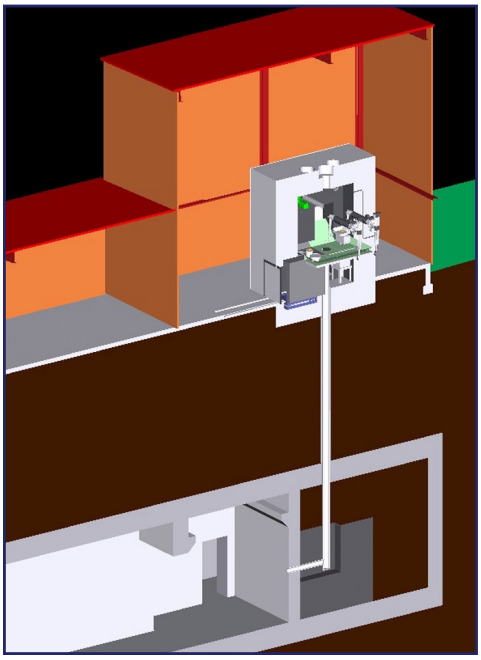
MERRICK®
BUILDING QUALITY SOLUTIONS

Isotope Production Facility Hot Cell

Los Alamos Neutron Science Center
Los Alamos National Laboratory
Los Alamos, New Mexico

■ ENGINEERING ■ ARCHITECTURE ■ DESIGN-BUILD ■ GEOSPATIAL SOLUTIONS ■ SURVEYING



Merrick & Company designed the Isotope Production Facility (IPF) and hot cell system at the TA-53 linear accelerator at the Los Alamos National Laboratory (LANL). The hot cell features one viewing window, two Central Research Laboratory Model G-HD manipulators, a cask docking port, and associated material handling equipment. Merrick performed all machine design, structural, electrical, HVAC, and instrumentation/control design for the facility and the hot cell. Source term for the hot cell was approximately 2000 Curies of 1 MeV gamma radiation. Personnel dose rates were minimized to 5 mrem/hr according to hot cell design criteria. The beamline components were installed in an underground tunnel 40 feet below grade. Merrick designed an excavation, foundation, and shoring design that prevented impact to the existing beamline during construction.

Merrick's activities for this project included:

- Performed shielding calculations for anticipated gamma source term.
- Created a 3D parametric CAD model in Pro/Engineer for the hot cell to identify physical interference issues.
- Designed a cask docking port for safe transfer of material, preventing exposure of workers to high radiation fields and mitigating the spread of contamination.
- Designed a sample introduction port for safe loading of small items including the targets into the hot cell.
- Designed hot cell work surfaces (fabricated from stainless steel) to accommodate all steps and procedures detailed in the sequence of operations.
- Designed a cask cart to move the target transport cask from the truck dock area to the cask docking port on the hot cell and back again.
- Performed structural engineering for analysis and design of the hot cell structure of high-density, reinforced concrete.
- Evaluated ventilation and exhaust requirements based on hot cell pressurization criteria, temperature, and cell leakage requirements. Mechanical design included mountings, collar details, arrangement of HEPA filtered air inlets and exhaust to the hot cell, and fire sprinkler location and penetration details.
- Foundation design included installation of 42" drilled concrete shafts 65 foot deep that served a dual purpose of radiation shielding and shoring.
- Provided electrical design including details for construction of lighting, special systems, and instrumentation and control.
- Provided detailed process utility requirements including a deionized water supply, compressed air supply and radioactive liquid waste drain. Penetration details were in accordance with ANS guidelines, where applicable.

Project Features:

- Design of radiological handling facility
- Experience in design of controls for gamma emitters and shielding calculations
- Special foundation design for unusual surface conditions