



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 6, 2015

Mr. Norman A. Kent
Director of Licensing and Training
Daher-TLI, Inc.
8161 Maple Lawn Boulevard
Suite 450
Fulton, MD 20759

SUBJECT: REVISION NO. 10 OF CERTIFICATE OF COMPLIANCE NO. 9342 FOR THE
MODEL NO. VERSA-PAC TRANSPORTATION PACKAGE

Dear Mr. Kent:

As requested by your application dated June 9, 2015, enclosed is Certificate of Compliance (CoC) No. 9342, Revision No. 10, for the Model No. Versa-Pac transportation package. Changes made to the enclosed certificate are indicated by vertical lines in the margin. The staff's safety evaluation report is also enclosed.

Those on the attached list have been registered as users of the package under the general license provisions of 10 CFR 71.17 or 49 CFR 173.471. This approval constitutes authority to use the package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR 173.471.

If you have any questions regarding this certificate, you may contact me or Huda Akhavannik of my staff at 301-415-5253.

Sincerely,

/RA/

Michele Sampson, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9342
TAC Nos. L25020 and L25026

Enclosures: 1. CoC No. 9342, Rev. No. 10
2. Safety Evaluation Report
3. Registered Users

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cc w/encls. 1 & 2: R. Boyle, Department of Transportation
J. Shuler, Department of Energy, c/o L. F. Gelder
Registered Users



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SAFETY EVALUATION REPORT
Docket No. 71-9342
Model No. Versa-Pac
Certificate of Compliance No. 9342
Revision No. 10

SUMMARY

By application dated June 9, 2015, Daher-TLI, Inc. (Daher-TLI or, the applicant), requested amendment to Certificate of Compliance (CoC) No. 9342, for the Model No. Versa-Pac transportation package. Daher-TLI requested adding natural thorium as an acceptable content, a benchmark evaluation for SCALE 6.1.3, a correction to their single and package array evaluation for homogenous, distributed fissile mass, and inclusion of an enrichment loading table for enrichments less than 100 wt% U-235. Additionally, Daher-TLI made grammatical and clarifying changes throughout their safety analysis report (SAR).

As part of their request, QSA also requested renewal of the package.

Staff reviewed these changes and concludes that they do not affect the ability of the package to meet the requirements of 10 CFR Part 71. The package has been renewed for a 5 year term.

EVALUATION

By application dated June 9, 2015, Daher-TLI requested amendment to Certificate of Compliance (CoC) No. 9342, for the Model No. Versa-Pac transportation package. Daher-TLI requested adding natural thorium as an acceptable content, a benchmark evaluation for SCALE 6.1.3, a correction to a their single and package array evaluation for homogenous, distributed fissile mass, and inclusion of an enrichment loading table for enrichments less than 100 wt% U-235. Additionally, Daher-TLI made grammatical and clarifying changes throughout their SAR.

Chapters 1-5, 7, and 8, contained grammatical changes and clarifications. These changes include deleting the word "shipping container," replacing the word "container" with "package" or "packaging," replacing "55 gallon version" and "110 gallon version" with "VP-55" and "VP-110," deleting any references to Century Industries, and adding references and citations to each chapter.

General Information

In addition to the grammatical changes and clarifications mentioned above, Daher-TLI added Table 1-1, "Versa-Pac U-235 loading table." This table contains the U-235 and uranium mass limit in grams for different enrichments.

Table 1-1: Versa-Pac U-235 loading table

Weigh Percent U-235	U-235 Mass Limit (g)	Uranium Mass Limit
100	350	350
20	410	2050

10	470	4700
5	580	11600

Staff reviewed the enrichment table and confirms that these limits fall within the bounds of their criticality analyses and therefore meets the requirements of 10 CFR Part 71.

Criticality

Staff reviewed the information in the SAR and verified that the information is consistent as well as all descriptions, drawings, figures and tables are sufficiently detailed to support an evaluation of the changes in this application. The staff evaluated the package design to determine any criticality safety concerns.

Model Configuration

The applicant re-evaluated the Versa-Pac homogenized contents cases using SCALE 6.1.3. This software and cross-sections libraries are appropriate for this evaluation, and the applicant's benchmark evaluation is sufficient. The packaging model is largely unchanged and uses dimensions that have previously been reviewed and considered to be conservative. The applicant modeled both the VP-55 and VP-110 package dimensions as they occur under hypothetical accident conditions. This conservatively minimizes the fissile payload spacing.

The applicant evaluated various compositions, shapes and positions of the contents in the computational model to verify maximum system reactivity. The inhomogeneous evaluation showed that the most reactive and limiting configuration is with packages placed in a triangular array. This is the only array configuration that the applicant investigated in the homogeneous fissile material evaluation. Since the applicant used the same model for both hypothetical accident conditions and normal conditions of transportation, the more limiting array size of 5N is used. The applicant used a minimum array size of 272 packages for all analyses.

The applicant found that the limiting configuration is one where an array of packages containing homogenized, moderated fissile material, fills about 18% of the payload cavity. The applicant showed that a minimum array of 272 packages will remain adequately subcritical per 10 CFR 71.22; the applicant's results show that the CSI is 1.

Staff Evaluation

Staff performed its own analysis, using SCALE 6.1 with a continuous energy library based on the ENDF/B-VII cross section data. Staff varied the parameters important to criticality safety over the same range as the applicant. Staff evaluated both spheres and cylinders of homogenized materials over a range from solid, uranium metal to a homogenized mixture of polyethylene and uranium filling the entire payload cavity. Staff selected enrichment and fissile nuclide mass to coincide with the values in Table 1-1 of this letter.

Staff results are in reasonable agreement with those of the applicant. Staff analysis confirmed that:

- An assumed enrichment of 100% ²³⁵U is bounding.
- Interspersed moderation (water) between packages reduces system k_{eff} .
- For LEU, the optimum moderation results when the fissile mass is modeled as a sphere that occupies approximately 10-18% of the payload cavity, depending on enrichment.

- With multi-layered arrays, increasing polyethylene density outside the homogenized fissile mass but within the payload cavity reduces system reactivity.
- The inclusion of natural thorium does not increase system reactivity.

Staff finds reasonable assurance that the package meets the subcriticality requirements of 10 CFR Part 71.

CONDITIONS

Condition No. 3.b., "Title and Identification of Report or Application," has been updated to reflect this consolidated application submitted by Daher-TLI.

Condition No. 5(b)(1), "Type and form of material," has been updated to include natural thorium in any form.

Condition No. 5.(b)(2), "Maximum quantity of material per package," has been updated to include loading table for U-235 and Uranium based on U-235 enrichment.

Condition No. 12 and has been updated to reflect the new expiration date of August 31, 2020.

The references section has been updated to include this request.

CONCLUSION

Based on the statements contained in the application, and the conditions listed above, the staff concludes that the changes indicated do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9342, Revision No. 10, on August 6, 2015.

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