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# Mass Carbon Monoxide Poisoning on a Train in Italy, March 1944. History Reconstructed

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**ABSTRACT**

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World War II was approaching its end in Italy in 1944 when one of the worst train disasters in world history occurred near the small town of Balvano in the Apennine Mountains. The train did not derail or crash into something as in most major train disasters. Instead, it entered a mountainous railway tunnel, and when it emerged, over 500 passengers were dead from carbon monoxide poisoning. The event was not allowed to be publicized for almost two decades. This manuscript reconstructs the story of possibly the most significant incident of carbon monoxide mortality ever recorded.

**Keywords:** carbon monoxide; death; poisoning

One of the world's greatest train disasters occurred near Balvano, Italy, in March 1944. A combination passenger-freight train with two steam-powered, coal-burning locomotives entered a tunnel on a routine trip. When it came out, most of the passengers were dead from carbon monoxide poisoning.

It was a time when World War II was nearing an end in Italy. Allied (British and American) troops occupied and controlled most of the southern part of the Italian peninsula and were working their way northward. Rome was expected to fall soon. Life was especially difficult in the region between Naples and Potenza. Everything was in short supply, especially food, resulting in an active black market.

Residents of Naples would hop freight trains to trade gum, candy, or cigarettes acquired from US servicemen to get butter, eggs, poultry, and produce from farms to the east to feed themselves or sell on the black market. Station crews were used to seeing hundreds of black marketeers riding the trains, and authorities largely ignored them. The 8017 was one of the most popular trains, leaving Naples once a week for its trip to the agricultural region of Potenza, and then on to Matera near the east coast (Figure 1). It was known as the "Black Market Express" (Figure 2).

On March 2, 1944, the 8017 train left Naples for Potenza on schedule. It was comprised of four passenger coaches, forty-two freight cars, and a caboose. For the initial portion of the route, it was pulled by an electric locomotive. At Solerno, this was replaced by two steam locomotives because the section from Battapaglia to Potenza was not electrified.

As the train pulled out of the Solerno station, hundreds of unauthorized travelers climbed aboard. US military police forced some stowaways off at Battipaglia. However, they were quickly replaced at subsequent stops, numbering around 600 when the train reached Balvano and stopped for engine maintenance. Unticketed passengers were riding in freight cars, on their roofs, and on their bumpers.

The two powerful steam locomotives were at the front of the train, followed by the passenger cars, the freight cars, and finally, the caboose. The train was powered with low-grade coal from Yugoslavia. Before September 1943, high-quality coal was

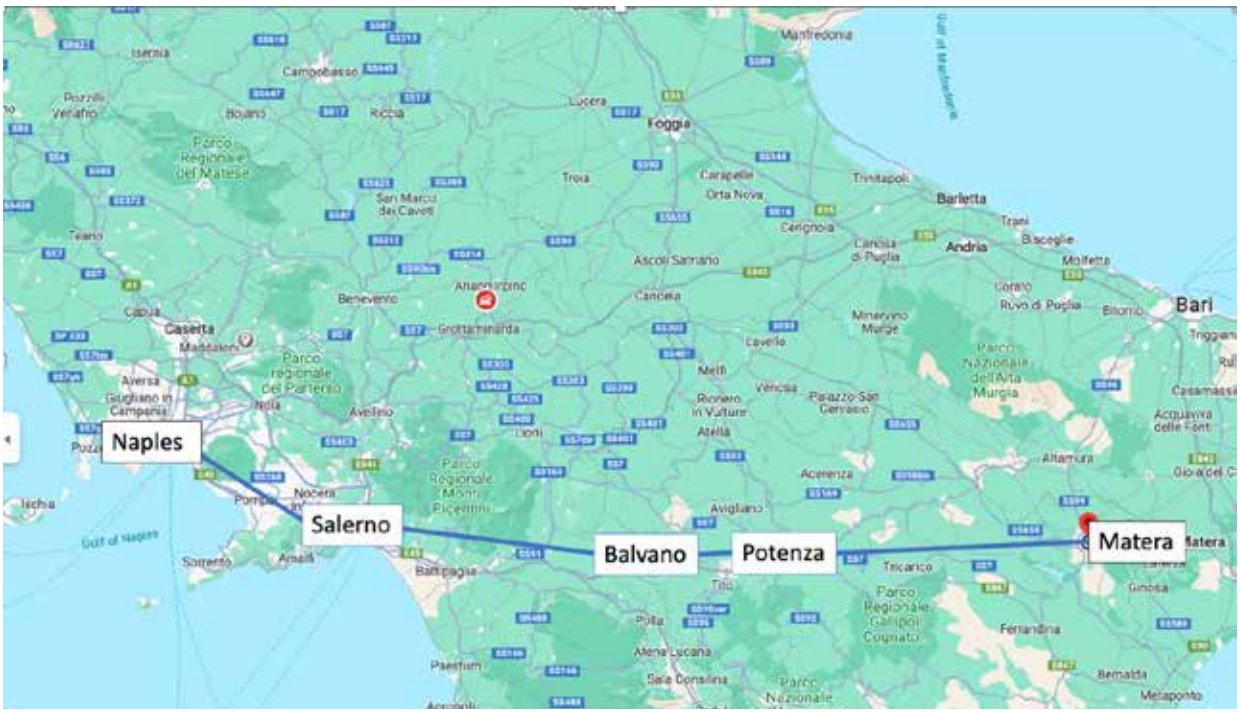


**Figure 1.** **Scheduled route of train 8017 from Naples, Italy via Balvano to Matera, Italy, March 1944.**

burned in Italian trains supplied from Germany. With the war situation, the US forces took the best coal. The poor-quality coal used had a low heat output per amount burned. This was particularly problematic for the Italian railways because many train routes were mountainous, with steep inclines and requiring tunnels.

The 8017 train route started at sea level in Naples, returned to sea level in Solermo, and eventually reached Potenza 819 meters above sea level. It was at an altitude of 424 meters when it reached Balavano 12 minutes after midnight on March 3, 1944, and stopped for engine maintenance. A drizzly sleet had fallen most of the day and, compounded by dense fog, made most of the tracks wet and slippery. In the eight kilometers between Balvano and the next stop, Bella Mura, was a stretch of track framed by a vast mountain gorge, numerous trestle bridges, and several tunnels with steep inclines.

The first two tunnels were short, but the third, Galleria delle Armi, was the longest tunnel on the route at 1,968 meters and an uphill grade of 1.3% over its length (Figure 3). Ventilation of the train tunnels was dependent on natural airflow. Because of its depth in the mountain, Galleria delle Armi was the tunnel with the fewest and smallest air intakes on the route.

At 00:50 AM, the train left Balvano for the Bella Muro station. Working together, the two locomotives could pull a 500-ton load up the incline of the route. With well over 500 passengers on board, it is estimated that it exceeded its maximum towing weight by eleven tons. A brakeman climbed aboard as the train pulled out and took his position in the eleventh car. A second brakeman climbed aboard the caboose. The Balvano stationmaster telegraphed ahead to Bella Mura that the train had departed and should arrive in about twenty minutes. He then turned over operations to the assistant stationmaster for the night.

At 01:00 AM, after traveling 1.8 kilometers, train 8017 reached the Galleria delle Armi. As it approached, the tunnel was already filled with thick smoke from a train that had passed through shortly before. Only 200 meters into the tunnel, the wheels of the locomotives began to slip on the wet tracks. Despite the application of sand, the wheels continued to slip, the train slowed to a stop, and it began to roll backward. Since railway regulations did not allow trains to back up, the brakeman in the elev-

enth car likely assumed that some cars had become disconnected. He applied the manual brake, stopping the train with only two freight cars and the caboose outside the tunnel.

The lead locomotive engineer ordered more coal to be supplied to increase the power. Additional coal was added to the fireboxes of both locomotives. However, the train could not go forward due to the slippery tracks, low power from the inferior coal, and application of the brakes. It could not back up because the brakes were being applied. Further, the engineer of the lead locomotive was unable to communicate with the engineer of the second locomotive, which continued in forward gear.

The tunnel filled with dense black smoke within a few minutes. Most of the passengers were sleeping in both the passenger cars and freight cars at the time and died of carbon monoxide poisoning without ever waking up. Some ticketed travelers in the passenger cars awoke feeling sick and started to go toward the rear entrance, apparently thinking the train had just entered the tunnel and they were escaping the smoke, not realizing they were going deeper into it.

The brakeman on the caboose initially thought the locomotive engineer had stopped the train for a signal. When the train did not move, he finally got off and walked into the tunnel to investigate. Only 100 meters in, he was overcome by nausea and realized what had happened. Dead passengers were everywhere: lying on the ground beside the train, on train bumpers, and in freight cars.

At 02:20 AM, the assistant stationmaster became concerned because the next train (number 8025) was due to arrive at Balvano shortly. He would not be able to allow it to advance until he knew the 8017 had cleared the intervening tracks but had received no confirmation that 8017 had reached Bella Nuro. He contacted Bella Nuro and was told that the 8017 had not arrived.

The 8025 arrived in Balvano just after 02:30 AM. It was decided to uncouple the locomotive and use it to search for the missing 8017. While uncoupling the locomotive, the brakeman from the 8017 caboose stumbled into view. Exhausted from the route he had just traversed on foot, he cried, "They are dead. They are all dead."

**Figure 2.** **Nonticketed passengers riding the freight cars of an Italian train in 1944. (Source of photograph reference 1, in public domain)**

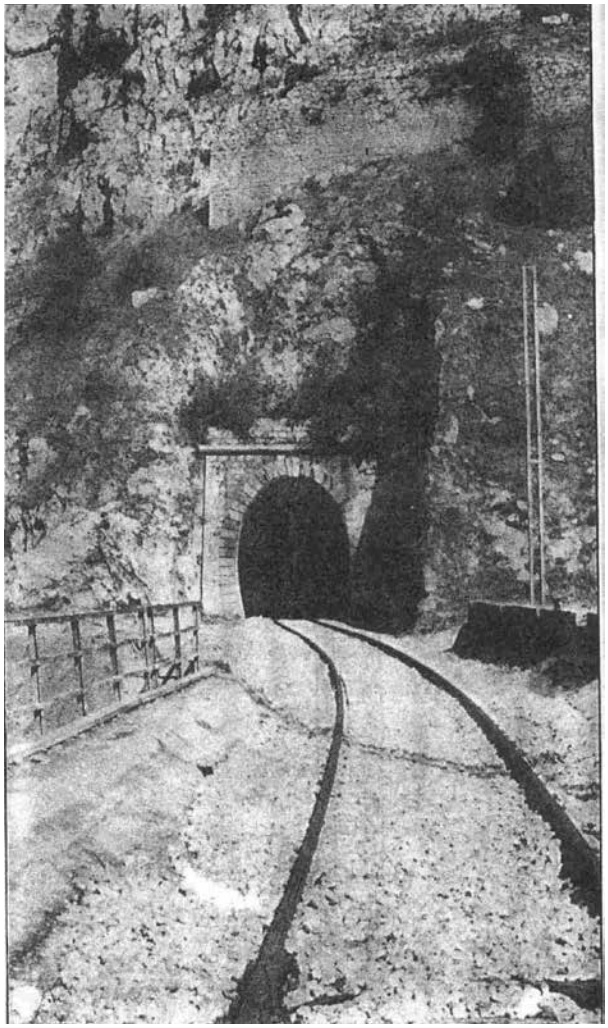

**Figure 3.** **Entrance to Galleria delle Armi train tunnel 1.8 kilometers from Balvano, Italy. (Source of photograph reference 7, in public domain)**

**Figure 4.** Dead passenger bodies alongside railway tracks. (Source of photograph reference 7, in public domain)

The search party from Balvano arrived at the site four hours after the 8017 entered the Galleria delle Armi. They were unable to immediately pull the train from the tunnel due to the large number of corpses on the tracks and under the train (Figure 4). Bodies were found inside and outside the train. A few were alive. In the end, there were about forty survivors. Of the crew, the second brakeman from the caboose and the fireman of the second locomotive were the only survivors. The head engineer was found dead in his seat, hands still on the controls.

After bodies were cleared from the tracks and beneath the train, the locomotive of 8025 pulled the 8017 backward to Balvano. Bodies were removed from the train by police and military personnel and stacked on the station platforms (Figure 5). In all, there were 521 deaths from carbon monoxide poisoning. Many carried false papers or no identification at all, leading to the inability to identify 193 of the deceased. Due to the large number of bodies, the wartime lack of resources, the inability to identify many of the dead, and the poverty of many victims, they were hastily buried in a mass grave in the Balvano cemetery (Figure 6). Only the railroad crew received proper burials.


**Figure 6.** Bodies being loaded for transport to Balvano cemetery for mass burial. (Source of photograph reference 7, in public domain)

**Figure 5.** Bodies of people killed by carbon monoxide poisoning stacked on platform in Balvano train station. (Source of photograph reference 7, in public domain)

Subsequent investigation identified numerous factors contributing to the disaster. The Galleria delle Armi tunnel lacked adequate ventilation and likely contained some carbon monoxide from an earlier train before the 8017 entered. Inclement weather had left the rails wet and slippery. The number of stowaway passengers allowed by the railway authorities contributed to the overweighting of the train. Poor-quality coal generated less heat than good-quality coal per unit burned, requiring a greater quantity of coal to be burned to achieve the same heat output and thereby producing more carbon monoxide. There was a lack of coordination between the engineers driving the two locomotives. Finally, the station masters of Balvano and Bella-Muro were criticized for not acting sooner when the train did not arrive. However, in their defense, in wartime conditions, it was usual for communication to be poor, and not uncommon for a train to take over two hours to travel the mountainous route between the two stations.

After the 8017 disaster, a railway worker was posted at the southern entrance of the tunnel 24/7 to ensure that smoke from one train had dissipated before another train was allowed to enter. A limit of 350 tons was placed on trains traversing the route. Authorities did not allow the story of the incident to be widely publicized at the time because of the effect they feared it would have on an Italian public already downtrodden by the war. It was kept quiet for almost two decades. Families of victims were issued the same compensation given to families of war victims, although it was not paid until fifteen years later.

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