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SDFW – Transport

GB/5124/AF-96 TCA000009 Traveller STD and XL packages (USA/9297/AF-96) - Project
Assessment Report

Project Assessment Report ONR-SDFW-PAR-21-001
Revision 0
20th April 2021

Office for Nuclear Regulation, 2021
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Published 08/21

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EXECUTIVE SUMMARY

GB/5124/AF-96 TCA000009 Traveller STD and XL packages (USA/9297/AF-96) - Project Assessment Report

This Report presents the basis of the regulatory decision, by the Office for Nuclear Regulation (ONR) as Great Britain (GB) Competent Authority (CA) for the transport of Class 7 (radioactive material) dangerous goods, to validate package design GB/5124/AF-96 (USA/9297/AF-96) used for transporting Pressurised Water Reactor (PWR) fuel between Japan and the UK.

Permission Requested

The Applicant, Westinghouse Electric Company Ltd (WEC) has written to the ONR to request a revision of current UK certificate GB/5124/AF-96 Revision 1 based on the issuance of:

- US Department of Transportation (DOT) Competent Authority Certificate (CAC) USA/9297/AF-96 Revision 10 for Model No. Traveller STD, XL, and VVER Packages.
- US DOT CAC USA/9297/AF-96 Revision 10 is a validation of the US Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) USA/9297/AF-96 Revision 12 and 13.

The requested revision only needs to maintain approval of the Traveller STD and XL Package types and excludes the Traveller VVER. The US DOT CAC USA/9297/AF-96, revision 10 maintains expiry of 31 March 2025.

The request was made under 'The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009' for transport by road and rail, and 'The Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997' for transport at sea. The regulations are based on the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material, currently SSR-6 (2012 Edition).

Background

The GB/5124/AF-96 (USA/9297/AF-96) is trademarked as the Traveller package. It consists of an outer clamshell transport container within which three different internal containers can be fitted. This application only requests validation for the STD (contains one complete fuel assembly) and XL (for transporting collections of individual rods) configurations as the third is not used in the UK.

The traveller package was previously validated by ONR in February 2020 for its statutory five yearly renewal. This re-validation is to allow the incorporation of new specification fuel which has plated coatings on the pin casing, and to allow an increase in loose rod fissile content from 5% to 7%.

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

ONR has taken a proportionate approach. There have been no changes to the design of the package since the 2020 ONR Approval. Therefore, it was not considered appropriate to revisit the full scope of Package Design Safety Report (PDSR). Consequently, the assessment work was scoped to review the impact of the modifications and determine if they created any issues.

A proportionate review was carried out by Radiation Shielding, Mechanical and Criticality specialist inspectors who concluded that the modifications were adequately justified in the PDSR.

Matters arising from ONR's work

No issues were raised as a result of ONR's assessment of the modifications.

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Conclusions

The safety submission from the applicant, together with supporting documentation provided to ONR, is considered to be adequate and meets applicable regulatory requirements. The conclusions of the mechanical, radiological and shielding, criticality PDSR reviews recommend that the package design be validated for the shipment of fuel as specified in the PDSR

Recommendation

It is recommended that the GB Transport Competent Authority validate the USA/9294/AF-96 package approval:

- US Department of Transportation (DOT) Competent Authority Certificate (CAC) USA/9297/AF-96 Revision 10 for Model No. Traveller STD, XL, and VVER Packages.
- US DOT CAC USA/9297/AF-96 Revision 10 is a validation of the US Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) USA/9297/AF-96 Revision 12 and 13.

A partial validation for the Traveller STD and XL Package types (GB/5124/AF-96) should run concurrently with the American certificates of approval.

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LIST OF ABBREVIATIONS

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ACT	Accident Conditions of Transport
BAM	Bundesanstalt für Materialforschung und -prüfung
CA	Competent Authority
DoT	Department of Transport
GB	Great Britain
GNS	Gesellschaft für Nuklear-Service
HOW2	(Office for Nuclear Regulation) Business Management System
IAEA	International Atomic Energy Agency
IMDG	International Maritime Dangerous Goods Code
NCR	Non-Conformance Report
NCT	Normal Conditions of Transport
NRC	United States Nuclear Regulatory Commission
ONR	Office for Nuclear Regulation
PAR	Project Assessment Report
PDSR	Package Design Safety Report
PWR	Pressurised Water Reactor
RCT	Routine Conditions of Transport
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SL	Sellafield Limited
SCR	Safety Case Requirements (Assessment)
SSG	(IAEA) Specific Safety Guide
SSR	(IAEA) Specific Safety Requirements
TAG	Technical Assessment Guide (ONR)
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe

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Figure 1: Traveller Package

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PERMISSION REQUESTED

1. This report presents the basis of the regulatory decision, by the Office for Nuclear Regulation (ONR) as Great Britain (GB) Competent Authority (CA) for the transport of Class 7 (radioactive material) dangerous goods, to validate US package design approval:
 - USA/9297/AF-96 approval. US Department of Transportation (DOT) Competent Authority Certificate (CAC) USA/9297/AF-96 Revision 10 for Model No. Traveller STD, XL, and VVER Packages.
 - US DOT CAC USA/9297/AF-96 Revision 10 is a validation of the US Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) USA/9297/AF-96 Revision 12 and 13.
2. The package is designed to transport unirradiated fuel in the form of complete assemblies or loose fuel rods depending upon the type of inner package.
3. The Applicant, Westinghouse Electric Company Ltd USA (WEC) has requested revision of current UK certificate GB/5124/AF-96 revision 1 based on the issuance of US regulatory approval:
 - US Department of Transportation (DOT) Competent Authority Certificate (CAC) USA/9297/AF-96 Revision 10 for Model No. Traveller STD, XL, and VVER Packages.
 - US DOT CAC USA/9297/AF-96 Revision 10 is a validation of the US Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) USA/9297/AF-96 Revision 12 and 13.

as documented in the application letter LTR-LCPT-20-19. WEC has written to the ONR to request approval to transport the package by road and rail in GB, and sea within United Kingdom (UK) territorial waters [1].
4. The requested revision of the current UK certificate shall maintain approval of only the Traveller STD and XL Package types and exclude the Traveller VVER Package type as this is not used in the UK. Approval is requested to support transports of Nuclear Fuel Industries Ltd. (NFI) fuel assemblies from Japan to UK scheduled to start in summer 2021.
5. This approval request was made under 'The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009' [2] for road and rail. These regulations transpose into GB law the United Nations Economic Commission for Europe (UNECE) modal requirements ADR [3] and RID [4] for transport of dangerous goods by road and rail.
6. For transport of dangerous goods by sea, the international requirements are specified in the International Maritime Dangerous Goods (IMDG) Code [5] and are implemented in the UK by The Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997. The modal regulations are based on the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material, currently SSR-6 (2018 Edition) [6].

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BACKGROUND

7. The GB/5124/AF-96 (USA/9297/AF-96) is trademarked as the Traveller package. The package consists of an outer clamshell casing within which several inner containers can be fitted depending upon what fuel is being transported.
8. For the UK application, two different inner containers can be used to transport either a complete PWR fuel assembly or a number of loose PWR fuel pins. The package was subject to a five-yearly renewal in 2020 [7] [8].
9. The modifications covered in this latest application were in development at the time of the five yearly renewal but were not ready to be included in that application. Now the work has completed WEC have applied for them to be incorporated into the Validation.
10. The modifications to be included apply to the adoption of chromium coatings to the 'optimised ZIRLO liner' (OZL) fuel pin casing and an increase in fissile content from 5% to 7% for the carriage of loose rods. Other than this, there has been no change to the base design or PDSR since the previous ONR approval in 2020. A full description of the modifications is given in a presentation from WEC that was prepared for the introductory meeting on 13 October 2020 [9] [10].
11. The traveller package modifications have been assessed by the US regulators (NRC and DoT) and gained approval in late 2020 [11] [12].

ASSESSMENT AND INSPECTION WORK CARRIED OUT BY ONR IN CONSIDERATION OF THIS REQUEST

12. ONR has carried out a proportionate review of three main safety functions; mechanical, radiation shielding and criticality. The safety case requirements assessment was not revisited, as the PDSR remained unchanged apart from the inclusion of the modifications.
13. In accordance with the transport permissioning process, a decision record was produced [13]. Due to the application being a minor modification to a recent five yearly renewal, and taking into consideration the current American approvals, it is considered that a reduced scope assessment is adequate, focussing on the modifications requested.
14. It was agreed that the engineering, and shielding reviews be in the format of file notes. This is because there have been no design changes to the package since the previous approval. The criticality assessor produced an assessment report in line with ONR transport permissioning guidance [14].

Engineering Assessment

15. The engineering assessment [15] focused on the coatings applied to the fuel pin clad. It was not considered that this modification had any effects that would invalidate the current Package Design Safety Report. As the package is long and narrow, attention was also paid to the possibility of bending/ warping during lifting operations.

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16. Westinghouse Springfields Ltd provided a copy of their package lifting procedure [16] which demonstrated adequate measure for lifting and stacking the package safely and provided engineering drawings.

Shielding Assessment

17. The shielding assessment [17] focused primarily on the increase in fuel fissile content from 5% to 7%. Again, this modification was not considered to have any effects that invalidated the current PDSR.

Criticality Assessment

18. Westinghouse submitted a revised criticality safety case to cover the increase in fissile concentration [19]. The criticality assessment [18] concluded that it was considered to be adequate and justify that the increase in fuel concentration did not create any issues with the adequacy of the criticality safety justification.

Safety Case Requirements Assessment

19. Due to the minor nature of the modifications and the bulk of the PDSR remaining unchanged, it was considered that a re-assessment of the SCR aspects was not warranted. The modifications were reviewed as part of the Engineering and Radiological and Shielding assessments. The revised criticality safety case for the increase in fissile mass from 5% not 7% was assessed by the criticality assessor. It is considered this is a sufficient analysis of the modifications to the safety case.
20. With regard to the safety management system, the previous 5 yearly re-approval in 2020 [7] referred back to the preceding assessment in 2018 [20] on the basis that there had been no substantial change since then. Although this argument still holds true for the current validation, it was felt prudent to ensure that the safety management system was operating adequately. Therefore a meeting was held with Springfields Ltd [21] to discuss the safety management system, and no significant issues were raised regarding the adequacy of the arrangements. It is therefore considered that the existing justification still stands, and that no changes have been made that affect compliance with the relevant legal requirements.

MATTERS ARISING FROM ONR'S WORK

21. No Q1AR queries were raised by ONR inspectors, as any queries regarding the modifications were addressed during the project meetings and were of a minor nature. None of the modifications were considered to pose a safety risk.

CONCLUSIONS

22. The safety submission from the applicant, together with supporting documentation provided to ONR, is considered adequate to meet applicable regulatory requirements.

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RECOMMENDATIONS

23. It is recommended that the GB Transport Competent Authority validate US Approval
- US Department of Transportation (DOT) Competent Authority Certificate (CAC) USA/9297/AF-96 Revision 10 for Model No. Traveller STD, XL, and VVER Packages.
 - US DOT CAC USA/9297/AF-96 Revision 10 is a validation of the US Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) USA/9297/AF-96 Revision 12 and 13.

A partial validation for the Traveller STD and XL Package types (GB/5124/AF-96 [22]) should run concurrently with the American certificates of approval.

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REFERENCES

- [1] "Letter: Formal Request for United Kingdom Validation of USA/9297/AF-96 for Model No. Traveller, October 2020 CM9 Ref. 2020/304854".
- [2] The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (SI 2009 No. 1348);.
- [3] United Nations Economic Commission for Europe (UNECE), European Agreement concerning the International Carriage of Dangerous Good by Road (ADR) 2019 Edition.
- [4] Intergovernmental Organisation for International Carriage by Rail (OTIF), Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) 2019 edition.
- [5] International Maritime Dangerous Goods (IMDG) Code 2018 Edition incorporating Amendment 38-16.
- [6] IAEA Safety Standards for Protecting People and the Environment, Specific Safety Requirements No. SSR-6 "Regulations for the Safe Transport of Radioactive Material", 2018 Edition.
- [7] "GB/5124 (SVC4401389) - Project Assessment Report - ONR-SDFW-PAR-19-022: CM9 Ref. 2020/15397".
- [8] "GB/5124 (SVC4401389) - Certificate - GB/5124/AF-96 (Rev.1): CM9 Ref. 2020/15948".
- [9] "GB/5124/AF-96 TCA000009 Traveller STD and XL packages (USA/9297/AF-96): Slides for Introductory Meeting - 13 October 2020 CM9 Ref. 2020/312828".
- [10] "CR ONR-SDFW-CR-20-705 - GB/5124/AF-96 TCA000009 Traveller STD and XL packages (USA/9297/AF-96): Introductory Meeting - 13 October 2020 CM9 Ref. 2020/301286".
- [11] "US NRC / USA/9297/AF-96 Certificate of Compliance For Radioactive Material Packages No 71-9297 revision 13 date 15th September 2020 CM(ref. 2020/304854)".
- [12] "US DoT Competent Authority Certification for Type Fissile n CertificateRadioactive Materials Package Design Certificate USA/9297/AF-96 Revision 10 CM9 Ref 2020/304854".
- [13] "ONR-SDFW-DR-20-027: GB/5124/AF-96 (TCA000009) Permissioning+Decision+Record++Document+Number+1581 - **A Wylie** Approved 19 November 2020 CM9 Ref. 2021/26913".
- [14] "TRA-PER-GD-001 Revision 3 Transport Permissioning Assessment February 2021".
- [15] "UK/5124/AF-96 TCA000009 Engineering File |Note: Request for United Kingdom Validation of USA/9297/AF-96 for Model No. Traveller STD and XL Packages. CM9 Ref. 2021/28568".
- [16] "E-mail GB/5124/AF-96 TCA000009 Traveller STD and XL packages (USA/9297/AF-96): Assessment Info - Eng Drawings and Lifting Procedure: 8/12/2020 CM9 Ref. 2020/319080".
- [17] "GB/5124 (TCA000009) - File Note - Shielding Assessment of Traveller STD and XL packages (USA/9297/AF-96) CM9 Ref. 2021/14254".
- [18] "GB/5124 (TCA000009) - Report - ONR-SDFW-AR-20-041 - Criticality AR Traveller STD and XL packages (USA/9297/AF-96) - 7 April 2021".
- [19] "USA/9297 (TCA000009) - Documents for USA/9297/AF-96 (GB/5124/AF-96) - 10 November 2020, CM Ref. 2020/307996".
- [20] "USA/9297 (SVC4361663) - Report - Safety Case Requirements Assessment for the part validation of Package Design Application **M.Turner** - 26 June 2018 CM9 Ref. 2018/206711".

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[21] "ONR-CR-20-1285 GB/5124/ AF-96 (TCA000009) USA/9297/AF-96 - Traveller Package: Meeting With Springfields Safety Management Section in support of Permissioning Validation of Traveller Package CM9Ref. 2021/27809".

[22] "GB5124 AF-96 (TCA000009) Certificate of Approval April 2021 CM9 Ref 2021/30341".

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Figure 1: Traveller Package GB/5124/AF-96 (USA/9297/AF-96)



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