TRISO

BWXT recently announced plans to restart and expand its TRISO fuel manufacturing capability. The equipment and the facility that will be used to manufacture TRISO can be used to manufacture other high-temperature nuclear fuels with direct applicability to nuclear thermal propulsion reactors.

TRISO refers to a specific design of uranium nuclear reactor fuel for advanced reactors and microreactors. It can withstand extreme heat, and it has very low proliferation concerns and environmental risks.

TRISO is a shortened form of the term TRIstructural-ISOtropic. TRIstructural refers to the layers of coatings surrounding the uranium fuel, and ISOtropic refers to the TRISO-coated kernel being the same size in each direction, since it takes the shape of a sphere. This three-layer coating system acts as a miniature pressure vessel, providing containment of the radionuclides and gases generated by fission of the nuclear material in the kernel.

TRISO fuel consists of a very small kernel of uranium coated with a variety of silicon- and carbon-based materials. Due to this design, radionuclides are retained within multiple barriers. Each TRISO-coated kernel is about 1 mm in diameter—about the size of the tip of a ballpoint pen. About 100,000 of them could fit in a standard tube of lip balm.

Beyond NTP

While BWXT is continuing its work to develop NTP technologies, the company’s work could also translate into providing power systems for operations after a spacecraft lands, a scope of work that goes beyond NTP. Not only could nuclear power get astronauts to Mars, but it could also provide the power needed to explore the planet’s surface and communicate back to Earth.

Ken Camplin, BWXT’s president for nuclear services, who has overall responsibility for BWXT’s space nuclear technology development efforts, said, “Nuclear power is one of several technologies that are options for propulsion to Mars and sustenance of life once we arrive, and BWXT is working hard every day to demonstrate that it can be a go-to choice for NASA. If this becomes a chosen technology for getting humans to Mars and powering their work while they are there, it won’t be just a victory for BWXT—it will be a victory for everyone in the nuclear industry.”