

BEIRUT PORT EXPLOSION 2020: COMPARISON OF FIELD ASSESSMENT AND EXPLOSIVE SAFETY STANDARDS

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ABSTRACT

The city of Beirut sits on a peninsula along Lebanon's Mediterranean coast. The Port of Beirut, opened in 1887, is located directly north of downtown Beirut and mostly separated from the commercial and residential quarters by the Charles Helou highway. Over the years, thousands of tons of ammonium nitrate ended up being stored in Hangar 12, located directly east of the grain silos at the Port of Beirut. For unknown reasons, the same hangar stored fuel, acid, fuse spools, and 15 tons of fireworks. On 4 August 2020, at around 18:07, a sequence of events started a chain reaction where a fire in the hangar caused the fireworks and subsequently the ammonium nitrate to detonate, causing nearly 200 deaths, over 6000 injuries, around 300,000 people to lose their homes, and between 10-15 billion of US dollars in damage throughout the city. Based on eyewitness video and estimated shock wave velocity, several researchers and experts have estimated that approximately 1500 tons of ammonium nitrate contributed to the explosion, or anywhere between 300 to 960 tons of TNT-equivalent.

Hangar 12 was essentially turned into an unhardened above ground magazine, routinely used in munition storage areas on military bases around the world. Explosive safety standards have been developed over the past several decades by the United States, United Kingdom, and NATO to provide a minimum level of protection to on-base personnel and off-base residents under an accidental explosion of stored munitions. This paper will discuss three key aspects of the 2020 Beirut Port explosion investigation: 1) review the explosion incident and sequence of events; 2) summarize results of the field survey conducted by the American University of Beirut shortly after the event; 3) apply current explosive safety standard requirements to Hangar 12; and 4) investigate the expected damage in Beirut if the ammonium nitrate was properly sited.