Slow as molasses? Sweet but deadly 1919 disaster explained

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In this Jan. 15, 1919, file photo, the ruins of tanks containing 2 1/2 million gallons of molasses lie in a heap after an eruption that hurled trucks against buildings and crumpled houses in the North End of Boston. Harvard University researchers said in November 2016 that they've solved the mystery behind the disaster that killed 21 people, injured 150 others and flattened buildings when a giant storage tank ruptured. The scientists concluded that the comparatively warm molasses thickened rapidly when exposed to the wintry air, trapping victims in hardening goop. (AP Photo, File)

The Great Molasses Flood of 1919—one of Boston's most peculiar disasters—killed 21 people, injured 150 others and flattened buildings when a giant storage tank ruptured.

Now Harvard University researchers think they know why the wave of sticky stuff claimed so many lives: A winter chill rapidly cooled the molasses as it streamed through the streets, complicating rescuers' frantic efforts to free victims.

A team of experts who studied the disaster to gain a better understanding of fluid dynamics concluded that cold temperatures quickly thickened the syrupy mess, which might have claimed few if any lives had it occurred in spring, summer or fall.

Team leader Nicole Sharp said she hopes the findings—presented last week at a conference of the American Physical Society—will shed new light "on the physics of a fascinating and surreal historical event."

"I'm originally from Arkansas, where we have an old expression: 'Slow as molasses in January,'" she said. "Oddly enough, that's exactly what we're dealing with here, except that this molasses wasn't slow."

On Jan. 15, 1919, shortly after 12:40 p.m., the massive tank in Boston's crowded North End buckled and gave way, releasing more than 2.3 million gallons of molasses in a towering wave that historical accounts indicate was initially 25 feet tall—nearly as high as a football goalpost.

Outrunning it was out of the question: Sharp says the sticky tsunami raced through the cobblestone streets at 35 miles per hour, propelled by the sheer weight of the goop.

It took only moments for the molasses to engulf the area around Commercial Street, a bustling artery. It reduced buildings to rubble and damaged an elevated train.

Sharp's team combed through hundreds of pages of historical accounts. Researchers also studied century-old maps and archived National Weather Service meteorological data.

Harvard graduate student Jordan Kennedy analyzed the properties of blackstrap molasses and how it flows at different temperatures. The team found that molasses thickens dramatically when exposed to cold, and that at the time of the collapse, the stuff in the storage tank likely was considerably warmer than the wintry air outside.

Two days before the disaster, the tank had been topped off with a fresh shipment of molasses from the balmy Caribbean that hadn't yet cooled to Boston winter temperatures.

Once the tank split and the molasses gushed across the Boston waterfront, it cooled rapidly, "complicating attempts to rescue victims," the team said in its report.

Mapping the physics of the molasses flood could help experts better understand other catastrophes such as industrial spills or ruptured levees, Sharp said.

But mostly, she and the others hope it will pique students' interest in physics.