International Nuclear Services

Transporting nuclear materials – MOX

What is MOX?

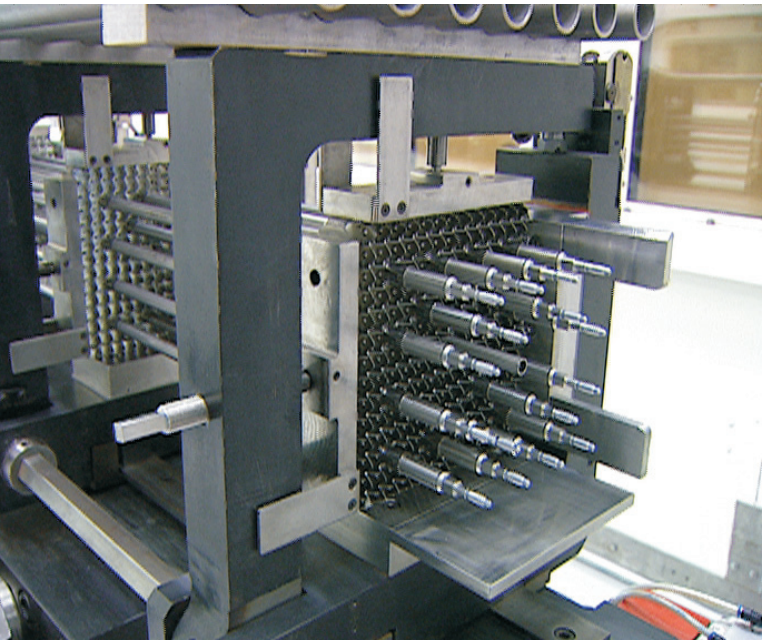
Mixed oxide (MOX) fuel is made of a mixture of plutonium and uranium oxides. It can be used in place of uranium fuel in conventional nuclear reactors to make electricity. It is an energy efficient fuel, which allows the products of reprocessing used uranium fuel to be recycled.

Reprocessing used uranium fuel recovers 97% of the original fuel, (96 % uranium, 1% plutonium) removing the 3% waste. This allows new fuel to be produced without the need to mine fresh uranium.

How is it transported?

MOX fuel is transported in extremely robust purpose-built cylindrical flasks. The package design is in accordance with the requirements of International Atomic Energy Agency (IAEA) TS-R-1 regulations for the safe transport of radioactive material 1996 edition for a B(U)F package.

The M4/12 flask design and manufacture is carried out in accordance with approved quality management systems complying with ISO 9001.



MOX fuel manufacture

How safe is it?

MOX fuel pellets are a hard, ceramic, stone-like material. The pellets are so durable that if dropped into water, they would take thousands of years to dissolve. These pellets are loaded into fuel rods made from zirconium alloy which are corrosion-resistant and able to withstand considerable extremes of temperature and pressure.

The rods are loaded into fuel assemblies, which are then loaded into the transport flasks. The fuel assemblies are safe enough to allow workers to work immediately next to them. Due to the low levels of radiation being emitted, the fuel is comparatively easy to handle and poses no threat to operators or the public. However, as with any radioactive material, suitable precautions must be taken and we fully comply with the necessary regulatory requirements.

The flasks used to transport the fuel are specifically tested against IAEA requirements. The IAEA regulations set the standards for impact and fire tests to check that the containers can withstand the most serious accident and that no radioactivity will escape.

These tests include:

- Drop tests, during which the lid seal must remain intact after being dropped one metre onto a concrete and steel reinforced spike; and a nine metre drop onto an unyielding surface - all performed at angles that ensure the maximum impact on the flask.
- Fire testing, requiring the flask to withstand an all-engulfing fire of 800 degrees Celsius for 30 minutes - the enhanced fire protection measures required on nuclear transport vessels make it extremely unlikely that a fire of this ferocity would occur.
- Pressure tests, in which the flask must withstand pressure of at least 15 metres of water - in fact the flasks are able to withstand the pressures created by submersion in considerable depths of water.

An M4/12 MOX fuel transport flask

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