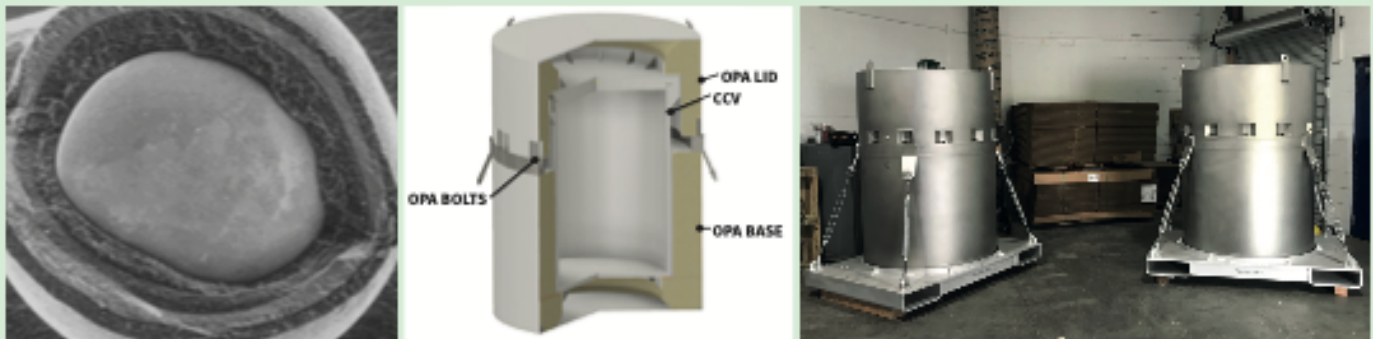


HALEU Fuel Transport: NAC International's OPTIMUS® Systems



Above
(from left to right):
TRISO Particle
Source: Energy.gov

OPTIMUS®-L

**Deployed OPTIMUS®-L
Packaging Systems**

NAC INTERNATIONAL'S PATENTED OPTIMAL MODULAR Universal Shipping (OPTIMUS®) transport packaging systems are certified Type B(U)F packagings that are ideal for transporting a variety of radioactive materials, including Type B quantities of intermediate level waste (ILW), transuranic waste (TRU), irradiated fuel waste (IFW), reactor components, laboratory and experiment wastes, pool debris, and reactor products (e.g., sealed sources, irradiated materials, etc.). The OPTIMUS®-L is used for low-activity contents such as contact-handled TRU waste, high-assay low-enriched uranium (HALEU), and low enriched uranium (LEU), whereas OPTIMUS®-H is used for high activity contents such as remote-handled TRU waste, LEU and fissile material. Both packagings are configurable with multiple shield insert assemblies (SIAs), balancing the need for radiation shielding with minimal shipping weight. These small, light modular packages are easily handled using cranes or forklifts and are ideal for facilities with restricted access and low crane capacity. The packagings are designed to support legal weight truck (LWT) shipments and can be used in multiple transport configurations.

The small size of the OPTIMUS®-L packaging, combined with its relatively large cavity size, payload capacity, and the ability to transport several packages on a single LWT shipment, make it an ideal packaging for transportation of different forms of HALEU fuels, including HALEU feedstock in the form of metal ingots or UO₂ powder and TRISO compacts/pebbles. An independent evaluation of the OPTIMUS®-L packaging performed through collaboration of Idaho National Laboratory, Pacific Northwest National Laboratory, and Oak Ridge National Laboratory, and funded by the U.S. Department of Energy, confirmed that a single LWT shipment of OPTIMUS®-L packages will transport 250% of the UO₂ HALEU contents possible with an alternative, more traditional Type B(U)F packaging¹.

To meet the anticipated near-term demand from Small Modular Reactor developers for the transportation of large quantities of HALEU fuel, NAC has developed a high-

capacity, cost-effective OPTIMUS®-L packaging configuration for TRISO compacts. NAC has demonstrated that a total of five (5) OPTIMUS®-L packages with the maximum number of TRISO compacts can be transported in a single LWT shipment while satisfying the regulatory requirements for criticality with significant margin, far exceeding the capacity of the competition.

An application to amend the OPTIMUS®-L U.S. Nuclear Regulatory Commission certificate for HALEU contents is in the process of submittal in 2022 with first transportation planned for Q1 of 2024.

NAC has fabricated and deployed 26 OPTIMUS® systems and over 20 basket and insert assemblies, with an additional four systems and two SIAs to be delivered by Q4 of 2022. NAC is currently designing two new OPTIMUS® packaging systems for additional contents, and several engineered basket assemblies are currently in the pre-approval design phase with a projected 2024 deployment window. The OPTIMUS®-L is scheduled to execute its first domestic shipment in Q3/Q4 of 2022. ■



For additional information about the OPTIMUS® Systems, please contact Mike Miller, Director of Business Development, Transportation Projects:
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References

1. Eidelpes, et. al., "UO₂ HALEU Transportation Package Evaluation and Recommendations," INL/EXT 19-56333, Revision 0, November 2019.