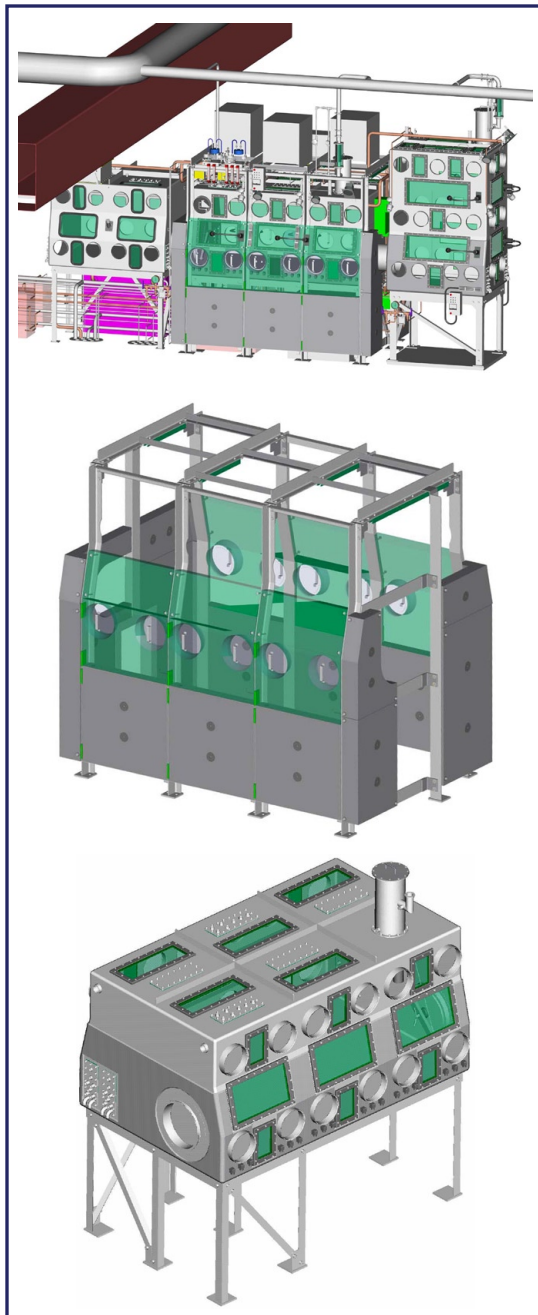


The <sup>238</sup>Pu Heat Source Production Program at Building PF-4, TA-55, Los Alamos National Laboratory (LANL) will produce heat sources to support several national security programs and NASA missions. In order to meet DOE deliverable requirements, it is necessary to install a new glovebox to house three new furnaces and bring the hot press in an existing glovebox online.

The purpose of the furnace glovebox is to provide a shielded inert atmosphere enclosure designed to interface with three internal microprocessor-controlled, resistance-heated furnaces. The furnaces support the three heat-treatment related operations that are required during <sup>238</sup>PuO<sub>2</sub> fuel processing. The shielding for the furnace glovebox consists of lead shielding in the glovebox shell as well as a separate hydrogenous shielding assembly for neutron shielding. The purpose of the hot press glovebox is to provide an inert atmosphere enclosure designed to interface with the hydraulic press and induction heating system required during <sup>238</sup>PuO<sub>2</sub> fuel processing.



Merrick & Company provided comprehensive engineering and design services for the furnace and hot press gloveboxes. The furnace glovebox design includes the furnace glovebox, glovebox support stand, hydrogenous shielding assembly, glovebox atmosphere ventilation system, and furnace cooling system including engineered controls for overheating. The hot press glovebox upgrades design includes the glovebox support stand, glovebox atmosphere ventilation system, induction coaxial transmission system, and hot press cooling system. Merrick provided build-to-print fabrication drawings for the furnace glovebox, hydrogenous shielding assembly, and hot press glovebox upgrades using Pro/ENGINEER<sup>®</sup> 3D modeling software. Merrick designed and analyzed the glovebox support stands and hydrogenous shielding assembly in accordance with PC-3 (safety-class) seismic criteria. Merrick performed a shell analysis on the furnace glovebox in accordance with the requirements of LANL Standard Specification 11608 - Glovebox Design. Merrick provided installation design services for both gloveboxes, including glovebox ventilation design, process design, and mechanical/electrical installation design. Merrick also prepared all designs in accordance with LANL Standard Specifications 11608 - Glovebox Design, 11610 - Glovebox Fabrication, and 11620 - Glovebox Installation.

The installation process design includes the design of glovebox atmosphere ventilation control and cooling systems for the furnaces in the furnace glovebox and the induction heating system associated with the hot press glovebox. The furnace glovebox is ventilated with a regenerable purification system (dri-train) that maintains the glovebox argon atmosphere below 10 ppm oxygen and moisture. The hot press glovebox is ventilated with an argon flush system to maintain an inerted glovebox atmosphere. The cooling systems for both gloveboxes incorporate limited volume chilled water units to minimize the potential for a criticality and instrumentation controls to prevent overheating of the equipment.

Merrick developed a Design Change Package (DCP) in support of installing the furnace glovebox and upgrades to the hot press glovebox into TA-55, PF-4. For the DCP, Merrick produced piping and instrumentation diagrams, detailed piping drawings, electrical routing drawings, HVAC ductwork drawings, and installation, testing and inspection specifications. In addition, Merrick developed procurement support documents including a Graded Approach Item Management Level Determination Form, Verification, Inspection, and Test Plan, and Consolidated Bill of Materials.