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| ONR Project assessment report  PR-01139 - GB/5127 (PR-01139) - 5-year Validation Renewal of F/323/B(M)F Package design |



ONR Project assessment report

**Project name**: PR-01139

**Report title**: 5-year Validation Renewal of F/323/B(M)F Package Design - GB/5127 (PR-01139) - 5-year Validation Renewal of F/323/B(M)F Package design

**Dutyholder/Applicant**: Orano NPS

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# Executive summary

This report presents the assessment findings of the application from Orano NPS (the applicant) which covers the design justification for the F/323/B(M)F-96 package. The application is for the renewal of the GB validation of the F/323/B(M)F-96 package design, commonly referred to as the TN 28 VT package. This package is designed for the transport of vitrified residues from Sellafield Limited, and vitrified and compacted residues from Orano reprocessing plant in La Hague, France. The applicant has requested approval for transport by road, rail, sea and inland waterway. However, ONR has no vires for approving transport by inland waterway as it is not a signatory to the regulations relevant to this mode of transport. ONR approval for this package design will therefore exclude transport by inland waterway.

The package has been approved in GB multiple times in the past, but in the most recent, 2020 approval, only vitrified residues from Sellafield Limited and from Orano reprocessing plant in La Hague were permissioned under GB/5127/B(M)F (Rev.0) certificate of approval (CoA). The GB validation currently being requested is a renewal of that existing 2020 GB/5127/B(M)F (Rev.0) CoA.

The applicant, in its latest application letter, identified the changes that it has made to the safety justification for the package design since the 2020 approval. To be proportionate, the ONR assessments have focused on the effect of these changes. However, ONR assessment also considered the effect of any changes to the transport regulations since 2020.

ONR assessments addressed the engineering, shielding and criticality aspects of the applicant’s safety submission. It was not considered necessary to undertake any specific inspection of the applicant in support of the ONR assessments. This is justified because ONR recognises that this package design has been first approved by the French Competent Authority who would have undertaken an inspection of the applicant to support the approval.

The ONR assessments all concluded that the safety submission from the applicant was adequate and met the applicable regulatory requirements.

I recommend approval, by the ONR Transport Competent Authority Head of Regulation, of the GB validation renewal of the F/323/B(M)F-96 (Jv) package design by issuing GB/5127/B(M)F (Rev.1) certificate of approval.

It should be noted that this GB validation approval is only for the package design aspect of the French CoA, and that a consignor intending to use this package will need submit a separate application for shipment approval within GB.

Table 1: List of abbreviations.

|  |  |
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| Term/Acronym | Description |
| ACT | Accident conditions of transport |
| ASNR | L’Autorité de Sûreté Nucléaire et de Radioprotection (French Competent Authority) |
| CA | Competent Authority |
| CoA | Certificate of Approval |
| GB | Great Britain |
| IAEA | The International Atomic Energy Agency |
| ONR | Office for Nuclear Regulation |
| RQ | Regulatory Query |
| SAR | Safety Assessment Report |
| TAG | Technical assessment guide (ONR) |
| TCA | Transport Competent Authority |

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# Permission requested

1. Orano NPS (the applicant), submitted a request [1] to the Office for Nuclear Regulation (ONR) for a GB validation approval of F/323/B(M)F-96 package design, commonly referred to as the TN 28 VT package. The applicant has requested approval for transport by road, rail, sea and inland waterway. However, ONR has no vires for approving transport by inland waterway as it is not a signatory to the regulations relevant to this mode of transport. ONR approval for this package design will therefore exclude transport by inland waterway.
2. This report presents the basis of the regulatory decision by ONR, as Great Britain competent authority (CA) for the transport of Class 7 (radioactive material) dangerous goods, to grant the requested approval.

# Background

1. The package is used to transport of vitrified residues from Sellafield Limited, and of vitrified and compacted residues from Orano reprocessing plant in La Hague, France.
2. The package design has been approved for use in France by the French CA, L’Autorité de Sûreté Nucléaire et de Radioprotection (French Competent Authority) (ASNR) under Certificate of Approval (CoA) F/323/B(M)F-96T (Jv) that combines the shipment approval with the package design approval.
3. The package has been granted validation approval in GB many times in the past, but in the most recent, 2020 approval, only vitrified residues produced by Orano and Sellafield Limited were permissioned under GB/5127/B(M)F (Rev. 0) CoA. The GB validation currently being requested is a renewal of that existing 2020 GB/5127/B(M)F CoA.

# Assessment and inspection work carried out by ONR in consideration of this request

1. The applicant, in its latest application letter, identified the changes that it has made to the safety justification for the package design since the 2020 approval. To be proportionate, the ONR assessments have focused on the effect of these changes. However, ONR assessments also considered the effect of any changes to the transport regulations since 2020.
2. ONR assessments addressed the engineering, criticality and shielding aspects of the applicant’s safety submission; these assessments are described briefly in sections 3.1 to 3.3 below.
3. It was not considered necessary to undertake any specific inspection of the applicant in support of the ONR assessments. This is justified because ONR recognises that this package design has been first approved by the French Competent Authority who would have undertaken an inspection of the applicant to support the approval.

## Engineering Assessment [2]

1. In accordance with the project permissioning strategy the ONR engineering assessment has focused on the effect of the following changes that the applicant has made to the package design since the 2020 approval:

* Introduction of new dimensions for the orifice plug gasket
* Introduction of additional criteria regarding minimum thermal power of the load for CSD-V wastes

1. Because the package lid is penetrated by the orifice the performance of the orifice plug gasket is one of the factors that determine containment performance of the package. The applicant’s criterion for “good” containment is one in which the maximum filling ratio is high but less than 100%. On this basis the change in orifice gasket dimensions would appear to have improved the containment performance of the package.
2. For the package to be used safely at ambient temperature down to –20oC, it must be loaded with CSD-V wastes with specified minimum thermal powers. The ONR assessor noted that the specified minimum total thermal power of the load for the 5-compartment basket has changed slightly from 10.0 kW in the 2018 safety assessment report (SAR) to 10.6 kW in the 2023 SAR, and that there was an additional entry for a 7-compartment basket in the 2023 SAR that was absent in the 2018 SAR. The assessor also confirmed that both of these latest thermal power criteria from the 2023 SAR are reflected in the latest French CoA (and is therefore captured by reference in the corresponding GB validation CoA).
3. The ONR assessor also considered the effect of changes in the transport regulations since the 2020 approval. The principal change is that the new GB/5127 approval will be issued against the 2018 edition of SSR-6 [3] whereas the 2020 approval was issued against the 2012 edition of SSR-6 [4]. A principal change from the 2012 to the 2018 edition of SSR-6 is the introduction of a new paragraph 613A in the 2018 edition that requires the package design to take into account ageing mechanisms.
4. Although the applicant’s submission has not addressed ageing mechanisms specifically, the package design has been in use for some 20 years during which time it has been approved several times by both French and GB CAs. Therefore the ONR assessor has judged that this long operating experience with the package was evidence that design has had to take into account ageing mechanisms, thereby meeting the requirements of paragraph 613A.
5. Finally, the ONR engineering assessor also reviewed the applicant’s assessment of the effect of additional heat input from a burning lid shock absorber during regulatory accident conditions of transport (ACT). The assessor decided to review this aspect of the safety submission because it had never been assessed in previous years. In fact, the assessor discovered that the applicant had never addressed this scenario in previous submissions.
6. The burning lid shock absorber scenario can potentially occur due to impact damage to a lid shock absorber with wood infill; the exposed wood infill then catches fire during the 30-minute ACT fire but continues to burn for several hours after the ACT fire. The ONR assessor had a serious objection to the method that the applicant employed to address the effect of additional heat input associated with a burning shock absorber, and raised a regulatory query (RQ) to address this objection. The RQ took a long time to resolve with the applicant but was ultimately resolved when the applicant provided the right type of additional justification.
7. Therefore, the ONR engineering assessor has no objection to the GB validation renewal of the F/323/B(M)F-96 package design being approved from an engineering perspective, and recommends ONR approval of the GB validation renewal of the F/323/B(M)F-96 package design by reissuing GB/5127 certificate of approval.

## Criticality Assessment [5]

1. A proportionate and targeted ONR criticality assessment has been undertaken to ensure that the TN 28 VT transport package meets the requirements of SSR-6 with respect to criticality safety. This assessment scope takes account of the fact that a comprehensive criticality assessment was undertaken for the 2020 UK validation, and that there have been no modifications to the design of the package since then that require consideration from a criticality perspective.
2. The ONR criticality safety assessor has judged that the applicant has adequately demonstrated criticality safety of the package, and has therefore recommended that validation of the package be approved for carriage in the UK by road, rail and sea, in accordance with the specifications set out in the applicant’s submission.

## Shielding Assessment [6]

1. The applicant, in its application letter [1] provided a list of changes it has made to the package design justification since the 2020 approval.
2. In consultation with the ONR project inspector and engineering specialist assessor, the shielding assessor judged that, of all the changes listed, only the one involving the change to the dimensions of the orifice plug gasket could have an effect on the package shielding dose rate performance. The shielding assessment has therefore focused on this change.
3. Furthermore, the engineering specialist assessor could not envisage how the small change in the dimension of the gasket would have any effect on the shielding performance of the package.
4. Also, the shielding assessor:
5. Noted that, for all conditions of transport, there were significant safety margins between the maximum package dose rates and the regulatory dose-limits limits for the respective conditions of transport.
6. Noted that the 2020 French and GB approvals were issued against the 2012 edition of the SSR-6 transport regulations [4], whereas the current GB approval was to be issued against the 2018 edition [3]; however the assessor confirmed, from a package design shielding and dose rate perspective, that no additional regulatory requirements needed to be met for the package design to be compliant with the 2018 edition of SSR-6.
7. Reviewed the assessment work underpinning the 2020 GB approval and confirmed that there were no recommendations for any additional regulatory work to be followed up in the current shielding and dose rate assessment.
8. The ONR assessor concluded that the change in dimensions of the orifice plug gasket would have no effect on the package shielding and dose rates for all conditions of transport.
9. From this assessment, the ONR assessor considered the package design to be compliant with the applicable transport regulations from a shielding and dose rate perspective, and has therefore recommended that ONR validate the French CoA F/323/B(M)F-96T to transport vitrified residues via the issue of GB/5127/B(M)F (Rev.1).

# Matters arising from ONR’s work

1. The matters arising from the work carried out by ONR specialists are summarised as follows:

* The criticality assessor has recommended that the applicant, before any future renewals with ONR, should update/append its safety documentation to include a justification that the macroscopic and microscopic effects of temperature within the IAEA range will have a negligible effect on the k-eff of the vitrified waste contents (1-6).

1. This will be addressed as a Level 4 regulatory issue, which the applicant will be required to have addressed before the next renewal application.

# Conclusions

1. Based on the work carried out by ONR, I consider that the safety submission from the applicant to be adequate and that the package design to be compliant with the applicable transport regulations.

# Recommendations

1. I recommend that that ONR TCA Head of Regulations validates the French CoA F/323/B(M)F-96T(Jv) to transport vitrified residues via the issue of GB/5127/B(M)F (Rev.1).
2. It should be noted that this GB validation approval is only for the package design aspect of the French CoA, and that a consignor intending to use this package will need submit a separate application for shipment approval within GB.

# References

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| [1] | Orano NPS - Application letter for United Kingdom validation of French certificate of approval F/323/B(M)F-96T renewal, 11 January 2023. |
| [2] | AR-01287 GB/5127 (PR-01139) - 5-year Validation Renewal of F/323-B(M)F Package design - Engineering Assessment Report. |
| [3] | IAEA. Regulations for the Safe Transport of Radioactive Material 2018 Edition. Specific Safety Requirements No. SSR-6.. |
| [4] | IAEA. Regulations for the Safe Transport of Radioactive Material 2012 Edition. Specific Safety Requirements No. SSR-6. |
| [5] | GB/5127 (F/323/B(M)F-96T) TN 28 VT - Criticality Assessment Report. |
| [6] | F/323/B(M)F-96T / (GB5127/B(M)F) - Shielding and Dose Rate Assessment. |