

## **NE-19-18417, Develop ASME Section III Division 5 Design Rules for Elevated Temperature Cladded Class A Type 316 Stainless Steel Components**

Type 316 stainless steel has been identified as a construction material for the Kairos Power fluoride-salt-cooled, high-temperature reactor (KP-FHR) primary coolant boundary components. While Type 316 stainless steel provides adequate high temperature strength for the operating conditions of KP-FHR, it is not optimized for corrosion resistance in fluoride salts that could place restrictions on the design lifetime of primary coolant boundary components to retain the required structural margins. One solution is to use a corrosion-resistant cladding for Type 316 stainless steel components to lessen, or possibly eliminate, such restrictions. The use of cladded components is a well-established practice in the other applications including light water reactors and in the petrochemical industry.

Kairos Power will work with Argonne National Laboratory where staff that are highly experienced in ASME code case development are available to develop design rules and associated materials data for the design of cladded components that are constructed of Type 316 stainless steel and cladded by non-code qualified corrosion resistant materials. The two clad materials of interest to the KP-FHR design are commercially-pure nickel and tungsten. These two clad materials show excellent corrosion resistance against fluoride salts and there are industrial processes for cladding Type 316 with both materials.