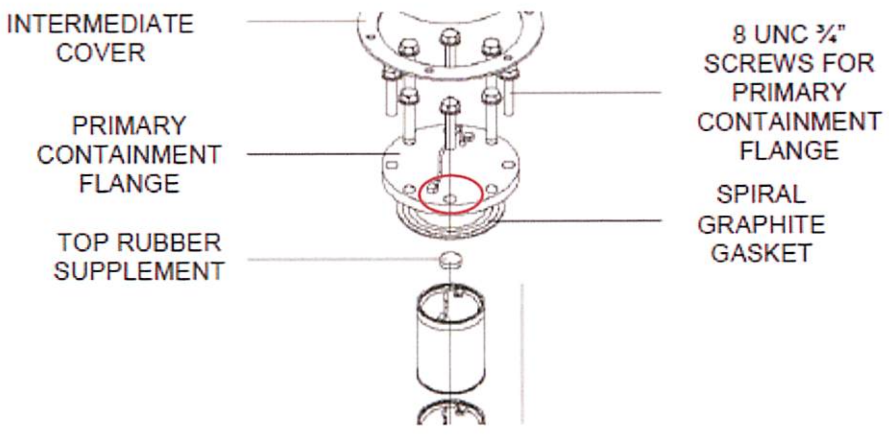
The picture above (i.e., figure) does not appear to be of or about the primary containment flange per the discussions and per the figure submitted in the RAI responses. It is not clear what this component is. Based on the figure submitted in the RAI responses, the metal object shown in the foreground of the picture, is not part of the packaging since that figure does not include it. It is also not clear that the design drawings include this metal object either. If this metal object in Picture 27 is the primary containment flange, then the submitted figure and the

English version of the figure that is on page 27 of 30 of the Safety Report (Document No. 002 0908-LE00-3BEIN-023-A) (see cut out of figure from Safety Report page 27 of 30 below) and the design drawings (see a cut out of Drawing No. 00B 0908-LE01-3AEIN-005-A below) are not correct and must be fixed because these show the primary containment flange as a solid lid with a handle and a cadmium component (whereas this Picture 27 has a large hole in the middle of the flange). The object with a handle in Picture 27 appears to be the top most of the four inner cans that are loaded into the package.

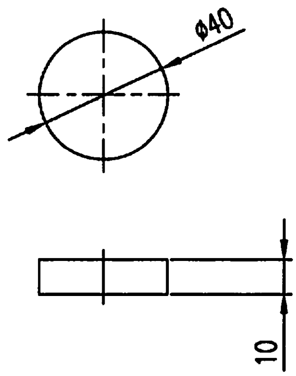
Security-Related Information Figure Withheld Under 10 CFR 2.390.

ANSWER

Figure 27 of the document "Test Final Report" show the bottom view of the blind flange of the container of inner cans. The flange has on its bottom face a rubber supplement, as shown in the figure below:



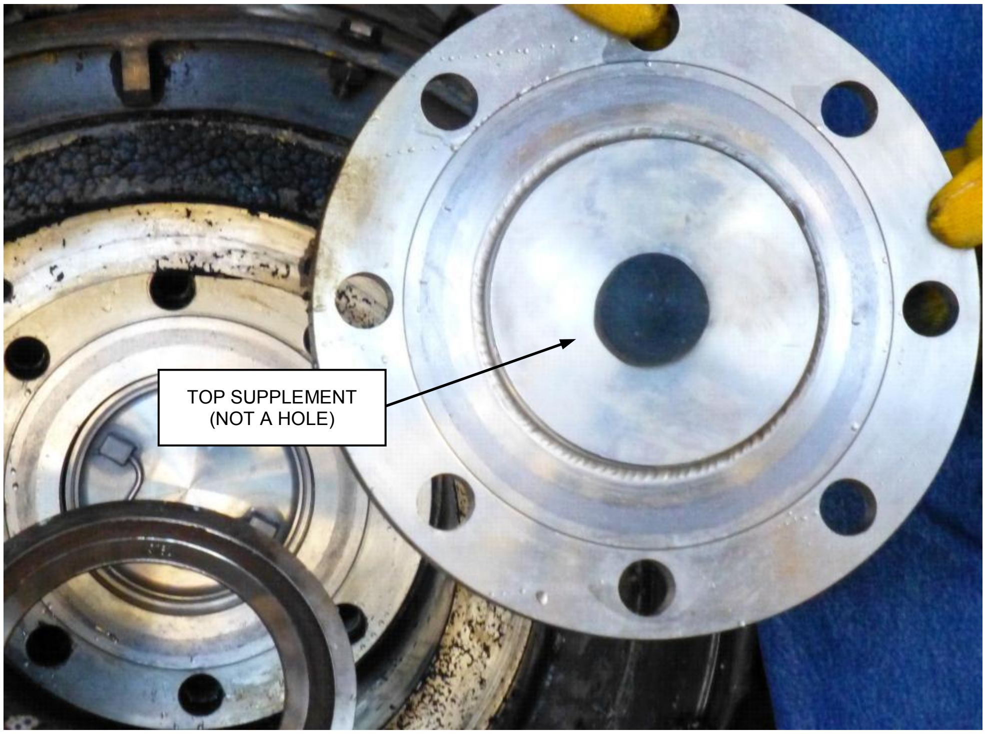
The following figure is from Drawing No. 0908-LE01-3AEIN-020, and shows the supplement dimensions:



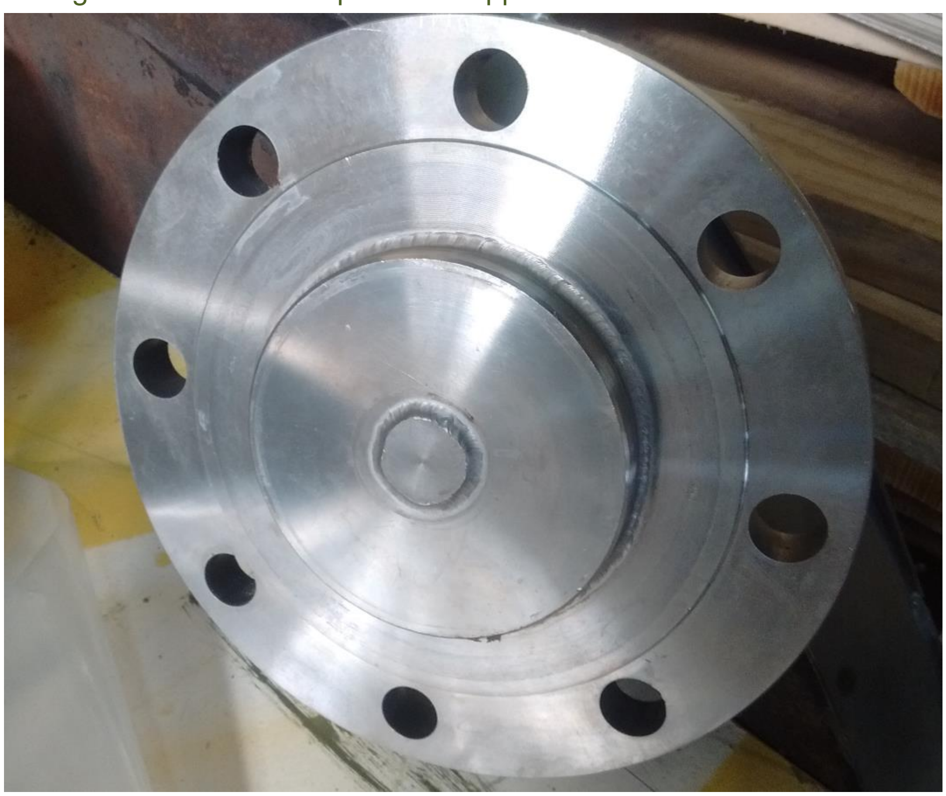
The following figure is from the Drawing No. 0908-LE01-3AEIN-005, and shows a sectional view of the blind flange, where you can see a rectangle of 30 mm on the bottom face, but this corresponds to a plug for casting cadmium which closed after the Cadmium is casted.

Security-Related Information Figure Withheld Under 10 CFR 2.390.

In Figure 27 from the "Test Final Report", the plug from the previous figure is covered by the top rubber supplement:



In conclusion, the blind flange does not have any hole in its center. The following image shows the same face of the flange but without the top rubber supplement.



G-Sh-2

Modify Drawing No. 00A 0908-LE01-3AEIN-004-A to include the Packaging Main Body Design and Manufacture Plate in its Bill of Materials with the reference to 0908-LE01-3AEIN-019 in the Bill of Material's Notes for that item.

This change is needed to ensure the acceptance criteria for the package acceptance tests and maintenance programs are adequate, as modified in response to the previous question about acceptance criteria.

This information is needed to confirm compliance with paragraph 501 of TS-R-1 .

ANSWER

A new version of the Drawing No. 0908-LE01-3AEIN-004 is being sent, where it is added, based on this request, the drawing 0908-LE01-3AEIN-019 on the list of materials as reference of the design and manufacture plates.

The new list of material of the new revision of the Drawing No. 0908-LE01-3AEIN-004 is shown below:

Security-Related Information Figure Withheld Under 10 CFR 2.390.

Sh-1

Clarify and revise the following information in the application:

a. The dose rates calculated in the "Safety Report" are for gamma radiation and that neutron dose rates were not calculated, stating the basis for not calculating neutron dose rates.
b. The dose rates in the application for the package surface and 1 meter from the package surface; the package surface dose rates should be larger than the 1 meter dose rates.
c. Verification that dose rates for a loaded package meet all appropriate dose rate limits in TS-R-1.

For Sh-1 .a, the "Safety Report" should clearly state what dose rates are calculated (i.e., should state that only gamma dose rates were calculated, which was done using MicroShield), and the "Safety Report" should also clearly state that neutron dose rates were not calculated and the reason for not calculating neutron dose rates. This information was given in the response to the question, but it should also be included in the "Safety Report."

For Sh-1 .b, the response to the previous question on this item was not adequate.

The "Safety Report" is still in error. The "Transport Manual" may also be in error.

Section 2.6 of the "Safety Report" states that the dose rate at 1 meter from the package is 0.3 μSv/hr but the dose rate at the package surfaces 6.89E-4μSv/hr. This does not make sense. The dose rate at the package surface should be higher than the dose rate at 1 meter from the package. Thus the dose rates in the "Safety Report" need to be corrected. The dose rates should also be corrected in the other documents where they are described.

For Sh-1.c, the response to the previous question on this item was not adequate.

Section 7.2.6 of the "Operation Manual" should include verification that ALL regulatory dose rate limits are met. This includes the surface dose rates as well as the 1 meter dose rates for calculating the Transport Index and ensuring it is less than 10. Section 7.2.6 needs to include verification of compliance with package surface dose rate limits.

This information is needed to confirm compliance with paragraphs 521, 524, and 525 of TS-R-1.

ANSWER

Details of the dose rate calculations are included in document 0908-LE01-3BEIN-028-A "Dose Rate Calculations". Responses to items a) to c) are included in that document too.

Sh-1-a

The information contained in document 0908-LE01-3BEIN-028-A "Dose Rate Calculations" shall be used to correct and update the related content in the "Safety Report".

Sh-1-b

The information contained in document 0908-LE01-3BEIN-028-A "Dose Rate Calculations" shall be used to correct and update the related content in the "Safety Report" and "Transport Manual" and any other document where it might be needed.

Sh-1-c

The dose limit will be added on the point 7.2.7 - 0908-LE00-3BEIN-017 - Operation Manual, to verify radiation on the surface.

Sh-2

Revise the "Safety Report" to provide information, including analyses as needed, to demonstrate compliance with the TS-R-1 dose rate limits for packages that have experienced accident conditions tests and limits for increases in package dose rates due to normal conditions tests.

ANSWER

Document 0908-LE01-3BEIN-028-A "Dose Rate Calculations" provides the needed information to update the "Safety Report".

This question has two parts. The first relates to changes to dose rates as aresult of the impacts of the normal conditions of transport tests (TS-R-1, 2009revision, paragraphs 719 through 724). The dose rates in the application are forthe package as designed. The dose rates, per Paragraph 646(b) of TS-R-1 for apackage that has been tested per Paragraphs 719 through 724, may not be morethan 20% higher than the as-designed package dose rates.

ANSWER

The document 0908-LE01-3BEIN-028-A "Dose Rate Calculations" answers this part of the question.

To demonstrate this, the applicant should describe the damage to the package in writing, including any dimensional changes to the package at the impact location for the normal conditions tests (Paragraphs 719 through 724) and calculate dose rates for a package with those dimensional changes. For example, if the greatest damage is indentation or crumpling of the package by 2 cm in the test impact area, then a MicroShield model that reduces the package dimensions and material by 2 cm in the highest dose rate orientation, or location, should be used to calculate dose rates in MicroShield. The resulting dose rates (surface and at distance) should not exceed 1.2 times the value of the dose rates for the as designed package. If the damage to the package from these tests is limited to only superficial nicks and scratches, then the application should state that. In that case, a new dose rate calculation for normal condition test impacts is not necessary. Note, the test orientations should include those that would result in the greatest damage to the package's shielding.

ANSWER

The document 0908-LE01-3BEIN-028-A "Dose Rate Calculations" answers this part of the question.

The second part of the question deals with the accident conditions dose rates. In the meeting on 04/27/2016, the NRC staff stated that the application did not include a Type B puncture test (Paragraph 727(b)), but only a Type C puncture test (Paragraph 735). A second look at the application documents indicates the NRC staff was in error. However, the documentation indicates that the Type B package thermal test was not done. Instead, a Type C thermal test was done after the Type C puncture test was performed. In analysing the dose rates from a Type B package for accident conditions, the dose rates should be calculated for a package that has experienced all of the Type B package accident conditions tests. Since there is no information about the package response to a Type B thermal test (Paragraph 728) after the Paragraph 727 drop tests, the NRC staff had to consider the configuration of the package after the Type C drop and thermal tests. This is a basis for the question about HAC dose rates. Since the configuration for the package as a result of these tests has a puncture in it, the applicant should calculate the accident conditions dose rates with a model to account for this package condition. Since the applicant uses MicroShield for dose rate analysis, an acceptable and bounding calculation would be to use a model that removes all of the package material that is external to the cadmium lined portion of the package (which has a 216 mm outer diameter per Drawing No. 00E 0908-LE01-3ASIN-010-C) and its associated lid.The accident dose rates would then be calculated at 1 meter from the external surface of this part ofthe package. This would also bound any damage from the Type B accident conditions tests.

ANSWER

The document 0908-LE01-3BEIN-028-A "Dose Rate Calculations" answers this part of the question.

This information is needed to confirm compliance with paragraphs 646(b) and 657 of TS-R-1 .

Sh-St-1

Modify the information in "Tests Final Report," Section 6.2.2, paragraph 3, to state the correct top load mass.

The response to the previous question about the load mass included changes to the language of this paragraph. However, the changed language includes an error. Section 6.2.2, paragraph 3 of "Tests Final Report" currently reads as "top load is 2933 Kg." It should be changed to read as "top load is 2399 kg."

This information is needed to confirm compliance with paragraph 723 of TS-R-1.

ANSWER

The document “Test Final Report” is sent with this correction. The paragraph is:

3. The weight of the specimen LEUPA 01 is 473 Kg and top load is 2399 Kg, they were verified with a load cell.

CONTAINMENT EVALUATION

Co-St-4

Provide documentation (in English) to confirm certain aspects of the containment boundary. The application should include explicit discussion and documentation that explain how item a and item b are satisfied.

a. The metal containment boundary AND the spiral gasket seal is designed and evaluated under a reduction of ambient pressure to 60 kilopascals(kPa), per IAEA paragraph 643.
b. The spiral gasket and its corresponding gasket groove is designed and evaluated for an internal pressure that produces a differential pressure of not less than the maximum normal operating

pressure plus 95 kPa, per IAEA paragraph 619. The response should also explicitly state the maximum normal operating pressure.

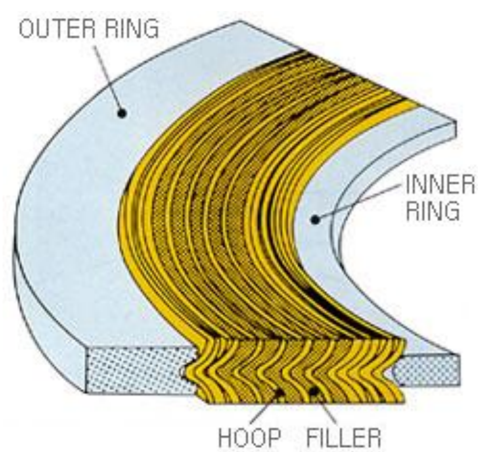
c. Specify whether a complete LEUPA containment boundary, including spiral gasket seal, successfully passed a hydraulic pressure test (perTable 1 of document No. 0908-LE01-3BEIN-011-A).

Note: These questions are asked because the focus of the finite element analysis in document No. 0908-LE01-3BEIN-011-A (for example, Figure 2) was on the vessel, with no mention that the spiral gasket seal could satisfy the pressure differentials.

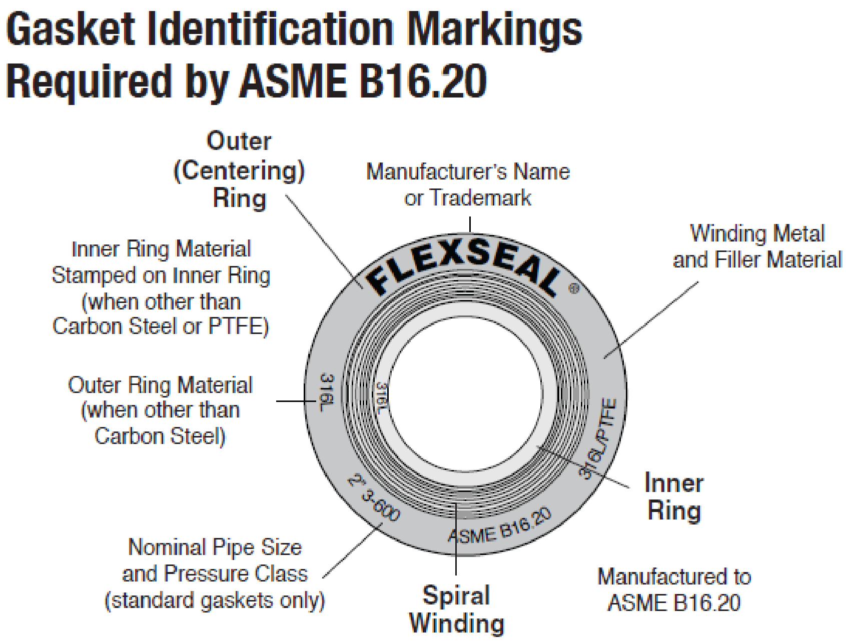
ANSWER

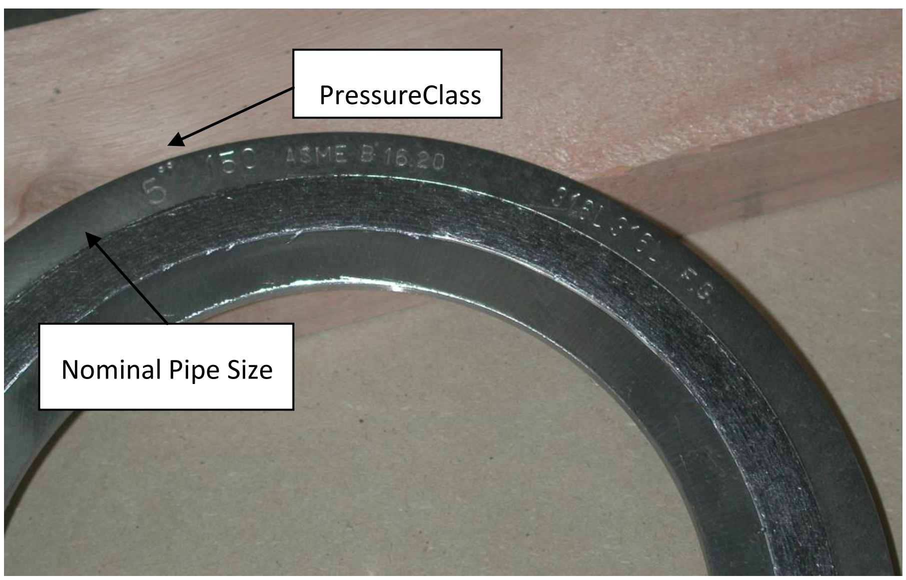
- **Item A**

The Spiral Gasket seal of the Container of Internal Containers (Inner cans) has dual support and therefore double protection in the sealing area, with the capacity to tolerate both external and internal pressure.



Low pressure in the environment of the Container creates a difference of pressure with the exterior, where pressure would be lower; therefore, low external pressure would cause the same effect than high pressure inside the Container of Internal Containers. In the event of exposure to high internal pressure, the Spiral Gasket is designed to tolerate 150Lb/in2. The applicable manufacturing standard is ASME B16.20 class 150, providing validation for maximum internal and external pressures of up to 150 Lb/in2. The following figure displays the meaning of the nomenclature and the subsequent figure displays the Spiral Gasket of the LEUPA:





- **Item B**

As per its manufacturing standard ASME B16.20, the Spiral Gasket is designed to withstand, at least, a pressure of 150 lb/in^2, and therefore an internal pressure of 95 KPa would have no leaks.

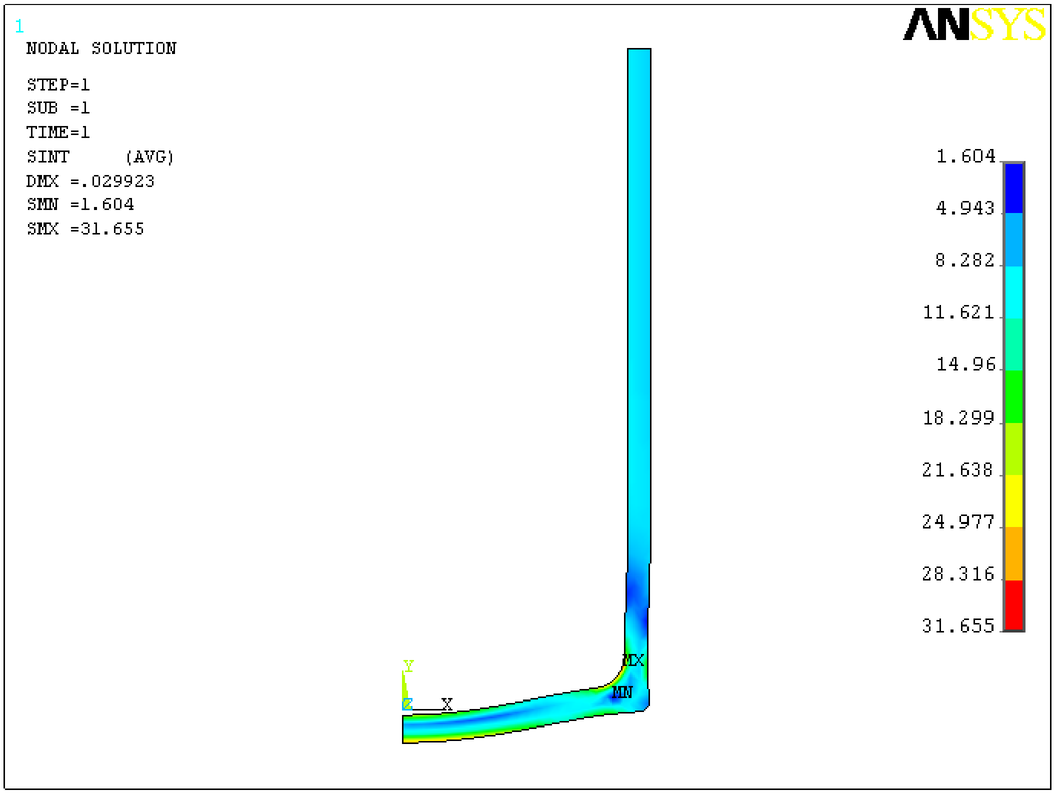
The flanged joint, which consists of a Blind Flange and a Neck, displayed in the following figure, is normalized as per Standard ASME B16.20, which is stated to tolerate pressures of up to 150 lb/in^2.

Security-Related Information Figure Withheld Under 10 CFR 2.390.

The thickness of pipe of the container of internal containers is estimated as per ASME III NB, section 3320, as shown below. The estimated thickness is way below the actual thickness of the 6,55 mm part, and is therefore considered acceptable.

International System of Units S.I.	$kPa = 1000\ Pa$
Material	ASTM A312 – 304L
Stress Intensity	$S_m = 16700\ psi$
Yield Strength	$\sigma_y = 25000\ psi$
Tensile Strength	$\sigma_u = 70000\ psi$
Design Pressure	$P = 700\ kPa$
Internal Radius	$R_i = 128.2\ mm$
Minimum Required Width	$t = \dfrac{P \cdot Ri}{S_m - 0.5 \cdot P} = 0.391\ mm$

The estimation for the flat cover, the base of the Container of Internal Containers, is prepared using finite elements, with an internal pressure of 700KPa, resulting in maximum stresses of 32 MPa and 0.03 mm displacements, which are considered acceptable. Below are the maximum stresses.



As a conclusion, we can say that the Container of Internal Containers can withstand a maximum internal pressure of 700Kpa.

- **Item C**

The hydraulic pressure test sheet added was performed on a LEUPA during the manufacturing stage.

This test is carried out based on the requirements stated in ASME VIII, to test the Container of Internal Containers, body, gasket and flange, at an internal pressure of 8.75 Bar for 30 minutes.

Given that the only record kept is a manually prepared test sheet, it cannot be converted properly, and therefore the following images and a conversion table are added to the original sheet to properly identify each part of the sheet.

LA METALÚRGICA INDUSTRIAl Form-0705-Rev.0
LAMPE LUTZ & CÍA. S.A.I. y C.
Av. Hipólito Yrigoyen 1310. (B-1868-EDP) Avellaneda
e-mail: info@lmi-ar.com

PRUEBA HIDRÁULICA

PROTOCOLO DE ENSAYO Nº LMI-12957-1H

Obra: 2 CONTENEDOR PORTA RECIPIENTES
Cliente: INVAP SE
Nº de orden de compra del cliente: ~~232531~~ 424392 **Nº de orden L.M.I.:** 12957
Inspector autorizado del cliente: ....
Responsable de L.M.I.: ....

En el dia de la fecha se procede a realizar prueba hidráulica de las siguientes cámaras del equipo que figura en el epígrafe según se detalla a continuación.

Cámaras:

Cámara	Presión máxima de trabajo [bar]	Presión de prueba [bar]	Duración [min]	Resultado	Manómetros utilizados			
					Rango [bar]	Tipo	Marca	Nº
INTERIOR	7	8,75	30'	APROBADO	0-20	B	BERIM	MAN 012
del Equipo Nº 1								
PL Nº 0908-LE01-								
3ASIN-005-B								

Condiciones:
Código bajo el que se realiza la prueba: ASME III – DIVISION 1

Localidad. Avellaneda, Fecha 07-06-07

Firma:...
(Representante técnico del cliente)

Documento Nº.................................

Firma: [signature]
(Representante LMI)

Documento Nº 5.224.690

Table 1- ORIGINAL VERSION

LA METALÚRGICA INDUSTRIAL LAMPE LUTZ & CÍA. S.A.I. y C

Form-0705-Rev. 0

Av. HipólitoYrigoyen 1310. (B-1868-EDP) Avellaneda
e-mail: info@lmi-ar.com

HYDRAULIC TEST
TEST PROTOCOL No. LMI-12957-1H

Work:	2 CARRIER CONTAINER PACKAGE		
Customer:	INVAP SE		
Purcharse Order No.:	424392	**L.M.I. Order No.:**	12957
Inspector Authorized by Customer:	________		
L.M.I Response:	________		

On the day of the date, it proceeds to perform hydraulic test of the following chambers of the equipment contained in the heading, as detailed below:

Chamber	Max. Work Pressure [bar]	Test Pressure [bar]	Duration [min]	Result	Gauge Used			
					Range	Type	Brand	No.
Inner (Equip. No. 1)	7	8.75	30	Approved	0 - 20	B	BERIM	MAN 012
(Drw. No. 0908-LE01-3ASIN-005-8)								

Conditions:
Code under which the test is performed: ASME III - DIVISION 1

Location: Avellaneda
Date: 07/06/2007

Table 2 - ENGLISH VERSION

PACKAGE OPERATIONS

Op-Sh-1

Provide a more complete description of unloading operations in the Operations Manual.

The unloading operations, added in response to a previous question, appear to be incomplete. The unloading procedures should include receipt inspections.

These inspection steps would include a check for damage to the package and descriptions of actions to take if the package is damaged. The unloading steps should include removal of the different package lids and covers as well as the different sets of bolts.

ANSWER

The unloading procedure was modified, paragraph 7.2.6 of the Operation Manual:

7.2.6 Unloading

1. The Package documentation, which contains a description of the type and amount of load, described in the LOADING AND UNLOADING SHEET, SHIPMENT SHEET and REMITTANCE DETAIL is received.
2. If the shipment data match the remittance details, and there are no damages or alterations in the exterior of the Package, and no signs that the External Cover was opened, the Package is accepted.
3. Radiation and contamination levels in the surface of the Package are controlled. None of the levels shall be above those detailed in the SHIPMENT SHEET.
    a. If a measurement is above the measurement allowed, the necessary precautions shall be taken into consideration, and the Nuclear Regulatory Authority shall be notified.
4. If the Package has suffered damages caused by transportation or handling, a report shall be issued and the procedure stated in the Inspection and Maintenance Manual for damaged Packages or Packages requiring maintenance shall be followed.
5. With the package accepted and the room download continues as follows:
    1. Remove the six (6) M12 bolts from the External Cover.
    2. Remove the External Cover.
    3. Remove the six (6) M12 bolts from the Intermediate Cover.
    4. Remove the Intermediate Cover.
    5. Remo Remove the eight (8) UNC ¾” bolts from the Blind Flange.
    6. Remove the Blind Flange.
    7. Remove the four (4) Inner Cans.
    8. Control the mass of the load of each Internal Container, to ensure it is the same as detailed in the REMITTANCE DETAILS sheet.
    9. After de download of the Inner Cans, the closure of the LEUPA package starts as follows:
        a. Place the Spiraled Stainless/Graphite Joint in its position and then place it upon the Blind Flange.
        b. Assemble the Cover of the container.
        c. Put the eight (8) UNC ¾” bolts with its washers.
        d. Adjust the bolts until reach a hermetic seal of the container (torque not less than 55 Nm). See Picture 6.
    10. Once the Container of Inner Cans is closed, it proceeds as detailed below:
        a. Place the Nitrile Gasket of the Intermediate Cover in its position.
        b. Assemble the Intermediate Cover.
        c. Put the six (6) M12 bolts with its washers.

    d. Adjust the bolts until fit the Intermediate Cover (torque not less than 15 Nm). See Picture 7.

11. Once the Intermediate Cover is fixed in position, it proceeds as detailed below:
    a. Place the Nitrile Gasket of the External Cover in its position.
    b. Assemble the External Cover.
    c. Put the six (6) M12 bolts with its washers.
    d. Adjust the bolts until fit the External Cover (torque not less than 15 Nm). See Picture 7.
12. Seal the package once finished each closure procedure.