

# Apache Powder No. 4

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(Source: S.E. Arizona History)

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The original nitric acid plant, constructed in the early 1920s

## A MODERN DYNAMITE PLANT, 1930 (continued)

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*The story of Apache Powder Company, from the El Paso Herald-Times Special Mining Edition, October 14, 1930 (continued).*

Sulphuric and nitric acids are used in manufacturing nitroglycerine explosives. The sulphuric acid is produced from compounds of sulphur derived from waste sulphur gases at the smelter in Douglas, Arizona. This transformation is accomplished by means of a vanadium oxide catalyst, one of the newer catalysts being used in the place of platinum.

The Douglas plant produces sulphuric acid at strengths up to 104 percent. The 104 percent seems a bit misleading at first glance but this grade is really 100 percent acid with sufficient sulphur trioxide absorbed to produce an additional four percent of sulphuric.

The plant produces from 20 to 25 tons of acid daily.

Two principal ingredients are used in the manufacture of nitric acid; sulphuric acid and nitrate of soda. The nitrate of soda is shipped to our plant from Chile. Entire ship loads are consigned to the Apache Plant via San Pedro, California.

Upon heating the nitrate of soda with sulphuric acid, nitric acid gas results. The gas passes from the Acid Plant's cast iron retorts into cooling condensers where the vapor is transformed into a liquid. The resulting nitric acid is mixed with sulphuric acid to form 'mixed acid,' which is used in the preparation of nitroglycerine.

A large part of the acid process of an explosives plant deals with the recovery of sulphuric and nitric acids from the so-called 'spent acids' resulting from the nitration of glycerine. This acid must be separated and recycled for further use.

Ammonium nitrate, an explosive ingredient, is produced from nitric acid and ammonia. The ammonia gas is received in railroad tank cars, while nitric acid is produced on-site. This process involves a series of processes; neutralization, concentration, and crystallizing, to convert the material into a useable dry, crystalline product.

The Apache Powder Plant near Benson has the distinction of being the only explosives plant in the Southwest, a location of great advantage to the Southwest consumer. The dry climate prevailing in the Benson area is a most favorable factor in producing a high-quality product – in fact, nowhere is the climate more ideal.

Close contact between manufacturer and consumer results in service that is efficient, reliable, economical, and surprisingly prompt.

It's easy to see Apache's Powder Line as an interesting relic of the past. But, on closer look, the picture is amazing! During 1930, plant production was about 1,000,000 pounds per month. That works out to more than 650 50-pound cases per day. In 1956 the numbers averaged more than 2,000 cases – every day, all year.

This was not a modern continuous-process chemical plant with product flowing out a chute, untouched by human hands. This stuff was dynamite – stick powder, involving intensive hand work at every step. Materials were not palletized. There were no fork lifts. But, somehow it worked. Workers produced thousands of cases of dynamite sticks, by hand, day after day.

Perhaps the most overlooked aspect of the process was how the entire operation, from overall Plant layout, down to the individual building, was carefully designed to maximize the benefits of the terrain, utilizing the natural force of gravity for efficiency and to minimize the efforts required in material handling.

It was all tied together by a system of narrow-gauge railroads, with bulk materials transported by flatcar in large wooden boxes on wheels, known as hods. The steam engines which pull the trains were unlike the conventional 'road' locomotives, in that they had no fireboxes. The boilers were periodically charged to 125 pounds pressure with

steam from the Plant's steam lines. The absence of fire reduces the risk of explosion.

Most Powder Line production buildings were two – or even three levels high. Raw materials entered at the upper levels and flowed downward, through the various processes, with finished product leaving from the bottom level. The whole process, from raw materials unloaded near the Powerhouse, to cases of stick powder in the magazines, was made possible by the little railroad.