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| ONR Project assessment report  PR-01207 - Validation of French Certificate of Approval [F/343/B(M)F T (Hae)] of TN Gemini for contents 8 and 9 package design only |



ONR Project Assessment Report

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**Dutyholder/Applicant**: Orano NPS

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# Executive summary

Orano NPS has applied to the Office for Nuclear Regulation (ONR), as Great Britain (GB) Competent Authority (CA) for the transport of Class 7 (radioactive material) dangerous goods, for renewal of the transport design certificate for TN Gemini to transport Contents 8 and 9 of French CoA (F/343/B(M)F T (Hae)) within Great Britain. The current certificate is due to expire on 20th July 2025.

The request from Orano NPS was initially for a combined design and shipment approval. In line with current ONR practices, it has been agreed with the applicant that the design approval only will be granted to Orano NPS, with the consignor applying separately for shipment approval.

The last ONR assessment was completed in March 2021. At the time, ONR carried out a detailed programme of work that involved the assessment of the applicant’s safety case, supporting documentation and evidence, and the mechanisms for its implementation via the relevant management systems.

In accordance with an approved regulatory permissioning strategy, ONR has carried out proportionate assessment activities focussed on:

* Consideration of changes identified in the Design Review (appendix 1 of application letter);
* Consideration of updates to International Atomic Energy Agency Specific Safety Requirements (SSR)-6 2018 Edition relating to obsolete components and aging mechanisms;
* Confirming the criticality safety case; and,
* Consideration of the changes that impact the shielding assessment, the validity of the source term calculations and implementation of the controls identified in the 2018 assessment.

Based on the work carried out by ONR:

* I consider the safety submission from the applicant to be adequate and the package design to be compliant with the applicable transport regulations.

I recommend that the Head of Transport Competent Authority signs the following Certificate of Approval of package design (CoA), which will become effective on 21st July 2025 and expire on 20th July 2030:

* F/343/B(M)F (Rev.1)

Table 1: List of abbreviations.

|  |  |
| --- | --- |
| Term/Acronym | Description |
| ADR | Agreement concerning the International Carriage of Dangerous Goods by Road |
| ASNR | Autorité de Sûreté Nucléaire et de Radioprotection |
| CA | Competent Authority |
| CDG09 | The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 |
| CoA | Certificate of Approval |
| CSI | Criticality Safety Index |
| DR | Decision Record |
| GB | Great Britain |
| HF | Human Factors |
| IAEA | International Atomic Energy Agency |
| IMDG | International Maritime Dangerous Goods |
| IMO | International Maritime Organisation |
| NRS | Nuclear Restoration Services Limited |
| PCM | Plutonium Contaminated Material |
| PI | Project Inspector |
| PL | Professional Lead |
| ONR | Office for Nuclear Regulation |
| OTIF | Intergovernmental Organisation for International Carriage by Rail |
| PAR | Project Assessment Report |
| RID | Regulations concerning the International Carriage of Dangerous Goods by Rail |
| RQ | Regulatory Query |
| SAR | Safety Analysis Report |
| SSR | (IAEA) Specific Safety Requirements |
| UNECE | United Nations Economic Commission for Europe |

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# Permission requested

1. Orano NPS has applied [1] to the Office for Nuclear Regulation (ONR) for validation for Contents 8 and 9 only of Certificate of Approval of package design (CoA) and shipment for the carriage of radioactive material: F/343/B(M)F T (Hae) [2].
2. The application is requesting design and shipment approval for transport in GB. The extant GB CoA is due to expire on 20th July 2025. The French base certificate has been issued on 19th March 2025.
3. This Project Assessment Report (PAR) presents the basis of the regulatory decision by ONR, as Great Britain (GB) Competent Authority (CA) for the transport of Class 7 (radioactive material) dangerous goods, to grant the requested CoA.

# Background

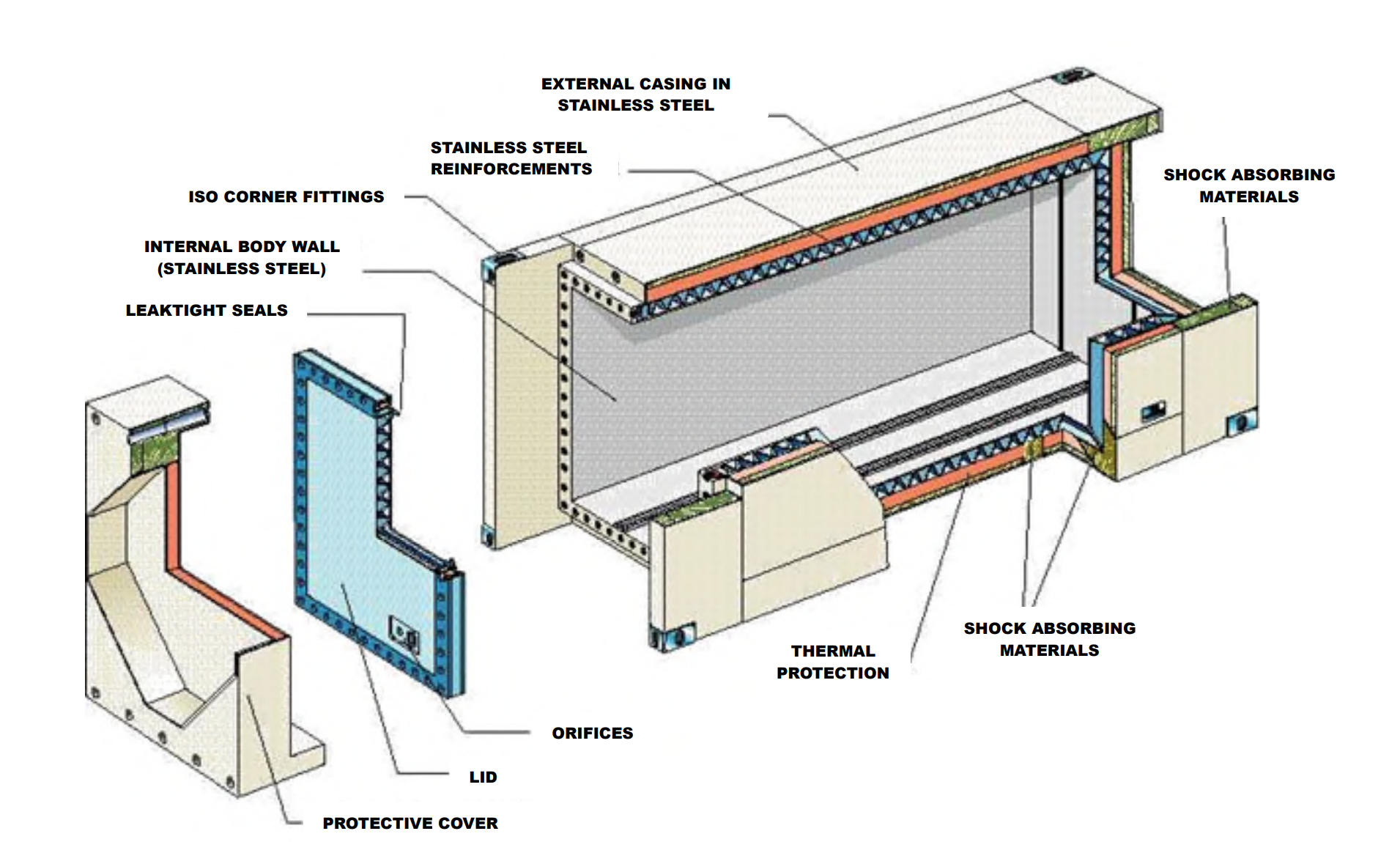
## Orano NPS’ application

1. The TN Gemini packaging, also named RD39, loaded with contents No. 8 and 9 of the French certificate of approval F/343/B(M)F-96T (Gab), has previously been granted the certificate of approval GB/5112B/B(M)F-96T (Rev.0) by ONR, for use in GB as a type B(M) package design containing fissile material. This approval is based on the French certificate of approval due to only two of the contents of French certificate F/343/B(M)F-96T (Gab) being relevant to the UK (contents 8 and 9).
2. ONR has since provided a full validation, F/343/B(M)F-96T (Rev.0) to a further French certificate (F/343/B(M)F-96T) that addressed a modification to content no. 9.
3. In line with current ONR practices, it has been agreed with the applicant that a design approval only will be granted to Orano NPS, with any consignor needing to apply separately for GB shipment approval using this package design. ONR has now received an application for Shipment Approval from Nuclear Restoration Services Limited (NRS). This is captured under ONR permissioning ID PR‑01879.
4. Orano NPS’ application was supported by:

* A Safety Analysis Report (SAR) [3]
* A Periodic Design review (Appendix 1 of application letter) [1]

## Package design

1. The package design is described in detail in the SAR. The description and figure 1 here is provided to give a brief overview.



*Figure 1 - TN Gemini Illustration*

1. The TN Gemini package is designed for transporting a variety of radioactive wastes, mainly with alpha-emitting radionuclides. There are three design variants of the packaging design (VA, VB and VC) which are differentiated by the mechanical characteristics of the shock absorber materials and the mass of the content authorised for transport.
2. For contents 8 and 9, only design variants VA and VB are used.
3. The package is a cuboidal design with an internal cavity accommodating internal arrangements to receive the waste. The body is manufactured entirely from stainless steel; surrounded by a shock absorber and thermal insulation materials with a bolted lid.
4. The package features anchoring points, of standard dimensions designated as “ISO corner fixings” for handling and tie down operations.
5. The package is designed, manufactured, inspected and tested in compliance with:

* The SAR. [3]
* The package design drawings. [4]
* The specifications concerning the materials and manufacturing processes indicated in chapter 0 and those relative to the acceptance tests appearing in chapter 7A of the SAR. [5]
* The Quality management principles detailed in chapter 8A of the Safety Analysis Report. [6]

1. The package is composed of the following sub-assemblies: A cuboidal body, a lid and a transport cover. For VA and VB variant, the total mass of the loaded package is 30,000kg.
2. The containment system consists of:

* The side and base reinforced walls;
* The lid and its internal seal; and
* The gas sampling and pressurisation orifice closure plate and its internal seal.

## Authorised contents

1. Contents 8: Low-level solid waste, contaminated by alpha or beta-gamma radionuclides, conditioned in concrete lined drums, Design Nos. 1801 or 1802. The content is only transported in the VA or VB packaging design variants. For content 8 the presence of beryllium or beryllium oxide is forbidden.
2. Contents 9: Low-level solid waste, contaminated by alpha or beta-gamma radionuclides, and neutron sauces, conditioned in concrete lined drums, Design Nos 1802 or 1803. The content is only transported in the VA or VB packaging design variants. For contents 9 drums containing beryllium, the mass of beryllium cannot exceed 500 grams per drum.

## Regulatory history

1. A full review of relevant regulatory history is included in the Pre-Job Brief (PJB) for this project [7]. Only the key points in the PJB are summarised in this section.
2. The last ONR assessment was completed in March 2021 [8]. At the time, ONR carried out a detailed programme of work that involved the assessment of the applicant's transport safety case, supporting documentation and evidence, and the mechanisms for its implementation via the relevant management systems. A proportionate and targeted sampling assessment approach was adopted which focused mainly on:

* Confirming the criticality safety case.
* Radiation Protection of the users and the public.
* Shielding aspects in relation to the GB contents.
* Internal furniture to secure the contents.
* Any findings and outcomes from previous ONR assessments.

1. Assessments were undertaken for: criticality, radiation protection, engineering (accounting for the thermal and containment requirements), shielding and safety case requirements (the implementation of the safety case). Assessment reports were produced for each assessment undertaken.
2. The PAR [8] concluded that the Project Inspector (PI) was satisfied with the claims, arguments and evidence laid down within the Applicant’s safety case documentation and considered that the application demonstrated that the package design meets the requirements of International Atomic Energy Agency (IAEA) Specific Safety Requirements (SSR)-6 and hence those in the Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) and the Regulations concerning the International Carriage of Dangerous Goods by Rail (RID). There were no outstanding issues to be addressed.
3. ONR has since provided a full validation [9], F/343/B(M)F-96T (Rev. 0) to a further French certificate [F/343/B(M)F-96T (Gac)] that addressed a modification to content no. 9.
4. There are no further matters from the reference [9] Decision Record (DR) to be addressed.
5. The terminology “low-level solid waste” is used within the French CoA and throughout the SAR. A Regulatory Query (RQ) was raised (RQ-01602) requesting clarification from the applicant. The term is a general description of the contents that refers to the low irradiance of the waste, but it is not related to a regulatory characterization of the waste. This should be noted for future GB design approvals and rectified on the CoA.

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

## Transport permissioning instruction and guidance

1. We have used ONR Instruction ONR-TCA-IN-001 “Transport Permissioning” [10] and ONR Guidance Document ONR-TCA-GD-001 [11] during this permissioning.

## Relevant regulations governing the transport of radioactive materials

1. Relevant international and UK regulations governing the transport of radioactive materials by road, rail and sea are:

* IAEA SSR-6 (Rev. 1) “Regulations for the Safe Transport of Radioactive Material. 2018 Edition” [12];
* United Nations Economic Commission for Europe (UNECE) “Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) 2025 Edition” [13];
* Intergovernmental Organisation for International Carriage by Rail (OTIF) “Regulation concerning the International Carriage of Dangerous Goods by Rail (RID) 2025 Edition” [14];
* International Maritime Organisation (IMO) “International Maritime Dangerous Goods (IMDG) Code 2022 Edition incorporating Amendment 41-22 (until 31 December 2025) [15] or IMDG Code 2024 Edition incorporating Amendment 42-24” [16];
* Energy Act 2013 [17];
* The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG09) [18];
* The Merchant Shipping (Carriage of Dangerous Goods and Harmful Substances) (Amendment) Regulations 2024 (SI 2024 No. 636) [19].

## Regulatory permissioning strategy

1. In accordance with the approved regulatory permissioning strategy, ONR has carried out a proportionate permissioning focussed on:

* Consideration of changes identified in the SAR; and,
* Updates to transport regulations.

## Mechanical engineering assessment

1. The focus of the engineering assessment was on the effects of ageing that has recently been introduced in paragraph 613A of the 2018 edition of SSR‑6. [20]
2. The applicant has considered ageing. Thermal damage is dismissed because thermal power of the package contents is low and results in component temperatures of less than 70oC during routine conditions. Our ONR assessor confirmed this is reasonable, given that the boiling point for water at atmospheric pressure is 100oC and the internal pressure within the package will be at least atmospheric.
3. Radiation damage is dismissed because the applicant claims that the activity of the content is too low to have an effect. Initially, this claim was made without specific, quantitative evidence, therefore our assessor raised RQ‑021244 for the applicant to address this evidence shortfall. An additional RQ was then raised requesting further evidence (RQ-01784) . The RQ was ultimately cleared when the applicant provided the requested additional evidence (as detailed in RQ-01784).
4. The applicant argues that the package components are protected against humidity by: being made of, or enclosed within, stainless steel casing; being made of copper-aluminium alloy which self-passivates; being protected by anti-corrosion coating; and regular visual inspection of surfaces to detect any onset of corrosion. Our assessor is satisfied with this.
5. The assessor is satisfied that the applicant has made an adequate case to conclude that the effect of ageing would have no impact on the package being able to continue to meet the safety requirements specified in the transport regulations.
6. The assessor has no objection to the renewal application for the F/343/B(M)F package design being approved from an engineering perspective.

## Human factors considerations

1. A Human Factors (HF) assessment has not been completed as part of this permissioning. This judgement is based on the nature of the drums being shipped and the total radioactive inventory and criticality safety case.
2. The drums being shipped are Plutonium Contaminated Material (PCM) waste packed before 1983 from various nuclear facilities in immobilised or immobilised concrete lined drums.
3. Given the waste is already packed in existing drums it cannot be ‘over-filled’ and there is no possibility of loading a source term greater that what is included in the inventory calculation. ONR recently undertook a criticality assessment of the TN Gemini package for contents 8 and 9. This concluded that an infinite number of packages remain safely subcritical, with a criticality safety index (CSI) of 0. There are no changes to the inventory for the current approval.
4. There are several human based control measures identified, which are necessary to ensure safe configuration of the package including maximum transport durations (intermittent venting), temperature controls and lid torque settings. Whilst these control measures are not novel, it has been agreed that the HF assessor will assess these as part of the consignor’s shipment application to ensure they are adequately embedded into practise. The HF assessor has documented this and agreed it with the Professional Lead (PL) [21].

## Criticality assessment

1. The focus of this assessment was on the list of changes in the applicants’ letter to ensure that the criticality safety case remains valid. [22]
2. Our assessor considered the changes proposed by the applicant to have a minor/insignificant impact to criticality safety, providing that the physical changes made to the TN Gemini Transport Package do not adversely affect the design performance requirements of the package. In relation to this, our mechanical engineering assessor has judged that they do not.
3. Our assessor concludes that he supports the validation of the TN Gemini Transport Package certificate from a criticality safety discipline.

## Radiation shielding assessment

1. There have been minor changes to the design since our previous radiation shielding assessment in 2019. The focus of this assessment was on changes to contents 8 and contents 9. Our assessor also considered the shipment application requirements which are captured under PR-01879. [23]
2. The contents have been revised to included neutron sources and account for increased neutron reactivity. Our assessor considered these minor changes and accepted that they do not impact the validity of our 2019 assessment. The requirement in the French CoA to transport radioactive material either after or before a minimum or maximum time (due radioactive decay) was also considered.
3. Our assessor concludes that the package design TN Gemini meets the relevant transport regulatory requirements from a radiation shielding perspective.
4. Our assessor recommends that:

* the French CoA F/343/B(M)F (Hae) should be validated.
* the PI should review the consignors arrangements in place to adhere to the requirements to transport radioactive material either after or before a minimum or maximum time in the CoA.
* the PI should review the consignor’s arrangements to adhere to the activity levels greater than 3000A2 requiring shipment approval.

## Inspection Work

1. The TN Gemini packages are already manufactured and in use. There was no requirement to inspect manufacturing arrangements as part of this application.
2. Operation and Maintenance - This design approval is being completed in parallel with the shipment approval. Operation and Maintenance arrangements will be assessed during the shipment approval under WIReD record - PR-01879 and so they have not been assessed for this application.
3. Management arrangements for Orano NPS as a Design Authority - Orano NPS is regularly assessed and inspected by the French Competent Authority, Autorité de Sûreté Nucléaire et de Radioprotection (ASNR). ASNR is a Competent Authority within ADR and as part of their renewal in line with ADR 1.7.3 ASNR has confirmed the adequacy of the management system.

## New certificates of approval

1. One CoA has been produced, F/343/B(M)F (Rev.1), in line with the instructions and guidance in [11] and [10].
2. The CoA is for validation of French CoA F/343/B(M)F T (Hae) for GB contents 8 and 9 only.
3. The CoA is for validation of design approval only and so the ‘T’ symbol has been removed.
4. The extant CoA’s are:

* GB/5112B/B(M)F-96T (Rev.0) – Expires 20th July 2025
* F/343/B(M)F-96T (Rev.0) – Expires 20th July 2025

1. The new certificate will replace both extant CoA’s when they expire and has an issue date of 21st July 2025.

# Matters arising from ONR’s work

1. There are no matter arising from ONS’s work.

# Conclusions

1. Based on the work carried out by ONR, I consider the safety submission from the applicant to be adequate and the package designs to be compliant with the applicable transport regulations (see section 3.2).

# Recommendations

1. I recommend that;

* The head of Transport Competent Authority accepts this PAR to confirm support for the ONR technical and regulatory arguments that justify granting CoA F/343/B(M)F (Rev.1).
* The head of Transport Competent Authority approves F/343/B(M)F (Rev.1) which will be become effective on 21st July 2025 and expire on 20 July 2030.
* The Project Inspector for shipment approval PR-01879 or future shipment approvals should review the consignor’s arrangements in place to adhere to the requirements to transport radioactive material either after or before a minimum or maximum time in the CoA.
* The Project Inspector for shipment approval PR-01879 or for future shipment approvals should review the consignors arrangements to adhere to the activity levels greater than 3000 A2 requiring shipment approval.

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|  |  |
| --- | --- |
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