

April 12, 2016

Ms. Sarah Bryson  
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Croft Associates Limited  
Building 4F, Culham Science Centre  
Culham Abingdon  
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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE MODEL  
NO. 3977A PACKAGE

Dear Ms. Bryson:

By letter, dated December 14, 2015 (Agencywide Documents Access and Management System (ADAMS) accession number ML15351A324), Croft Associates Limited submitted an application for amendment of Certificate of Compliance No. 9338 for the Model No. 3977A package. To assist with our review, the U.S. Nuclear Regulatory Commission staff needs the information identified in the enclosure to this letter. Discussion of this request for additional information (RAI) and a response date occurred on March 30, 2016.

We request that you provide this information by May 20, 2016. Inform us at your earliest convenience, but no later than May 13, 2016, if you are not able to provide the information by that date. If you are unable to provide a response by May 13, 2016, please propose a new submittal date with the reasons for the delay.

Please reference Docket No. 71-9338 and TAC No. L25075 in future correspondence related to this amendment request. The staff is available to discuss these questions as well as your proposed responses. If you have any questions regarding this matter, feel free to contact me at (301) 415-6877.

Sincerely,

**/RA/**

Chris Allen, Project Manager  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 71-9338  
TAC No. L25075

Enclosure: Request for Additional Information

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Enclosure: Request for Additional Information

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**ADAMS Accession No. ML16104A323**

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Request for Additional Information  
Docket No. 71-9338  
Model No. 3977A Package

By letter, dated December 14, 2015 (ADAMS accession number ML15351A324), Croft Associates Limited submitted an application for amendment of Certificate of Compliance No. 9338 for the Model No. 3977A package. This RAI letter identifies information needed by the staff in connection with its review of the application.

Each individual RAI describes information needed by the NRC staff to complete its review of the application to determine whether the applicant has demonstrated compliance with the regulatory requirements.

### **Drawing Review**

- 1.1 Revise Drawing No. 2C-6176 as necessary to identify under what conditions the PTFE liner is optional.

Although Note 3 on Drawing No. 2C-6176 states that the PTFE liner is optional, the safety analysis report (SAR) change pages provided with the application do not identify instances where the stainless steel liner is used without the PTFE liner. In addition, in reviewing historical documents associated with this package, staff determined that the applicant previously addressed this question during the initial issuance of Certificate of Compliance No. 9338 and stated "...[t]he liner shall be used for all contents types carried in the stainless steel insert..." (ADAMS accession number ML13114A172).

This information is necessary to satisfy the requirements in 10 CFR 71.33(a)(5).

### **General Information Review**

- 1.2 Identify the correct mass of the stainless steel insert.

Table 1-3-5 states the stainless steel insert mass is 730 g and Table 1-1 states the stainless steel insert mass is 1451 g.

This information is necessary to satisfy the requirements in 10 CFR 71.33(a)(5).

### **Thermal Review**

- 3.1 Review all units to ensure that they are correct for the parameters they represent and revise as necessary.

Page 3-15 of the Safety Analysis Report (SAR) in a free volume of 216.4°C along with heating of the gases on loading this would lead to a MNOP of 2.23 bara. The units used for both volume and pressure are incorrect. The staff needs to verify that adequate units are used for the parameters they represent.

This information is needed to determine compliance with 10 CFR 71.71.

- 3.2 Provide detailed calculations, as well as all assumptions used in these calculations, which demonstrate that the heating from hydrogen ignition is negligible.

Page 3-15a of the SAR states that the heating created by ignition of all of the hydrogen generated over 28 days would be negligible compared to the heating of the package by the decay of I-131. However, the assumed initial temperature and pressure of both the containment vessel and associated contents are not provided. In order to assess both the accuracy of this statement and the adequacy of the containment system if hydrogen ignition occurred, the staff needs to review the detailed calculations and all assumptions which substantiate this statement. Identify the maximum temperature and pressure of the containment vessel and associated contents due to hydrogen ignition with the detailed calculations.

This information is needed to determine compliance with 10 CFR 71.71.

- 3.3 Identify the gamma energy used in the hydrogen generation analysis and prove it bounds all expected values.

Page 10 of 13 of the Hydrogen Generation Analysis – MURR Technical Note states that I-131 decays emitting beta particles with an average energy of 0.19 MeV and gammas with an average energy of 0.364 MeV. However, it appears the gamma energy value used in the analysis is the most likely gamma energy and not necessarily the average. If the average gamma energy is higher than the value used in the analysis, the hydrogen generation rate could be under predicted.

This information is needed to determine compliance with 10 CFR 71.71.

## **Containment Review**

- 4.1 Provide the basis for the new O-ring groove dimensions.

The staff needs to verify the acceptability of the proposed containment system relaxed O-ring groove dimensions; therefore, the applicant should provide the basis for their choice of new O-ring groove dimensions, e.g.; manufacturer data sheets.

This information is needed to determine compliance with 10 CFR 71.33(a)(5).

- 4.2 Clarify the material used for the containment vessel O-ring and justify removal of the O-ring test from Section 2.3.2 of the SAR.

The applicant proposes to remove an O-ring test from page 2-25 of the SAR because, as the applicant states on page five of “SAR Update Matrix for Addition of Liquid I-131” (ADAMS Accession No. ML15351A333), the O-ring material was changed during the original application and this test should have been removed. The applicant states they are correcting this error. However, Drawing 1C-5944, Issue C, identifies the containment seal material as Fluoroelastomer (Base material Viton GLT) while page 2-19 of SAR Revision 5 states that the containment seal material is Ethylene Propylene Rubber. Consequently, the staff needs clarification on the containment seal material and the basis for the removal of the O-ring test in Section 2.3.2 of the SAR.

This information is needed to determine compliance with 10 CFR 71.33(a)(5).

## **Shielding Review**

- 5.1 Identify clearly the location of maximum dose rate resulting from the 3D Monte Carlo evaluations and the correlating Microshield evaluation.

The values in Table 5-6 do not correspond to the expected thicknesses shown in the drawings in reference AMEC/SF6652/001 even if the evaluation were to be at a point on the outer radial surface of the package at the same elevation of the point source. Therefore, it is not clear that the slab thicknesses used in the Microshield evaluation correspond to the location of maximum dose rate, described as “just above the top steel annulus” in reference AMEC/CRM37327/TN\_001. This location is at an elevation above the containment vessel, and both Rev. 5 and Rev. 6 of the SAR state that Microshield calculations were only run at the location of highest dose rate. The application also states that the Microshield evaluation used nominal thicknesses. However, it is not clear if the Microshield evaluation occurred in either the radial direction from the point source, the vertical direction from the point source, or if another path was used to determine the slab thickness in the Microshield evaluation.

This information is required to determine compliance with 10 CFR 71.47.

## **Operations Review**

- 7.1 Identify how flammable and combustible gases will be purged from the containment vessel prior to content removal.

The hydrogen gas generation analysis report submitted in support of the application postulates that hydrogen gas could escape from the product container into the containment vessel. Therefore, if a flammable and combustible atmosphere exists inside the containment vessel and does not ignite during transit, the unloading procedures need to address how the package recipient will safely remove the contents.

This information is needed to ensure compliance with 10 CFR 71.87(f).

## **Maintenance Review**

- 8.1 Clarify when damaged keg closure studs (Item 16 on the Bill of Materials) and hardware (nuts and washers) will be replaced.

Section 8.2.3.2 indicates that damaged keg closure studs will be replaced according to drawing 0C-5942. However, it is unclear from this drawing and Section 8.2.3.2 what procedure or criteria will be invoked for stud and/or hardware replacement.

This information is needed to determine compliance with 10 CFR 71.87(b).