



# Engineering Ethics: The Great Boston Molasses Flood

An Online Continuing Education Course for Engineers

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# Engineering Ethics: The Great Boston Molasses Flood

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## An Ordinary Day

Many disasters come without warning. Such was the case with Boston's Great Molasses Flood. It was the time of the day when workers paused to eat their lunches and chat about the events of the day. Children played in the streets while mothers, perhaps taking advantage of the unusually warm weather, visited with neighbors and walked to the market to select items for that evening's dinner.

The day before, January 14, 1919, had been a bone chilling 2°F compared with the 40°F being enjoyed in Boston on this day. No one knew that this sudden and drastic change in temperature would be a contributing factor to the impending disaster.

At about 12:30 p.m., with a sound described as a sort of muffled roar, a giant molasses tank built just four years earlier by U.S. Industrial Alcohol, ripped apart. It seemed to rise and then split, the rivets popping in a way that reminded many ex-soldiers of machine-gun fire. And then a wet, brown hell broke loose, flooding downtown Boston.



Elevated Rail after the Flood

When the molasses wave hit houses, they "seemed to cringe up as though they were made of pasteboard," wrote one reporter. The Clougherty home at the foot of Copp's Hill collapsed around poor Bridget Clougherty, killing her instantly. The great brown wave smothered five workers eating lunch at the nearby Public Works Department.

How fast *is* molasses in January? That day the wave moved at an estimated 35 miles per hour. It caught young children on their way home

from the morning session of school. One of them, Anthony di Stasio, walking homeward with his sisters from the Michelangelo School, was picked up by the wave and carried, tumbling on its crest, almost as though he were surfing. Then he hit ground and the molasses rolled him like a

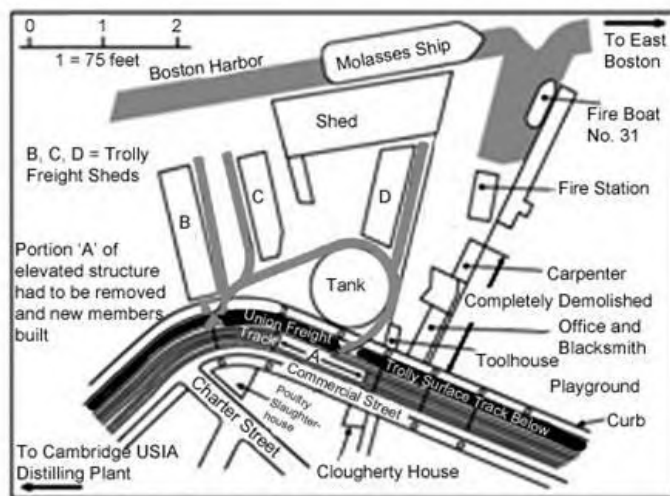
pebble as the wave diminished. He heard his mother call his name. But, Anthony's throat was so clogged with the smothering molasses that he couldn't answer her. He passed out, then opened his eyes to find three of his sisters staring down at him. (A fourth sister had been killed in the flood.) They had found little Anthony stretched under a sheet on the "dead" side of a body-littered floor.

### War, Munitions, Alcohol and Discrimination

The year was 1915. Purity Distilling Company and its parent company, U.S. Industrial Alcohol (USIA), were desperately in need of a large storage tank. The War to End All Wars had been raging in Europe for years. USIA was in the business of manufacturing industrial alcohol, which was used to make dynamite and other munitions. And large amounts of molasses were needed to make the alcohol.

Without a tank of its own in the Boston area, USIA had to get its molasses from a supplier who owned a storage tank in South Boston. Not only was the molasses expensive, but USIA was at the mercy of an outside supplier at a time when demand for industrial alcohol (and the molasses used to make it) was skyrocketing.

It was decided that the ideal spot to fabricate and install a new 2.3 million gallon storage tank was a waterfront location along Commercial Street on the North End of Boston. This location



North Boston, Commercial Street - 1919

would allow molasses ships from Cuba, Puerto Rico and the West Indies to dock just to the north of the storage tank.

Additionally, major freight lines traveled along the elevated track that ran parallel to Commercial Street.

Yes, the location seemed perfect. Well, almost perfect. Just south of Commercial Street was a residential area inhabited mostly by working class Italian immigrants. Erecting a huge molasses storage tank near so many homes, schools and playgrounds, would likely be met with protests. Or would it?

Discrimination against Italian immigrants was rampant around the country in 1915, particularly Sicilians and other immigrants from the southern part of Italy. The discrimination they faced undoubtedly fueled the immigrants' disdain for politics, their suspicion and distrust of government, and their aversion to civic activism. This, coupled with their very high illiteracy

rates and inability to speak English, had a profoundly negative effect on the assimilation of southern Italians into American life.

It was in this environment that executives of USIA contemplated locating their new storage tank in the midst of the densely populated Italian residential area on the North End of Boston. No doubt, the lack of political muscle within the Italian immigrant community was a factor in their decision. And, as expected, there were no protests or demonstrations once erection of the tank began.

### **Early Stages of the Project**

The task of securing a lease and overseeing construction of USIA's massive molasses tank was put squarely on the shoulders of Purity Distilling Company's treasurer, Arthur P. Jell. Since the age of 14, Jell had worked in various clerical, administrative and financial jobs. In 1909, at the age of thirty, he took a position as Purity's secretary. Within a couple of years, he was promoted to treasurer, and was on the fast track to be named a vice president of USIA, the parent company of Purity.

In late 1914, Jell solicited Hammond Iron Works to draw up plans for the mammoth tank. USIA President Frederic M. Harrison made it clear to Jell that his standing in the company depended on the ultimate success or failure of this project. As Jell set out to find a site for the tank, he passed over two prime waterfront locations with rail access in the nearby Irish neighborhoods of South Boston and Charleston. Instead, he began negotiations with Boston Elevated to lease a seventeen-thousand-square-foot waterfront parcel at 539 Commercial Street, sandwiched between the North End Italian residential neighborhood and the inner harbor.

Negotiations with Boston Elevated dragged on for months... much longer than Jell anticipated. The two sides haggled over money, assignment of rights, liability issues, and utility charges. Jell finally signed a twenty-year lease with Boston Elevated on September 24, 1915 at an annual rate of \$5,000. The lease was set to commence on November 1, 1915.

While Jell was busy negotiating with Boston Elevated, the contract with Hammonds progressed in parallel. In early 1915, Jell signed a contract with Hammonds to manufacture and erect the molasses tank for the sum of \$30,000. Blueprints were completed in April, 1915 and steel fabrication commenced soon after.

The scope of the project was enormous. When completed, the tank would be 90 feet (27.4 m) in diameter and stand 50 feet (15.2 m) tall, with the capacity to hold more than 2 million gallons of molasses. The tank would be constructed by fastening together seven vertical layers of rounded steel plates, each overlapping the layer below and held in place by a horizontal row of rivets. Vertical rows of rivets sealed the seams of each of the eighteen steel plates that formed the tank's cylindrical shape.

In addition to erecting the tank, Jell was responsible for installing the accompanying infrastructure required to offload, store and transfer molasses. This included a pump room, moor vessels alongside the wharf to unload molasses, a 220-foot underground pipe to carry molasses from the ships to the tank, a small auxiliary tank that acted as a molasses feeder between the large tank and the railroad cars, and a “spur track” that would enable railroad cars to travel back and forth between the tank site and the main Commercial Street tracks.

### A Looming Deadline

Arthur Jell was a man “under the gun.”

A ship owned by the Cuba Distilling Company, a subsidiary of USIA, was scheduled to deliver about half of her 1.3 million gallons of cargo to USIA distilleries in New York and the remaining molasses to Boston. If Jell was not able to finish the tank and accept the molasses by December 31, the ship would have to find another location to accept the delivery or even dump the product at sea. In either case, USIA would lose a lot of money.

Jell had lost a lot of time early in the project schedule haggling with Boston Elevated. Jell wrote to Hammond on October 19: *“We confirm the understanding whereby you are to furnish sufficient men to complete the tank by December 15th and we agree to pay ... any additional expenses which may be necessary in order to hurry the work as much as possible.”*

Shortly after gaining access to the site on the lease commencement date of November 1, 1915, the Hugh Nawn Construction Company began work on a three-foot thick concrete foundation for the tank. While foundation work proceeded, Jell hammered Hammond to expedite completion of the tank’s steel plates, which arrived in Boston around December 1.

Construction of the tank finally started in early December. With his deadline less than 30 days away, the anxious Jell, pushing for fast work from his crew, was a bit annoyed when the death of a 33-year-old worker who fell into the tank caused the other workers to be more cautious and deliberate, thereby slowing progress.

The weather caused further delays. In mid-December of 1915 as Jell attempted to complete construction of the tank, the worst storm in years dumped 20 inches of snow on the streets of Boston. The day after Christmas, a sleet storm stopped work again.

With the deadline fast approaching, Jell made a crucial decision. The contract with Hammond required the tank to be leak tested by filling it with water. But, Jell was running out of time. Filling the tank would require purchasing a huge amount of water from the municipal water supply. Not only was this an expensive proposition, the filling and testing process would take days or even weeks to complete. Besides, Jell didn’t think it was necessary. Instead, Jell ordered crews to run only six inches of water into the tank, enough to raise the water level above the first

angle joint at the base of the structure. When no leaks occurred, Jell pronounced the tank sturdy, sound, and ready to use.

On December 29, 1915, Hammond Iron Works submitted a final invoice to USIA. After all the delays and frustration, Arthur Jell had accomplished the impossible! USIA was ready to receive molasses. On December 31, 1915, the huge tanker arrived in Boston and unloaded her molasses cargo, filling the tank to a level of about thirteen feet.

### A Premonition

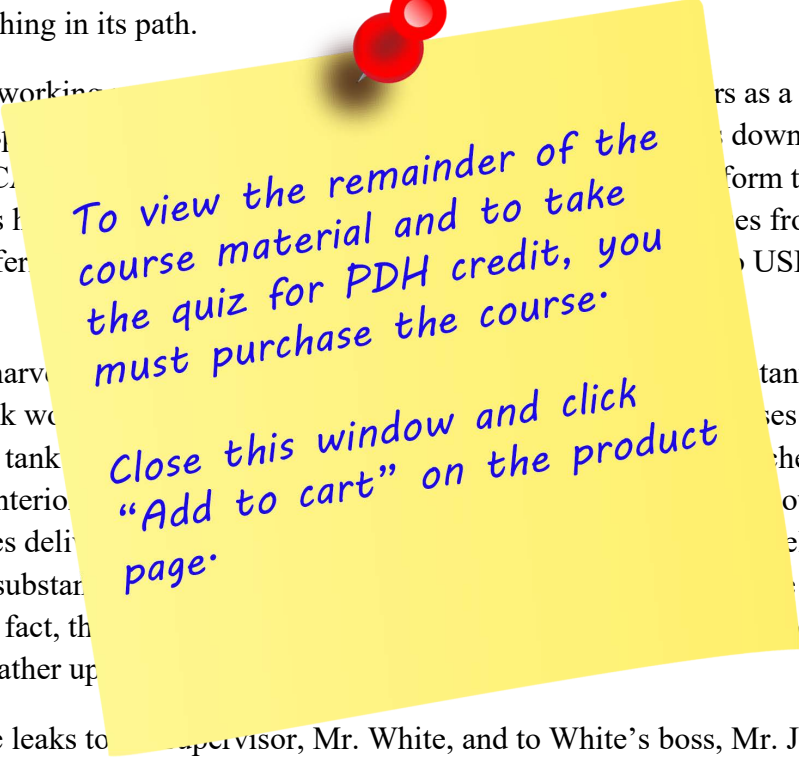
Isaac Gonzalez was haunted by terrible visions. And his dreams, which kept him tossing and turning almost every night, were always the same. In his mind, he could see USIA's huge molasses tank splitting open and pouring its gooey contents out into the streets of Boston... destroying everything in its path.

Isaac was a hard-working seaman as a seaman working on molasses transport ships. He was down on his luck, living at the YMCA and performing the duties of a "general man," as he transferred molasses from the huge tankers and transferred it to USIA's Cambridge distilling plant.

Although Isaac marvelously at the tank work, he constantly gnawed at him—that the tank would eventually fail. As molasses was offloaded, he would feel the tank splitting open. Shards of steel fell off the interior of the tank, which he had gathered as flecks of steel prior to a molasses delivery. The outflow pipes just prior to a molasses delivery were leaking, which caused the black, sticky substance to leak out. The leaks were so commonplace, in fact, that Isaac had a bucket and a pail-in-hand, to gather up the molasses.

Isaac reported the leaks to his supervisor, Mr. White, and to White's boss, Mr. Jell, who twice ordered the tank recaulked shortly after its construction. After that, the leaks had continued, but White and Jell ignored Isaac's pleas, accusing him of exaggerating and overreacting.

Isaac even traveled to the Cambridge headquarters of USIA to show Mr. Jell the rusty shards of steel that he had gathered, which was quite a risky move for a lowly laborer with no union protection. But, Jell simply replied, "I don't know what you want me to do. The tank still stands."



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