|  |
| --- |
|  |
| ONR Project Assessment Report  Transport Package Validation Approval – GB Validation of Industrial Fissile Package Designs F/347/IF (FCC3) and F/348/IF (FCC4) |



ONR Project Assessment Report

Project Name: Transport Package Validation Approval

Report Title: GB Validation of Industrial Fissile Package Designs F/347/IF (FCC3) and F/348/IF (FCC4)

Dutyholder/Applicant: ORANO NPS

ONR Report Ref. No.: ONRW-2019369590-1945

Report Issue No.: 0

March 2023

© Office for Nuclear Regulation, [2023]

For published documents, the electronic copy on the ONR website remains the most current publicly available version and copying or printing renders this document uncontrolled. If you wish to reuse this information visit [www.onr.org.uk/copyright](http://www.onr.org.uk/copyright) for details.

# Executive Summary

ORANO NPS have applied to the Office for Nuclear Regulation (ONR) for validation of transport package designs FCC3 and FCC4. The packages have been approved by the French Competent Authority (CA) and certified as F/347/IF-96 (Gx) and F/348/IF-96 (Gv). Package design FCC3 (F/347/IF) was validated by ONR in 2018 and the GB approval certificate expires in April 2023. Package design FCC4 (F/348/IF) has not been validated previously by ONR, but other than fuel assembly / rod sizes is essentially the same design as the FCC3.

This report presents the basis of the regulatory decision by the ONR as Great Britain (GB) CA for the transport of Class 7 (radioactive material) dangerous goods. The statutory duty is given to ONR through The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (CDG).

The package is used to transport Enriched Natural Uranium (ENU) fuel assemblies and ENU non-assembled rods from European manufacturing facilities to European nuclear power stations, containing up to two Pressurised Water Reactor (PWR) fuel assemblies or up to two boxes of PWR non-assembled rods.

ONR has undertaken a programme of work to assess the Package Design Safety Report (PDSR), its claims, arguments, supporting documentation and evidence. ONR has considered the engineering, criticality, radiation shielding and safety case requirements aspects of the safety submission in respect of compliance with the relevant transport regulations.

ONR assessments of all four specialist areas recommended approval of the package design. I consider the PDSR submitted by the Applicant, together with supporting documentation provided to ONR during the assessment process, meets the applicable regulatory requirements and the package design is judged to be safe.

I recommend that the ONR CA should validate the FCC3 and FCC4 designs by issuing GB validation certificates F/347/IF-96 (Rev.7) and F/348/IF-96 (Rev.0), to run concurrently with the French certificates F/347/IF-96 (Gx) and F/348/IF-96 (Gv) until April 2028 and December 2027 respectively.

# List of Abbreviations

CA Competent Authority

CDG The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations

ENU Enriched Natural Uranium

GB Great Britain

IF Industrial Fissile

ONR Office for Nuclear Regulation

PDSR Package Design Safety Report

PWR Pressurised Water Reactor

SAR Safety Assessment Report

SCR Safety Case Requirements (Assessment)

TCA Transport Competent Authority

UK United Kingdom

Contents

[Executive Summary 4](#_Toc130988321)

[List of Abbreviations 5](#_Toc130988322)

[1. Permission Requested 7](#_Toc130988323)

[2. Background 7](#_Toc130988324)

[3. Assessment and Inspection Work Carried out by ONR in Consideration of this Request 7](#_Toc130988325)

[4. Matters Arising from ONRs Work 10](#_Toc130988326)

[5. Conclusions 10](#_Toc130988327)

[6. Recommendations 10](#_Toc130988328)

[References 11](#_Toc130988329)

# Permission Requested

1. ORANO NPS have applied [1] to the Office for Nuclear Regulation (ONR) for validation of transport package designs FCC3 and FCC4. The packages have been approved by the French Competent Authority (CA) and certified as F/347/IF-96 (Gx) [2] and F/348/IF-96 (Gv) [3] respectively.
2. This report presents the basis of the regulatory decision by the ONR as Great Britain (GB) CA for the transport of Class 7 (radioactive material) dangerous goods. The statutory duty is given to ONR through The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (CDG) [4].

# Background

1. The package transports Enriched Natural Uranium (ENU) fuel assemblies and ENU non-assembled rods from European manufacturing facilities to European nuclear power stations, containing up to two Pressurised Water Reactor (PWR) fuel assemblies or up to two boxes of PWR non-assembled rods.
2. The FCC4 design is a variant of the FCC3 that can accommodate larger fuel assemblies and rods. As such, the outer package dimensions and maximum authorised mass are slightly higher. There are other minor differences between the package designs including the number of bolts required to attach the outer casing, loading configurations and the maintenance schedule. The two packages have similar internal furniture, similar containment systems, and contain (with the exception of a difference in rod length) the same fissile content types (namely fuel assemblies and non-assembled rods).
3. A GB validation is required to transport PWR fuel to the Sizewell B site, operated by EDF Nuclear Generation Limited.
4. Package design FCC3 was validated by ONR in 2018 [5]. The GB approval certificate expires in April 2023. Package design FCC3 has been approved multiple times by ONR and its predecessor over the last twenty years. FCC4 has not been validated previously by ONR but other than assembly / rod sizes is essentially the same design as FCC3.

# Assessment and Inspection Work Carried out by ONR in Consideration of this Request

1. The packages are both Industrial Fissile (IF) designs and in accordance with transport regulations only the fissile aspects of the package design require validating. However, ONR has taken the opportunity to consider other aspects during fissile validations of foreign packages.
2. A regulatory permissioning plan was devised and agreed with the Transport Competent Authority (TCA) lead. In accordance with this plan and ONR transport guidance [6], a targeted and proportionate assessment of the criticality safety case was undertaken, taking into account previous ONR approvals and the French CA approval. Aspects of the engineering and radiation shielding safety cases were reviewed and an ONR safety case requirements assessments was also undertaken.
3. The FCC3 and FCC4 designs are underpinned by safety assessment reports (SARs) DOS-19-021165 Revision 2 [7] and DOS-19-021166 Revision 2 [8] respectively.
4. As this is a validation of a package approved by a foreign transport CA, no inspection activities were undertaken in relation to the package design approval.
5. All ONR assessments took congnisance of the following; certificates have been issued by a reputable foreign CA (France) [2] [3]; there is confidence in the Applicant’s process for producing transport safety cases and they have a good track record; the FCC3 / FCC4 packages are not novel or complex; the FCC3 package has been approved multiple times by ONR [5] and its predecessor over the last twenty years; and there is little change to the package design.

*Criticality Assessment* [9]

1. A comprehensive ONR criticality assessment of the SAR criticality safety case was undertaken in 2018 and identified large criticality safety margins. This ONR assessment targeted the delta between the current and previously approved FCC3 design, as well as the delta between the FCC3 and FCC4 designs. The criticality safety case documents are common to both FCC3 and FCC4 designs.
2. Additional to the points set out in paragraph 11, further congnisance has been taken from the 2018 detailed criticality assessment by ONR, the commonality of the criticality assessment between both FCC3 and FCC4 designs and the minor nature to the change in terms of criticality design (the ONR criticality assessor reviewed changes in the FCC3 design since the last approval and it was determined that the changes would not adversely impact the criticality safety case).
3. Whilst the FCC4 has not previously been validated in the UK, from a criticality safety perspective it is in almost all respects identical to the FCC3 package, the only difference being in the length of fuel assemblies and non-assembled rods the package can transport. The ONR criticality assessor judged that the analytical approach to the FCC4 criticality safety case is equivalent to the FCC3 assessment and that there is no reason to doubt the accuracy of the FCC4 criticality results.
4. One criticality question [10] was asked with respect to temperature effects which the Applicant adequately addressed.
5. The ONR criticality assessor judged that the Applicant has adequately demonstrated that the FCC3 and FCC4 packages are safe from a criticality perspective and is satisfied that this package meets the criticality safety requirements of the relevant transport regulations.
6. A recommendation was made to validate French certificates F/347/IF-96 (Gx) and F/348/IF-96 (Gv).

*Radiation Shielding Assessment* [9]

1. For foreign validations of IF packages, there is no requirement to undertake a radiation shielding assessment. However, the opportunity was taken to undertake a proportionate assessment. It was identified that the 2018 ONR assessment reported large safety margins and this assessment focused on design changes.
2. The ONR radiation shielding assessment considered points made in paragraph 11 with further cognisance taken from the commonality of the Applicants radiation shielding assessment for both FCC3 and FCC4 package designs.
3. The ONR radiation shielding assessor judged that, based on the previous ONR approval, large safety margins and negligible changes to the design, the FCC3 and FCC4 packages are safe and compliant with the relevant transport regulations from a radiation shielding perspective.
4. A recommendation was made to validate French certificates F/347/IF-96 (Gx) and F/348/IF-96 (Gv).

*Engineering* [11]

1. For foreign validations of IF packages, there is no requirement to undertake an engineering assessment. However, the opportunity was taken to undertake a proportionate and targeted assessment.
2. Further to the points made in paragraph 11, the ONR engineering assessor also highlighted that the 2018 ONR engineering assessment was comprehensive. Due to the negligible design changes, the results of safety evidence presented in the current safety submission is taken at face value, i.e., without questioning or re-examining the validity of the analysis and design data that underpin the results.
3. The scope of the engineering analysis covered the examination of the changes between the current safety case and the case that ONR validated in 2018, as well as the package design safety review, as required by Section 6 of the Applicants Guide [12].
4. The ONR engineering assessor concluded that the design changes since the 2018 ONR approval, as well as the differences between the FCC3 and FCC4 designs, are minor and will not impact the engineering safety case. Although a design review has not been provided, the engineer can confirm that these aspects have been considered elsewhere in the application (including ageing effects as required in the 2018 edition of SSR-6).
5. The ONR engineering assessor concluded that both the FCC3 and FCC4 package designs are safe and compliant with the relevant transport regulations.
6. A recommendation was made to validate French certificates F/347/IF-96 (Gx) and F/348/IF-96 (Gv).

*Safety Case Requirements (SCR)* [13]

1. An ONR SCR assessment addresses the non-engineering means of achieving compliance with the requirements of SSR-6, such as in the use, operation and maintenance of the approved package design.
2. An ORANO SCR assessment [14] was undertaken during the approval of F/381 package design in July 2022. Some of the judgements (not specific to this package) remain valid for this approval. The SCR assessment recommended approval.
3. Some reliance is placed on the French CA approval and regulatory processes with respect to safety case implementation. However, it was determined during this approval that the management systems are established, and operating instructions, inspection, and maintenance arrangements have been documented.
4. One question was raised with the intended GB package consignee relating to how operating and maintenance instructions were adapted to local instructions. The response was deemed adequate.
5. The ONR SCR assessor concluded that the arrangements of the Applicant are suitable and sufficient to comply with the regulatory requirements for transport and recommended validation of French certificates F/347/IF-96 (Gx) and F/348/IF-96 (Gv).

# Matters Arising from ONRs Work

1. None.

# Conclusions

1. Based on the work carried out by ONR, and the confidence in the foreign approval of the FCC3 and FCC4 packages, I am satisfied that the package designs satisfy the requirements of the relevant transport regulations.

# Recommendations

1. I recommend that ONR should produce GB validation certificates F/347/IF-96 (Rev.7) and F/348/IF-96 (Rev.0) to run concurrently with French certificates F/347/IF-96 (Gx) and F/348/IF-96 (Gv).

# References

|  |  |
| --- | --- |
| [1] | Application Letter COR-22-003726-000-1.0, ONRW-2019369590-293. |
| [2] | F-347-IF-96 (Gx) FCC3\_EN, ONRW-2019369590-508. |
| [3] | F-348-IF-96 (Gv) FCC4\_EN, ONRW-2019369590-509. |
| [4] | The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (CDG) 2009. (SI 2009 No. 1348). |
| [5] | F347 GB Validation Certificate 2018, ONRW-2019369590-512. |
| [6] | ONR Guide TRA-PER-GD-001 Revision 3 “ONR Transport Permissioning Process Guide” CM9: 2021/14609. |
| [7] | F347 (FCC4) (English) SAR DOS-19-021165-2.0, ONRW-2019369590-291. |
| [8] | F348 (FCC4) (English) SAR DOS-19-021166-2.0, ONRW-2019369590-292. |
| [9] | F347 F348 (TCA000050) - Criticality and Shielding Assessment, ONRW-2019369590-1005. |
| [10] | Q1AR, ONRW-2019369590-713. |
| [11] | F347 F348 Engineering Assessment, ONRW-2019369590-1919. |
| [12] | TRA-PER-GD-014 Revision 3, ‘Guidance For Applications For UK Competent Authority Approval’ November 2019 CM9: 2019/335838. |
| [13] | F347 F348 SCR Assessment, ONRW-2019369590-1918. |
| [14] | F/381 (SVC4386311) - Report - Safety Case Requirements AR for F/381/AF-96 -Orano TN International - 1 February 2019 CM9: 2019/28320. |