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| ONR Project assessment report  PR-01208 - Renewal of Transport Package Design Approvals GB/3570/H(U)-96, GB/3571/H(U)-96 and GB/3572/H(U)-96 |



ONR Project assessment report

**Project name**: PR-01208

**Report title**: Renewal of Transport Package Design Approvals GB/3570/H(U)-96, GB/3571/H(U)-96 and GB/3572/H(U)-96

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# Executive summary

URENCO UK Limited (UUK) 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 certificates pertaining to the 48X and 48Y cylinders that are used to transport Uranium Hexafluoride between nuclear fuel cycle facilities worldwide. The current certificates are due to expire on 31 July 2025.

Transport design certificates pertaining to the 48X and 48Y cylinders were initially granted in May 2004 and there have been multiple renewals since. Much of the design is captured within International Organization for Standardization (ISO) and American National Standards Institute, Inc. (ANSI) standards.

In accordance with an approved regulatory permissioning strategy, we have carried out proportionate assessment and inspection activities focussed on:

* Actions from the most recent (May 2020) renewals;
* Consideration of changes identified in the Periodic Design Review (PDR);
* Consideration of UUK’s treatment of Human Factors (HF) matters; and,
* Follow-up of a transport management system inspection in June 2021.

Based on the work carried out:

* We consider the safety submission from the applicant to be adequate and the package designs to be compliant with the applicable transport regulations.
* We have raised three Level 4 (the lowest level) Regulatory Issues to monitor UUK’s work to address relatively minor shortfalls identified during this permissioning project.

We recommend that the Head of Transport Competent Authority signs the following three Certificates of Approval of package design (CoAs), each of which will become effective on 1 August 2025 and expire on 31 July 2030:

* GB/3570/H(U) (Rev.7);
* GB/3571/H(U) (Rev.8); and,
* GB/3572/H(U) (Rev.8).

Table 1: List of abbreviations.

|  |  |
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| Term/Acronym | Description |
| ADR | Agreement concerning the International Carriage of Dangerous Goods by Road |
| ANSI | American National Standards Institute, Inc. |
| BTP | Blanket Thermal Protector |
| CA | Competent Authority |
| CDG09 | The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 |
| CoAs | Certificates of Approval of package design |
| CTP | Composite Thermal protector |
| GB | Great Britain |
| HF | Human Factors |
| IAEA | International Atomic Energy Agency |
| IMS | Integrated Management System |
| IMDG | International Maritime Dangerous Goods |
| IMO | International Maritime Organisation |
| ISO | International Organization for Standardization |
| LC36 | Licence Condition 36 “Organisational Capability” |
| ONR | Office for Nuclear Regulation |
| OTIF | Intergovernmental Organisation for International Carriage by Rail |
| PAR | Project Assessment Report |
| PDR | Periodic Design Review |
| PDMS | Package Design Management System |
| PDSR | Package Design Safety Report |
| PJB | Pre-Job Brief |
| RI | Regulatory Issue |
| RID | Regulations concerning the International Carriage of Dangerous Goods by Rail |
| RQ | Regulatory Query |
| SAR | Safety Analysis Report |
| SSR | (IAEA) Specific Safety Requirements |
| TAG | Technical Assessment Guide |
| UCP | URENCO ChemPlants |
| UF6 | Uranium Hexafluoride |
| UNECE | United Nations Economic Commission for Europe |
| UNS | URENCO Nuclear Stewardship |
| USA | United States of America |
| UUK | URENCO UK Limited |
| VPA | Valve Protector Alternate |

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# Permission requested

1. URENCO UK Limited (UUK) has applied [1] to the Office for Nuclear Regulation (ONR) for renewal of three Certificates of Approval of package designs (CoAs) for the carriage of radioactive material: GB/3570/H(U)-96 [2]; GB/3571/H(U)-96 [3]; and, GB/3572/H(U)‑96 [4].
2. The application is for transport by road, rail and sea. The extant CoAs are due to expire on 31 July 2025. The renewed CoAs require validation in the United States of America (USA).
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 three renewed CoAs.

# Background

## UUK’s Application

1. UUK’s application [1] was supported by:

* A Safety Analysis Report (SAR) [5] [also referred to as a Package Design Safety Report (PDSR)] which references multiple supporting appendices; and,
* A Periodic Design Review (PDR) [6].

1. As noted in the title of the PDR, it was undertaken in accordance with Revision 1 of ONR Guidance Document TRA-PER-GD-014 and not in accordance with the extant revision of this document [7]. This is dealt with in Sections 2.4.3 and 3.5 of this PAR.

## Package Design

1. The package design is described in detail in the SAR/ PDSR. The description here is provided to give a brief overview of the three different package types.
2. The packaging consists of either a model 48X or 48Y cylinder with or without thermal protection. The basic design of the cylinders, and material to be used, is specified in International Organization for Standardization (ISO) 7195:2020 [8] and in American National Standards Institute, Inc. (ANSI) N14.1:2023 [9].
3. The cylinders are fitted with valve protection. There are two designs, “valve protector” and “valve protector alternate” (VPA) with both designs being shown in ISO 7195:2020 and in ANSI N14.1:2023.
4. The cylinders can be fitted with thermal protection. There are two thermal protection designs in use; Blanket Thermal Protector (BTP) and Composite Thermal protector (CTP).
5. The three package designs covered by the application are:

* The GB/3570/H(U)-96 design with BTP (Figure 1);
* The GB/3571/H(U)-96 design with CTP (Figure 2); and,
* The GB/3572/H(U)-96 design which transports low levels of Uranium Hexafluoride (UF6) and does not require thermal protection (Figure 3).

## Authorised Contents

1. The authorised radioactive contents are solid, depleted, natural or re‑processed (232U maximum concentration 0.005μg/gU), non-fissile or fissile excepted, uranium hexafluoride UF6. The maximum quantity of UF6 in a cylinder is limited to approximately 12,500kg.

## Regulatory History

1. A full review of relevant regulatory history is included in the Pre-Job Brief (PJB) for this project [10]. Only the key points in the PJB are summarised in this section. These key points relate to:

* Actions from the most recent renewals;
* Previous transport management system inspection;
* Human factors; and,
* Regulatory Issues (RIs);

### Actions from the Most Recent Renewals

1. New CoAs for GB/3570/H(U)-96, GB/3571/H(U)-96 and GB/3572/H(U)‑96 were issued in May 2004 and there have been multiple renewals since. The most recent renewals were on 12 May 2020. Granting of these renewals was supported by a Transport Approval Assessment Decision Record [11] which raised two recommendations to be communicated to UUK. This was done via an e-mail on 21 July 2020 [12] which placed the following actions:

* Action 1: UUK should keep ONR informed of progress following submission of defect tolerance research to international standards organisations.
* Action 2: Appendix Q (thermal performance of 48Y composite thermal protection) should be updated by the Applicant prior to the next CA approval.

1. These actions were followed up during this project (see Section 3.4).

### Previous Transport Management System Inspection

1. A transport management system inspection was undertaken 23-24 June 2021 [13]. This inspection raised eleven observations. These were followed up during this project (see Section 3.6).

### Human Factors

1. As noted in Section 2.1, the PDR was undertaken in accordance with Revision 1 of TRA-PER-GD-014 and not in accordance with the extant revision of this document [7].
2. The most significant gap between Revision 1 and Revision 4 of TRA‑PER‑GD-014 relates to the inclusion of ONR’s Human Factors (HF) expectations in Revision 4.
3. This was followed up during this project (see Section 3.5).

### Regulatory Issues

1. I am satisfied that relevant historical RIs are all now closed.

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

## Transport Permissioning Instruction and Guidance

1. I have used ONR Instruction ONR-TCA-IN-001 “Transport Permissioning” [14] and ONR Guidance Document ONR-TCA-GD-001 [15] 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:

* International Atomic Energy Agency (IAEA) Specific Safety Requirements (SSR)-6 (Rev. 1) “Regulations for the Safe Transport of Radioactive Material. 2018 Edition” [16];
* United Nations Economic Commission for Europe (UNECE) “Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) 2025 Edition” [17] (the 2025 Edition is applicable since the CoAs come into effect on 1 August 2025);
* Intergovernmental Organisation for International Carriage by Rail (OTIF) “Regulation concerning the International Carriage of Dangerous Goods by Rail (RID) 2025 Edition” [18] (the 2025 Edition is applicable since the CoAs come into effect on 1 August 2025);
* International Maritime Organisation (IMO) “International Maritime Dangerous Goods (IMDG) Code 2022 Edition incorporating Amendment 41-22 (until 31 December 2025) [19] or IMDG Code 2024 Edition incorporating Amendment 42-24” [20];
* Energy Act 2013 [21];
* The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG09) [22];
* The Merchant Shipping (Carriage of Dangerous Goods and Harmful Substances) (Amendment) Regulations 2024 (SI 2024 No. 636) [23].

## Regulatory Permissioning Strategy

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

* Actions from the most recent renewals;
* Consideration of changes identified in the PDR;
* Consideration of UUK’s treatment of HF matters; and,
* Follow-up of the previous transport management system inspection.

## Mechanical Engineering Assessment

1. A mechanical engineering assessment has been undertaken to support this permission [24]. The resultant engineering assessment note included follow‑up of the two actions from the most recent renewals of GB/3570/H(U)-96, GB/3571/H(U)-96 and GB/3572/H(U)-96.
2. In relation to follow-up of these two actions, I raised Regulatory Query (RQ)-02033 “Actions from ONR's Assessment Supporting the Current CoAs for GB/3570/H(U)-96, GB/3571/H(U)-96 and GB/3572/H(U)-96”.
3. The mechanical engineering assessor has reviewed UUK’s response to RQ‑02033 and stated that he is satisfied that Action 1 has been completed.
4. In relation to Action 2, the mechanical engineering assessor has stated that Appendix Q has not been updated since the last submission. However, he has reviewed the previous assessment report and decision record and he does not consider that there is a safety implication associated with this. He has now raised the following Level 4 (the lowest level) RI relating to this matter:

* RI-12521 “Update to Appendix Q of Urenco UK Limited SAR for Type 48X and 48Y H(U) Uranium Hexafluoride Cylinders”.

1. In terms of his broader assessment, the mechanical engineering assessor has provided UUK [25] with regulatory advice relating to Appendix U “Operating and Maintenance Instruction for 48Y and 48X Cylinders” of the PDSR to ensure it remains compliant with ISO 7195:2020.
2. The mechanical engineering assessor concludes that he is satisfied that the safety justifications remain valid and that the safety case has been updated appropriately to capture the changes in SSR-6 (Rev. 1) [16].
3. The mechanical engineering inspector finally concludes that he has no objection to the package design being approved from an engineering perspective for GB/3570/H(U), GB/3571/H(U) and GB/3572/H(U).

## Human Factors Considerations

1. The application letter [1] acknowledges that the PDR was undertaken in accordance with Revision 1 of TRA-PER-GD-014 and not in accordance with the extant revision of this document and that the material difference between the two revisions relates to HF considerations. A commentary of this matter is included in the application letter. This commentary states that human performance issues are not a significant contributor to the operational performance of this cylinder design.
2. A HF assessor has reviewed this commentary and produced a statement relating to HF assessment of PR-01208 [26]. The statement concludes that it would be disproportionate to undertake HF assessment of the submission.
3. The statement also partly accepts UUKs statement that human performance issues are not a significant contributor to the operational performance of this cylinder design.
4. Finally, the statement requests that the Project Inspector for PR-01208 should reiterate to UUK their responsibilities to consider HF in line with the new ONR Technical Assessment Guide (TAG) [27] for all renewals and approval requests.
5. In response to the HF assessor’s request, I have now raised the following Level 4 RI relating to this matter:

* RI-12518 “Inclusion of Human Factors in the PDR and the PDSR for 48X and 48Y UF6 Transport Cylinders”.

## Inspection

1. I led the following inspection relating to PR-01208:

* IR-54033 “PR-01208 - Type 48X and 48Y Hex Cylinder H(U) Renewal - Readiness Inspection”.

1. In relation to management systems, the aim of this inspection was to obtain evidence to support granting revised CoAs for transport package designs GB/3570/H(U), GB/3571/H(U) and GB/3572/H(U).
2. The inspection covered three main themes:

* High level overview of UUK’s Integrated Management System (IMS);
* Follow up of the ONR transport management system inspection undertaken in June 2021; and,
* Management systems specific to Section 3 “Management Systems” of the CoAs for package designs GB/3570/H(U), GB/3571/H(U) and GB/3572/H(U).

1. The findings related to these three themes are summarised next.

High Level Overview of UUK’s IMS

1. I am satisfied that UUK is operating with an IMS which is generally consistent with relevant good practice.
2. Although a major change programme “One Capenhurst and Matrix Optimisation” is progressing, so that the UUK IMS will become part of an overall Capenhurst IMS which covers UUK, URENCO Nuclear Stewardship (UNS) and URENCO ChemPlants (UCP), ONR is satisfied that this is being appropriately managed using UUK’s Licence Condition 36 (LC36) “Organisational Capability” arrangements.
3. In relation to the PDSR for the 48X and 48Y cylinder package design I identified a shortfall against relevant good practice relating to demonstration of Intelligent Customer. I consider the shortfall to be relatively minor and I have now raised the following Level 4 RI relating to this matter:

* RI-12576 “Demonstration of Intelligent Customer for 48X and 48Y UF6 Transport Cylinders Package Designs”.

Follow up of the ONR Transport Management System Inspection Undertaken in June 2021

1. I am satisfied that UUK has addressed all eleven observations arising from the transport management system inspection undertaken in June 2021.

Management Systems Specific to Section 3 “Management Systems” of the CoAs for package designs GB/3570/H(U), GB/3571/H(U) and GB/3572/H(U)

1. I was satisfied that UUK’s Package Design Management System (PDMS) arrangements are consistent with relevant good practice. I have used UUK’s PDMS to inform Section 3 of the CoAs for GB/3570/H(U), GB/3571/H(U) and GB/3572/H(U).
2. The PDSR supporting the PR-01208 permissioning has now been updated [28] to reflect the PDMS considered during this inspection.

## New Certificates of Approval

1. Three new CoAs have been produced in line with the instructions and guidance in [14] and [15].
2. The most significant changes compared to the extant CoAs are described next.
3. The symbol “-96” has been removed from the Type Code in line with SSR-6 (Rev. 1) [16]. I have advised UUK of the implications of this [29]. The implications relate to marking of packages and update of the PDSR and the PDR. In relation to update of the PDSR and the PDR, addressing Action 01 of the aforementioned RI-12518 “Inclusion of Human Factors in the PDR and the PDSR for 48X and 48Y UF6 Transport Cylinders” requires an update of the PDR and the PDSR. I have advised UUK that whilst addressing RI‑12518 Action 01 it should, when appropriate, remove references to the “‑96” symbol.
4. The extant CoAs each contain a statement “Pre-shipment measurements may be taken to confirm that the maximum surface dose rate of empty / heeled cylinders are within the regulatory limit”. Having consulted a radiation shielding assessor [30], this statement has been removed from the new CoAs since relevant requirements are included in the PDSR and the associated Appendix U “Operating and Maintenance Instruction for 48Y and 48X Cylinders”.

# Matters arising from ONR’s work

1. Three Level 4 RIs have been raised to monitor UUK’s work to address shortfalls identified during this project. These are:

* RI-12521 “Update to Appendix Q of Urenco UK Limited SAR for Type 48X and 48Y H(U) Uranium Hexafluoride Cylinders”;
* RI-12518 “Inclusion of Human Factors in the PDR and the PDSR for 48X and 48Y UF6 Transport Cylinders”; and,
* RI-12576 “Demonstration of Intelligent Customer for 48X and 48Y UF6 Transport Cylinders Package Designs”.

1. Taken individually or together these RIs do not preclude the requested permissioning. Instead, the expectation is that they are each closed before the next application to renew the GB/3570/H(U), GB/3571/H(U) and GB/3572/H(U) CoAs.

# Conclusion

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 relevant 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 CoAs GB/3570/H(U) (Rev.7), GB/3571/H(U) (Rev.8) and GB/3572/H(U) (Rev.8);
* Signs CoA GB/3570/H(U) (Rev.7) which will be become effective on 1 August 2025 and expire on 31 July 2030;
* Signs CoA GB/3571/H(U) (Rev.8) which will be become effective on 1 August 2025 and expire on 31 July 2030; and,
* Signs CoA GB/3572/H(U) (Rev.8) which will be become effective on 1 August 2025 and expire on 31 July 2030.

Figure 1 GB/3570 48Y (48X) UF6 Cylinder (with Blanket Thermal Protector) (all dimensions are approximate)

Figure 1 GB/3570 48Y (48X) UF6 Cylinder (with Blanket Thermal Protector) (all dimensions are approximate)

Figure 2 GB/3571 48Y (48X) UF6 Cylinder (with Composite Thermal Protector) (all dimensions are approximate)

Figure 2 GB/3571 48Y (48X) UF6 Cylinder (with Composite Thermal Protector) (all dimensions are approximate)

Figure 3 GB/3572 48Y (48X) UF6 Cylinder (bare) (all dimensions are approximate)

Figure 3 GB/3572 48Y (48X) UF6 Cylinder (bare) (all dimensions are approximate)

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