



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

October 31, 2019

Mr. Alex Ferguson  
Licensing Engineer  
Croft Associates Limited  
Building 4F, Culham Science Centre  
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Oxfordshire, OX14 3DB, United Kingdom

**SUBJECT: SECOND REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE  
MODEL NO. 3977A PACKAGE**

Dear Mr. Ferguson:

By letter dated March 31, 2018 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML18136A484), as supplemented on July 24, 2018, July 31, 2019 and October 2, 2019 (ADAMS Accession Nos. ML18213A130, ML19218A004 and ML19275D608), Croft Associates Limited submitted an application to amend Certificate of Compliance No. 9338 for the Model No. 3977A package to add contents to the Model No. 3977A package, add licensing drawings and other miscellaneous changes. To assist with our review, the U.S. Nuclear Regulatory Commission staff (the staff) needs the information identified in the enclosure to this letter. Discussion of this request for additional information and a response date occurred on October 28, 2019.

We request that you provide this information by December 2, 2019. Inform us at your earliest convenience, but no later than November 25, 2019, if you are not able to provide the information by that date. If you are unable to provide a response by December 2, 2019, please propose a new submittal date with the reasons for the delay.

Please reference Docket No. 71-9338 and EPID No. L-2018-LLA-0137 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  
Storage and Transportation Licensing Branch  
Division of Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 71-9338  
EPID No. L-2018-LLA-0137

SUBJECT: SECOND REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW OF THE  
MODEL NO. 3977A PACKAGE DOCUMENT

DATED: October 31, 2019

Enclosure: Request for Additional Information

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**ADAMS No.: ML19301A144**

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

By letter dated March 31, 2018 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML18136A484), as supplemented on July 24, 2018, July 31, 2019 and October 2, 2019 (ADAMS Accession Nos. ML18213A130, ML19218A004 and ML19275D608), Croft Associates Limited submitted an application to amend Certificate of Compliance No. 9338 for the Model No. 3977A package to add contents to the Model No. 3977A package, add licensing drawings and other miscellaneous changes. This Request for Additional Information (RAI) letter identifies information needed by the staff in connection with its review of the application. NUREG-1609, "Standard Review Plan for Transportation Packages for Radioactive Material," was used by the staff in 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.

## **Shielding Review**

- 5.1 Confirm that the maximum energy for each energy bin was used in the MCNP model for calculating dose rates.

The Atkins report 5183326-HS-REP-001-01 (ADAMS Accession No. ML19289A805) states that the photons were binned into energy groups. From the sample MCNP file provided on October 2, 2019 (ADAMS Accession No. ML19297E730), it appears that the energy used to simulate the energy group represented in this file (2-2.5 MeV) is the maximum energy of the group (2.5 MeV). Confirm that the maximum energy for each group is modeled for every energy group allowed within the package. The staff is requesting this information to determine if the modeling of the gamma energy is conservative.

This information is needed to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) 71.33(b)(1), 71.47 and 71.51(a)(2).

- 5.2 State if the additional steel on the bottom of the CV plug was included in the model used to determine if dose rates are within regulatory limits and if so provide the dimensions used in the model.

Table 8-1 does not include the extra steel as part of the CV split lid configuration on the bottom of the CV plug. The staff requests that the applicant state if this was modeled in the shielding evaluation and how much steel it assumed. It appears to be present in some of the drawings in Section 9 of the Atkins report. The staff needs this information so that it can compare the dimensions with those in Drawing 1C-7947 to determine if it was modeled in a conservative or accurate way.

This information is needed to verify compliance with 10 CFR 71.47 and 71.51(a)(2).

Enclosure

- 5.3 Provide additional information justifying that the effect of vibration normally incident to transport does not result in source relocation.

As part of first round RAI 5-3, the staff requested that the applicant provide information on how the effects from NCT and HAC were incorporated into the shielding evaluation. The staff found that the information provided does not fully address the question as it only addressed the free drop test results. The staff is requesting that the applicant discuss the effects of vibration normally incident to transport as specified in 10 CFR 71.71(c)(5) on the jar/tin that contains the thorium source and justify that the source cannot come out of the configuration in which it is analyzed. Although the spacers should keep the lid from opening based on gravity if shipped upright, if not shipped upright there could be space between the spacers and the walls of the cavity that could allow relocation of the source. The entire height of the jar and spacer configuration is 110mm from Drawing 1C-7975 as compared to the height of the cavity of 113.4mm of the HS-55X113 Insert in Drawing 2C-8094. Based on the Studsvik event from 2001 (<https://inis.iaea.org/collection/NCLCollectionStore/Public/37/088/37088552.pdf>), the staff is concerned with the possibility of small sources migrating out of the content holder due to vibration normally incident to transport. The staff requests that the applicant include a description of the measures that would prevent the small source from escaping from the jar/tin or the design features of the jar/tin that would prevent this from happening.

This information is needed to verify compliance with 10 CFR 71.47 and 71.71(c)(5).

- 5.4 Provide the cross section library used within the MCNP code to calculate the dose rates.

This information is needed to verify compliance with 10 CFR 71.47 and 71.51(a)(2).

- 5.5 Provide additional information on the tallies used to calculate dose rates.

Section 4.1.2 of the Atkins report states that dose rates were assessed in a mesh arrangement for purposes of determining the peak dose rate locations. However, the staff did not locate a description of the tallies used to calculate compliance with regulatory dose rate limits. The staff requests that the applicant provide a summary of the tally type and size in order for the staff to determine if the tallies are sufficiently small to be able to evaluate a maximum dose rate and not an average dose rate.

This information is needed to verify compliance with 10 CFR 71.47 and 71.51(a)(2).

- 5.6 Provide the location used to evaluate the bottom surface dose rate.

The staff requests that the applicant confirm if the reference surface on which the package surface dose rate is evaluated is the annular hole on the bottom of the SAFKEG, or whether it is flush with the bottom rims and confirm all other distances (0.75 meter conveyance, 1 meter and 2 meter). There is not enough information from Figure 9-10 from the Atkins report, 5183326-HS-REP-001-01 (proprietary report, ADAMS Accession No. ML19218A020) for the staff to determine on which the surface dose is calculated and from which the other distances are referenced.

This information is needed to verify compliance with 10 CFR 71.47 and 71.51(a)(2).