Seismic Gas Shutoff Valves a Long-Term Benefit Realized in Alaska

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Valves Work to Avert Disaster in Municipality of Anchorage, Anchorage School District

ANCHORAGE, Alaska – Long before a magnitude 7.1 earthquake struck south-central Alaska in November 2018, the state began assessing its risk: identifying critical facilities and their vulnerabilities.

In Alaska, one of the most seismically active regions in the world with more than 150,000 earthquakes in the last five years, Local Hazard Mitigation Plans come under regular scrutiny as state and local officials prepare for the next big earthquake. Engineers identify structural and non-structural design deficiencies and infrastructure vulnerabilities such as fire suppression systems, bracing, strapping and shear walls.

In the Municipality of Anchorage, 83 schools in the Anchorage School District were identified as critical facilities heated with natural gas. Also on the list: the emergency operations center, police and fire stations, sports arenas and senior centers. A total of 117 public buildings.

With funding from the Federal Emergency Management Agency's Pre-Disaster Mitigation Grant program and its Hazard Mitigation Grant Program, the Municipality of Anchorage and the Anchorage School District installed 117 seismic gas shut-off valves. The valves, which react to shaking, are designed to stop the flow of gas to the buildings in the event of an earthquake.

Those installations helped to protect more than 297,000 residents across the Municipality of Anchorage, nearly 50,000 schoolchildren among them, when the earthquake struck last Nov. 30. Centered 10 miles north of Anchorage, the quake caused damage in the Municipality of Anchorage, Matanuska-Susitna Borough and Kenai Peninsula Borough, an area encompassing more than 60 percent of Alaska's total population and a substantial portion of its economic base.

Across the 51,000-square-mile disaster area, there was severe damage to major highways and other transportation infrastructure as well as public buildings, businesses, personal property and private homes. Power was cut to 80,000 residents, water lines broke, communications were disrupted.

The 117 seismic gas shut-off valves, however, worked just as designed, stemming the flow of gas to each building.

The State of Alaska, Division of Homeland Security and Emergency Management began working in 2006 with the Municipality of Anchorage to update its Hazard Mitigation Plan.

“They recognized that there was a need to identify all of the vulnerable infrastructure within the Municipality of Anchorage and teamed up with the Anchorage School District to install seismic gas shutoff valves in their 83 schools,” said Brent Nichols, the state’s hazard mitigation officer.

Using a FEMA Pre-Disaster Mitigation Grant, 15 schools including Ernest Gruening Middle School in Eagle River installed the valves as part of a project completed in July 2009. FEMA’s Hazard Mitigation Grant Program funded valves for the remaining 68 schools. Each of the FEMA grant programs funds 75 percent of a project, with the state and applicant funding the remaining 25 percent.

Gruening, a school for seventh- and eighth-graders, is located close to the epicenter of the quake. Classes were in session when the violent shaking began at 7:53 a.m. The children and staff did as they had practiced in monthly drills: They quickly took cover and held on for the duration of the shocks.

No injuries were reported but the school was heavily damaged. Cracks appeared in the cinderblock walls and drywall, sprinkler heads shifted, the roof dislodged from the walls in two places, floors surrounding the gym were weakened and there was damage to heating and ventilation systems.

The school district’s maintenance crews detected an odor of gas when the shaking subsided and found a 90-degree elbow pipe had sheared off. The odor came from gas residue after the shut-off valves, working as expected, choked the feed into the building. The gas odor was not unusual after the valves shut off because there was still gas residue in the pipes.

Gruening was evacuated and will remain closed until 2020 while repairs are addressed. Anchorage firm BDS Architects estimates repairs and upgrades to Gruening will cost about $23.3 million, according to a March 28 story published by the Chugiak-Eagle River Star.

The shut-off valves averted a potential catastrophe, preventing gas from escaping through leaks caused by the earthquake. The valves installed in the other 34 Anchorage facilities also did their job. Gas was cut to the police department, fire stations, emergency operations center, Egan Convention Center, two sports arenas and two senior centers.

In the months since the November 2018 earthquake, the Anchorage School District completed an extensive survey of the 83 schools heated with natural gas while the Municipality of Anchorage continues to assess its public buildings.

The Alaska Earthquake Center detects a temblor every 15 minutes, on average. This year alone, 22,030 earthquakes were detected through June 21. The center reported 150,000 earthquakes in Alaska over the last five years. Thirty-one of them were magnitude 6 or greater; four were magnitude 7 or greater.

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