Pressure System Safety

1971 Bldg. 64 Explosion

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Event

At 12:15 a.m., April 7, 1971, an overpressure occurred in the Altitude Exhaust System in the basement of Building 64, which resulted in the catastrophic rupture of a 96″ inverted dished head. The resulting release of pressure caused complete fragmentation of a 6-inch reinforced concrete floor directly above the dished head. I-beams under the concrete floor were extensively distorted and damaged. A hole was blown in the roof approximately 35 feet above the floor level.

The hole in the roof was approximately 30 feet in diameter. Approximately 60% of the large window area on two sides of the building near the explosion was destroyed .Two men, approximately 150 feet outside the building, were struck by falling debris. One man suffered a fracture near the right elbow. The other man was uninjured. The explosion caused extensive damage to piping, expansion joints, tie rods, supports, and other equipment in the vicinity.

At the time of the explosion, two lines of 4-stage exhausters were operating to provide altitude conditions for a combustor rig in Building 5 (ERB).

Subsequent investigations revealed that a 72″ butterfly valve (AC 4600) was inadvertently closed by an operator. The air flow reduced, causing the inlet pressure to the exhausters to rise. The exhausters then began operating as compressors, (PR ≈ 2:1), generating a pressure in excess of 100 psi at the closed valve. The weak point near this location was the dished head, which failed catastrophically.

As a result of this incident, extensive engineering studies and analyses of the Altitude Exhaust System design and operating procedures were performed. These studies resulted in the replacement of three 60″ and two 72″ uniquely designed check/ relief valves to prevent overpressure throughout the system under all operating conditions.

This accident, along with a previous overpressure accident at LaRC in Jan., 1971, resulted in the implementation of the NASA Recertification Program. Piping and components in the Altitude Exhaust System are currently inspected and recertified in accordance with the requirements of the Glenn Recertification Program .

Outside of Building 64

Inside of Building 64

East Side View
Building 64