December 3, 2012

Ms. Sarah Marshall
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Oxfordshire OX14 3DB United Kingdom

SUBJECT: APPLICATION FOR CERTIFICATE OF COMPLIANCE NO. 9338 FOR THE MODEL NO. 3977A – SUPPLEMENTAL INFORMATION NEEDED

Dear Ms. Marshall:

By letter dated September 29, 2012, you submitted an application for a Certificate of Compliance for Safkeg-HS package Model Number 3977A (Docket No. 71-9338). Staff performed an acceptance review of the application to determine if it contained sufficient technical information in scope and depth to allow the staff to complete the detailed technical review.

This letter is to advise you that, based on our acceptance review, the application does not contain sufficient technical information. The information needed to continue our review is described in the enclosure to this letter as Request for Supplemental Information (RSIs). In order to schedule our technical review, the RSI responses should be provided by December 17, 2012. If the RSI responses are not received by this date, the review of this application may be delayed. This letter confirms our phone call on November 30, 2012, with respect to the supplemental information needed. If you have any questions regarding this matter, please contact me at (301) 492-3148.

Sincerely,

/RA/

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

Docket No. 71-9338

TAC No. L24687

Enclosure: Request for Supplemental Information

Ms. Sarah Marshall
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CROFT ASSOCIATES LIMITED

DOCKET NO. 71-9338

REQUEST FOR SUPPLEMENTAL INFORMATION

GENERAL INFORMATION

1.1 Provide a clear and consistent definition of the package's radioactive contents throughout the application.

The current definition of the proposed contents is not clear and is described inconsistently in various locations in the application. The following are specific aspects which should be addressed:

a. fissile materials in contents types CT-1, 2 and 3 (information in Tables 1-3-1~3 contradicts information in Tables 1-4-1~3),
b. materials in contents types CT-1 through CT-6 may only be normal form or special form or both,
c. sources in configurations such that they are effectively point sources,
d. complete list of all radionuclides proposed for shipment (approval will only be given for those radionuclides listed in the application), and
e. account for daughters of radionuclides in proposed contents.

A consistent and clear definition of the proposed contents is necessary for the staff to evaluate compliance with 10 CFR 71.33(b), 71.35, 71.47 and 71.51.

1.2 Ensure the application is consistent in its descriptions of the proposed package and its contents.

The application includes a number of apparently inconsistent and confusing statements regarding the package and the contents. As an example, within the shielding chapter, liquid contents are sometimes analyzed as point sources that remain within the insert whereas the analyses in Attachment 2 to that chapter use a different configuration for the liquid contents. Staff also noted that the application refers to different sources (e.g., Ir-192 vs. Cs-137 in Section 5.4.1.1) and a different package (e.g., Sections 1.2.1.2 and 1.2.1.4 refer to a SAFKEG LS package).

This information is necessary for the staff to evaluate compliance with 10 CFR 71.33, 71.35, 71.47, and 71.51.

1.3 Provide clear and legible drawings in Chapter 1 of the application.

The application indicates that the drawings included in Chapter 1 (Section 1.3.2) are the basis for the analytical models. The images of these drawings in the current submittal are difficult to read. These images are important in enabling the staff to understand the models and ensure their consistency with the licensing drawings.

This information is necessary for the staff to evaluate compliance with 10 CFR 71.35.

STRUCTURAL

2.1 Provide representative Abaqus CAE files (input and output) so that staff may perform a review of the computational methodology used, per ISG-21.

Staff requests load cases NCT-9, NCT-10, HAC-3, and HAC-5 to make a safety determination.

This information is necessary to evaluate compliance with 10 CFR 71.71 and 10 CFR 71.73.

SHIELDING

5.1 Provide all appropriate analyses to support the shielding evaluation of the proposed package and its contents. The analyses should address the following aspects:

a. all tolerances resulting in minimum shielding dimensions,
b. material properties which result in maximum dose rates,
c. both normal conditions of transportation (NCT) and hypothetical accident conditions (HAC) and demonstrate compliance with the limits for the respective conditions,
d. package and source configurations and conditions assumed for NCT and HAC conditions with justification for those conditions, and
e. bounding values for all proposed contents and insert combinations.

The analysis provided is apparently for an “as-fabricated” package that equates to an “as-designed” package. Since the design drawings to which the packages will be fabricated include tolerances which permit the use of less shielding material, the analyses should reflect the effect of using these tolerances. In addition, the application appears to propose contents limits that are based on back-calculation from the regulatory dose rate limits, and although there appears to be some discussion of source configuration, it is unclear that the configurations adequately address NCT and HAC conditions. Further, some analyses may not address all aspects of the package. For example, the contents associated with the steel insert do not appear to be addressed in the Monte Carlo analyses.

Finally, the evaluation needs to demonstrate that a package which has undergone the respective tests for both NCT and HAC conditions (see 10 CFR 71.71 and 71.73) meets the respective dose rate limits. The information in the current shielding evaluation does not distinguish between NCT and HAC analyses, and it appears that the provided analysis only demonstrates package compliance with NCT dose rate limits. There is neither discussion of analyses for a package having undergone NCT or HAC conditions nor any justification provided as to why the current analysis is adequate to cover NCT and/or HAC conditions. There is also no discussion of HAC dose rate limits and compliance with them.

This information is necessary for the staff to evaluate compliance with 10 CFR 71.35, 71.47, and 71.51.

5.2 Provide an evaluation with analyses that demonstrate compliance with the regulatory dose rate limits.

The current shielding evaluation appears to rely upon the McBend and Microshield analytical methods to determine the dose rates and allowable contents. However, it is not always clear which method is used to demonstrate compliance with specific regulatory limits. In addition, the dose rates calculated for a variety of the contents using the McBend code appear to exceed the regulatory dose rate limits. Thus, it is not clear if compliance with those regulations has been demonstrated. The evaluation should be based upon analytical methods that are appropriate for the package and source configurations and the radiation emitted by those contents.

This information is necessary for the staff to evaluate compliance with 10 CFR 71.47 and 71.51.

5.3 Provide a summary table showing the maximum radiation levels for the proposed contents under NCT and HAC conditions.

Table 5-1 in the current evaluation appears to merely repeat the NCT dose rate limits for non-exclusive use packages. Since the evaluation appears to determine the allowable contents by back-calculation from the regulatory dose limits, dose rates calculated for one or more of the proposed contents would be sufficient to demonstrate compliance with the regulations. Supporting information, such as modeling assumptions used to generate the dose rates, should also be provided.

This information is necessary for the staff to evaluate compliance with 10 CFR 71.47 and 71.51.

5.4 Provide an evaluation that uses appropriate flux-to-dose rate conversion factors to demonstrate compliance with the regulatory dose rate limits. In the application, cite the conversion factors used in the evaluation.

The application uses conversion factors that are based on effective dose equivalent (e.g., ICRP 51 and 74 factors) and are not appropriate for demonstrating compliance with 10 CFR Part 71 dose rate limits which are based on dose equivalent. The staff's guidance is to use the conversion factors from the 1977 revision of ANSI/ANS 6.1.1, "Neutron and gamma-ray flux-to-dose rate factors," and to provide the factors used in the analyses in the application. Other conversion factors that calculate the dose rates in terms of dose equivalent may be used; however, the application would need to include them along with a justification for their appropriateness.

This information is necessary for the staff to evaluate compliance with 10 CFR 71.47 and 71.51.

CRITICATLITY

6.1 Clarify the limits on fissile material to be shipped in the Safkeg-HS.

Tables 1-3-1 through 1-3-3 for content types CT-1, CT-2, and CT-3 do not discuss fissile material as allowable contents; however, corresponding Tables 1-4-1 through 1-4-3 list activity limits for plutonium-239 and plutonium-241. Also, Tables 1-4-7 and 1-4-8 report activity limits corresponding to masses greater than the fissile material limits in the fissile exemptions in 10 CFR 71.15, and the general licenses in 10 CFR 71.22 and 10 CFR 71.23.

This information is needed to ensure the package design meets the fissile material requirements in 10 CFR 71.15, 10 CFR 71.22, and 10 CFR 71.23.