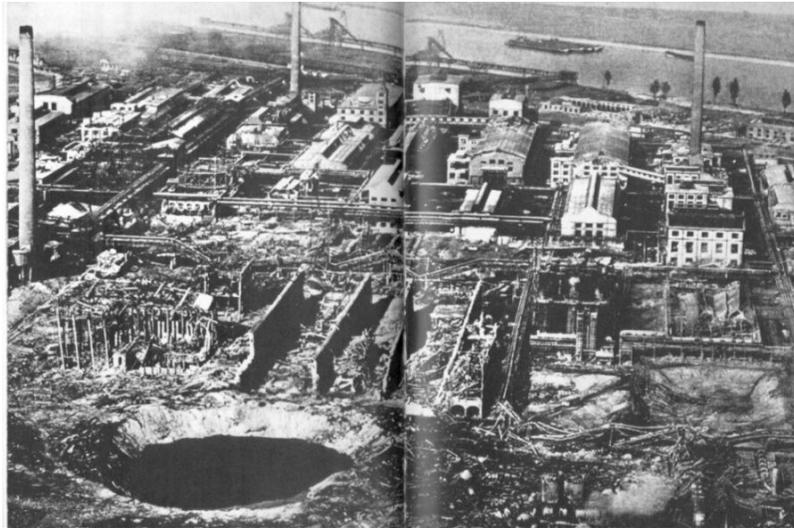


# Three Significant Ammonium Nitrate Accidents



## BASF PLANT OPPAU, GERMANY, 21<sup>st</sup> SEPTEMBER 1921

Ex-WWI explosives factory now making fertiliser – a 50/50 mixture of ammonium sulphate and ammonium nitrate called “mischsalz”. This highly hygroscopic mixture had the disadvantage of clogging together under the pressure of its own weight during storage. It was common practice to loosen the “aggregated” product by firing explosives in holes drilled using a jumper bar in the hardened mass. Until the day of the accident over 20,000 firings were carried out in the “mischsalz” without any sign of accident being observed.

The explosion was heard in Munich, 275 km from the plant and caused panic among the masses. Material damage was reported at several dozens of kilometres away from the accident site. A dark green cloud overcast the skies of Ludwigshafen and Mannheim. The entire region was then covered in thick smoke that along with the interruption of telegraph and telecom services made rescue operations even harder.

The official human casualty reported included 561 deaths, 1,952 injured and 7,500 people left homeless. Among the victims include passengers from three worker trains arriving on site for change of shift. Several children on their way to school were injured, boats on the Rhine river sustained damage with numerous sailors also injured. Eye injury was observed in several cases. Around 80% of the buildings in Oppau were destroyed.

## AZF TOULOUSE DISASTER, 21<sup>st</sup> SEPTEMBER 2001

On 21st September 2001 a fertiliser factory containing ammonium nitrate storage facilities exploded. The factory, owned by Total, which employed 470 persons, was located 3 km from the centre of Toulouse on an island of the Garonne River surrounded by an (urban) environment. The explosion produced a crater measuring about forty meters in diameter and 7 m in depth related to the natural ground.

The most important consequences were:

- Explosion equivalent to 3.4 on Richter scale. 22 people were killed on the factory site and 8 persons outside.
- In total 2500 persons were injured. Various structures were distorted within a radius of 400 to 700 m.
- Buildings were damaged within a radius of 700 to 1500 m and many windows broken even at a larger distance.
- In total about 30,000 buildings were touched of which 10,000 heavily damaged including schools, universities and a hospital. Transportation facilities and electrical power lines and telephone communication were also disrupted. The financial consequences were estimated to be 2.5 billion euros.
- Outside France, publicity was limited by the recent 9/11 attack in New York.

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## TEXAS CITY, 16<sup>th</sup> APRIL 1947

Deadliest industrial accident in US history. Fire on board SS Grandcamp led to explosion of some 2000 tonnes of Ammonium Nitrate. Chain reaction explosions occurred on other ships and at oil storage facilities. At least 581 fatalities. Windows were shattered 60 kilometres in Houston.

## The Texas City disaster

Home of seven petrochemical companies, two oil refining firms and the only tin smelter in the country, tiny Texas City never got much publicity during World War II, despite its major role in the Allied war effort. That changed after April 16, 1947. The worst industrial disaster in US history put Texas City in the national spotlight.

Three days of explosions and fires, triggered after a burning ship loaded with ammonium nitrate ran aground, blew up in the port, killed 370 people and injured 4,000 more. The wreck included at 27 firefighters who responded to the blaze at the docks. Granted from the blast: car victims to ribbons. Spoons of fire, fueled by chemicals from insurance references, pipelines and storage tanks.

Unhated many of the dead and dying. Dozens of people near the ship simply disappeared. The vessel of destruction crashed almost every building within a half mile of the port. Investigation later blamed the fire that caused the disaster on a longshoreman's carelessly discarded cigarette.

**Key to damage**

- Destroyed structure, impossible of reconstruction.
- Extensive structural damage, not habitable.
- Moderate structural damage.
- Slight damage from missiles.

**Zones of destruction**

After the disaster, investigators plotted together a chart of the damage at Texas City. They divided their map into four damage zones.

- Zone 1: Many fragments, ranging in weight from 1 to 5 tons, along with a great number of smaller pieces of shrapnel. Distance between fragments generally less than 7 feet.
- Zone 2: Uniformly scattered fragments, about 12 feet apart, some weighing several tons. Every structure hit, in some hit by flying debris.
- Zone 3: Fragments range from a few pounds to more than 1 ton.
- Zone 4: Few fragments, although some tubing and other projectiles landed as far as 15,000 feet from the docks.

**Ammonium nitrate: A fertilizer and an explosive**

With a nitrogen composition of 25 percent, ammonium nitrate fertilizer is one of the best sources of nitrogen for all crops. It also has fueled several major explosions, including the notorious blast in 1965 that killed 168 people in Oklahoma City. The world's largest fertilizer plant is located in Texas City. The world's largest fertilizer plant is located in Texas City. The world's largest fertilizer plant is located in Texas City.

**In the holds of the S.S. Grandcamp**

<b>Hold No. 1</b> Tobacco 26,000 bales of shell Twine (Five Cubic)	<b>Hold No. 2</b> 5,334 bags of shell 10,806 bales of shell twine An automobile (Open Cabrio) A truck (Open Hoopster) 25,892 bags of ammonium nitrate fertilizer	<b>Hold No. 3</b> 4,000 bags of shell 2,000 bags of shell twine Lower hold empty	<b>Hold No. 4</b> 1,800 bales of shell twine Oil and agricultural machinery (Open Hoopster) 20,410 bags of ammonium nitrate fertilizer	<b>Hold No. 5</b> 18 cases of small arms ammunition (From Army, Navy, and civilian for New York) 380 bales of cotton 22,000 bales of shell twine Tobacco
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**Wharf fire started**

**Destroyed cars in the Maritime parking lot near a wrecked crane and burning warehouse on Pier 0.**

**Entry house for nearby mills was damaged.**

**Source:** Fire Protection and Engineering Bureau of Houston and the National Board of Fire Underwriters.  
**Photos courtesy:** Project Liberty City, Missouri Memorial Library and National Museum of Texas City.  
**Graphic by:** BOM 10/11 / Staff