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EM NEWS FLASH

Windows to the Past—Windows to the Future

For over 50 years the Nevada Test Site has been used to conduct various scientific projects. Among the early endeavors was the Supersonic Low Altitude Missile (SLAM) in 1957. The concept was a revolutionary type of propulsion: nuclear ramjet power, code named Project Pluto. The principle was relatively simple: draw air in at the front of the vehicle under ram pressure (i.e., great force), heat it to make it expand, and exhaust it out the back to provide thrust. Using a nuclear reactor to heat the air was a relatively new idea. Unlike commercial reactors, which are surrounded by concrete, the Pluto reactor had to be small and compact in order to fly, but durable enough to survive long trips to potential targets. To test Pluto's reactor, facilities were constructed on eight square miles of Jackass Flats at the Nevada Test Site. The complex consisted of six miles of roads, the critical assembly building, the control building, the assembly and shop buildings, and utilities, as well as a two-mile, fully automated railroad to move the reactor between its static test stand and the disassembly building.

The exterior of the Pluto Facility.

Steel columns now stabilize the two sections of the blast door in the open position .

Despite successful tests, the Pentagon and Pluto sponsors began to reconsider the project. Military experts were concerned that Pluto could be dangerous to U.S. allies with the potential to endanger people along its flight path. The U.S. Air Force had also begun deploying ballistic missiles capable of carrying out the missions planned for Pluto, casting further doubt on the prospects for the project. On July 1, 1964, seven years after its inception, Project Pluto was canceled by the Atomic Energy Commission and the U.S. Air Force.

Today, nearly 45 years later, work is being performed to address potential environmental concerns resulting from this and other historic projects. The scope of work for Industrial Sites Sub-Project personnel who are working to address environmental concerns associated with Pluto centers primarily around two objectives: to place the Pluto Disassembly Facility in a safe configuration so it can be demolished at a future date, and to close the facility according to Federal Facility Agreement and Consent Order guidelines. This high hazard work is being led by the Stoller-Navarro Joint Venture, the architectural and engineering contractor for the U.S. Department of Energy National Nuclear Security Administration Nevada Site Office, with support from fellow DOE contractor National Security Technologies. Among the numerous tasks that have to be accomplished is environmental sampling which identifies potential contaminants that may have migrated from the site into the soil. Some polychlorinated biphenyl soil contamination was discovered, and is currently being remediated. Approximately 30 cubic yards of soil has been removed and properly disposed at the Nevada Test Site.

A specially designed and fabricated extraction tool was used to remove the lead glass windows from the wall.

The lead glass windows were 11 feet off the floor. Personnel and equipment had to be safely secured .

Field work on the facility began in May 2008. Of all the recent work done at the Pluto Facility, removing the lead glass windows and securing the blast doors proved most challenging.

The blast door leading to the Main Assembly Bay at the Pluto Facility consists of two sections – a top and a bottom half. These blast doors were created for shielding. When the reactor was active inside the assembly bay, or when there was potential for exposure to the fuel rods, the blast doors would close. The size and composition required to provide this shielding is impressive. Each section of the door is made of a steel shell, four feet thick, 26 feet wide, 11 feet tall, and filled with barite concrete. This high density concrete is desirable for shielding from radiation. The doors are suspended by steel cables, and actuated by hydraulic rams. Each section weighs approximately 100 tons.

The windows were massive, weighing approximately 11,000 lbs. each.

Strict procedures and diligent work allowed the task to be performed with zero safety incidents.

"A primary safety concern was the condition of the steel cables that hold the door," noted Stoller-Navarro Joint Venture Project Task Manager Mark Burmeister. In place since 1959, the cables are old, rusted, and it was unknown when they were last inspected – therefore, their structural integrity was suspect. "Furthermore, the only way to use this entrance was to pass in between the halves of the door," said Burmeister. "The doors close with one half descending from the top, and another emerging from beneath."

To address this safety concern fellow DOE contractor National Security Technologies engineered a unique design. By inserting a steel column on each side of the entrance the door is stabilized in the open position. The steel columns are braced and anchored to the concrete walls of the building itself.

After thorough decontamination and secure packaging, the windows were shipped to Fermi National Accelerator Laboratory for re-use.

In July and August of 2008, another unusual challenge was presented by six windows inside the facility. Each of these windows is constructed of multiple lead glass panes (glass to which lead has been added to block radiation). Between each pane is mineral oil, which benefits the optic quality of the windows. Overall, each window unit is approximately four feet tall, five feet wide, four feet deep, and weighs approximately 11,000 lbs. One window is slightly larger than the other five windows, and weighs approximately 13,000 lbs. In addition to the formidable size and weight of the window units, the windows are tapered from the front to the back (that is, the side occupied by the viewer is smaller in size). "In order to remove the window units, they could only be removed in one direction, which happened to be 11 feet off the floor," said Burmeister. "Both personnel and equipment had to be safely secured 11 feet up." To remove the windows in one piece, a subcontractor that specializes in this specific type of work was utilized. A specially designed and fabricated extraction tool was bolted to the wall and to the window unit. The window units were slowly winched out onto a sled device, picked up and then removed from the facility.

The windows were advertised for appropriate re-use through a U.S. General Services Administration publication. Ultimately, all six windows were shipped to Fermi National Accelerator Laboratory (Fermilab), a DOE national laboratory specializing in high-energy physics research, located in Batavia, Illinois. This repurposing saved approximately $55,000 in mixed low-level waste disposal costs.

Fermilab's work is quite unlike the work that takes place at the Nevada Test Site, and the lab does not deal with nuclear reactors and their components. However, accelerator components that are repeatedly exposed to high-intensity proton beams can, over time, become radioactive. According to Kurt Riesselmann, Head of Fermilab's Office of Public Information,
Fermilab will use the windows to put together a repair stand in which it can remotely fix accelerator components. "Fermilab was looking for exactly these types of windows," said Riesselmann, "and it was available for the cost of shipping. It was a win-win situation for everyone."

“We’re proud to say that we have accomplished these difficult tasks, provided important cost savings to taxpayers, and done so with zero safety incidents,” said Kevin Cabble, the Industrial Sites Federal Sub-Project Director.

The majority of the hazard removal and stabilization field work at this site is now complete.