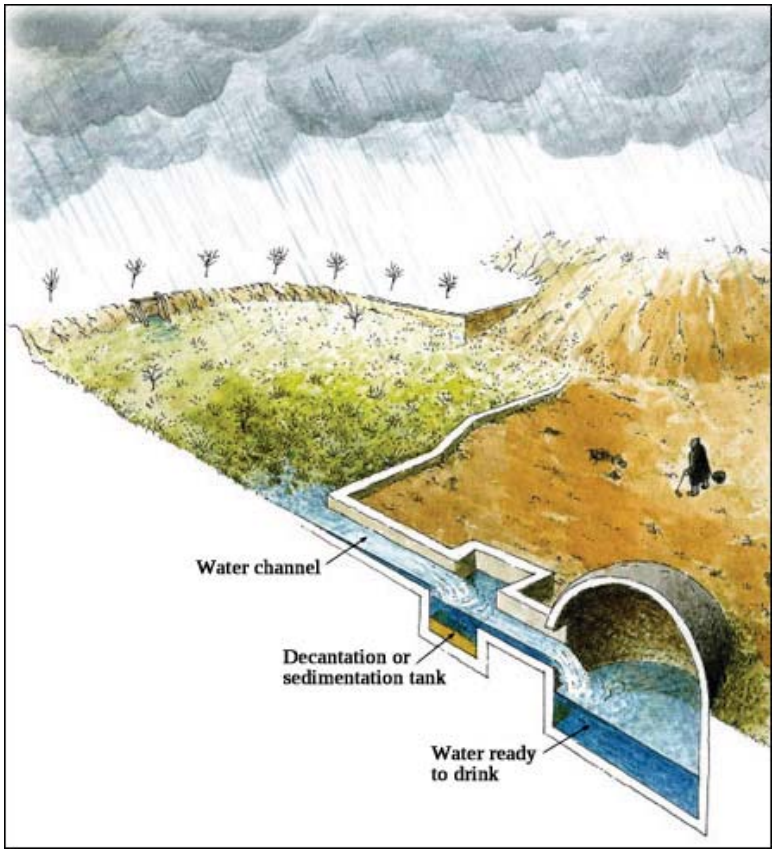
THEN, THERE WERE MINES

Volume 3



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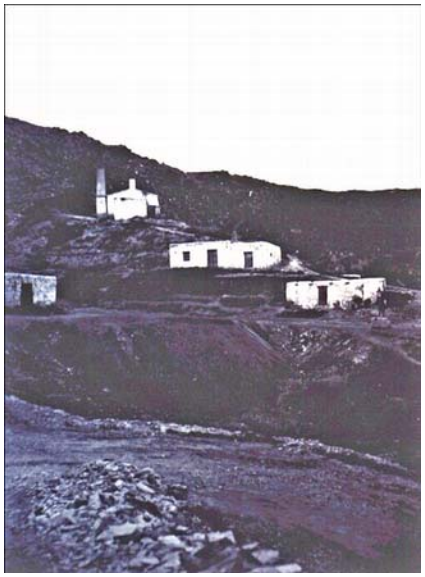
Chapter 1. Water, But Not Enough To Drink.

Low labour costs, small individual mines and good returns on extracted minerals, delayed the arrival of steam power in the Sierra Almagrera. While the desagüe had a steam driven pump as early as 1852, it was largely ineffective and unreliable.

The boiler for the desagüe arrived in Villaricos in 1851 and was transported by a team of oxen.
Sierra Almagrera y Herrerías. Bolea.

In 1864 the Purísima Concepción mine installed a steam powered winch. The benefits, in terms of achievable depths, were impressive and the use of this form of power spread. By 1883 most of the top forty mines had installed steam driven extraction machines, although Carmen, Observación and Estrella continued to use mule powered whims.



The engineer Paul Colson, responsible for 75% of the steam engines, favoured brick chimneys … …

. . . while the German firm, Humbolt, preferred a metal stack.
Both, Rodrigo.

The disadvantage of steam power was that it was a thirsty beast. A 10h.p. engine required 3,000 litres of water daily. The annual cost of transporting that amount of water was in the region of 17,000 reales. The cost of constructing a 500 cubic metre rain water cistern or balsa, was in the region of 15,000 reales

The simple balsa of the mine Ibería.

Needless to say, the owners opted for at least one balsa, or water cistern, and hoped for wet weather to fill it. In times of drought, if there was insufficient water in the balsa, the choice was to either, buy in a supply and have it brought up on the backs of mules, or, shut the engine down.

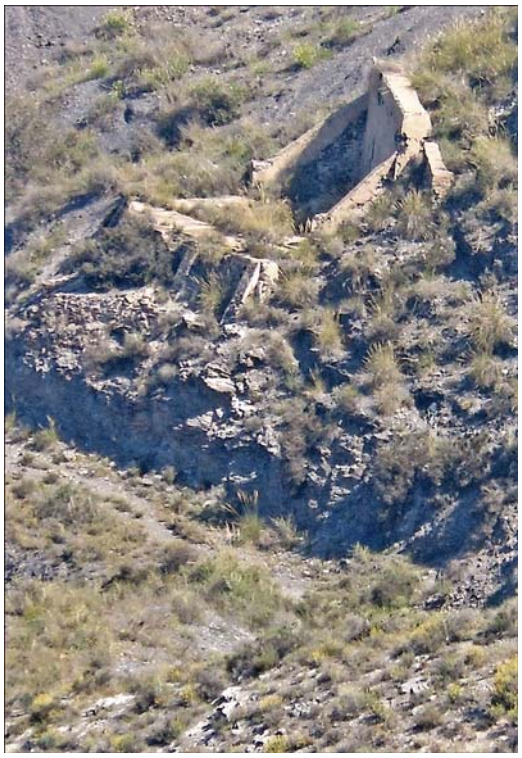
La Compañia de Águilas even pumped seawater up from the Cala del Peñón Cortado in an effort to make up the shortfall of water to feed the boilers of their pumping station in the Barranco del Francés.

There are a variety of balsas in the Sierra, each easily recognizable. Any construction that has been rendered impermeable will have been used to contain and store water. Many of them are still capable of holding some water after nearly 100 years, as demonstrated by my canine companion, in the balsa of the mine La Ibería.

The balsa at mine La Ibería.

The shallow balsa of the mine Encarnación on the way up to the "Lost Village".

As well as the type of balsa shown above there are at least two others. The first, above the lost village in the Barranco de Francés, has a high back wall, hard against the rock, and a tank at the front. A good view of this can be had from the Casa Dos Mundos promontory. Why they are constructed like this is a mystery to me. However, the design is still used in the present day. There is a massive, recently constructed example just outside Murcia.



Two views of the balsa above the "Lost Village".

What looks like another example of this type of balsa is at Ramo de Flores and is best seen when you approach the mine from the Barranco de las Palomas.

What looks like a balsa at the mine Ramo de Flores.

This structure was used for ore washing, but I'm not sure how it functioned.

The mine Venus Amante, up by the Arab Watchtower, has a raised, circular balsa as well as the more usual sunken, rectangular type.

The unusual, circular balsa of the mine Venus Amante.

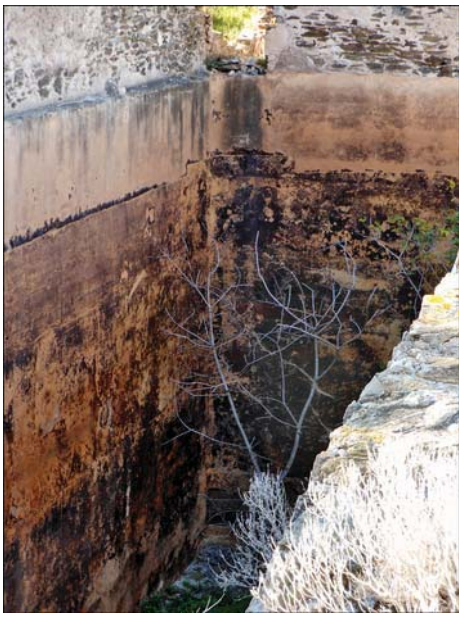
Looking inside the circular balsa.

When it came to water collection and storage, it was, again, the men from Bilbao who were the masters. At the head of the Barranco Hospital de Tierra, the mines Independiente and La Guzmana have the most striking water collection systems in the whole Sierra. Unlike the two previous types, these had roofs. The sheer size of the one that served the Independiente is quite breathtaking. The main feed channel was served by several terraces on either side.

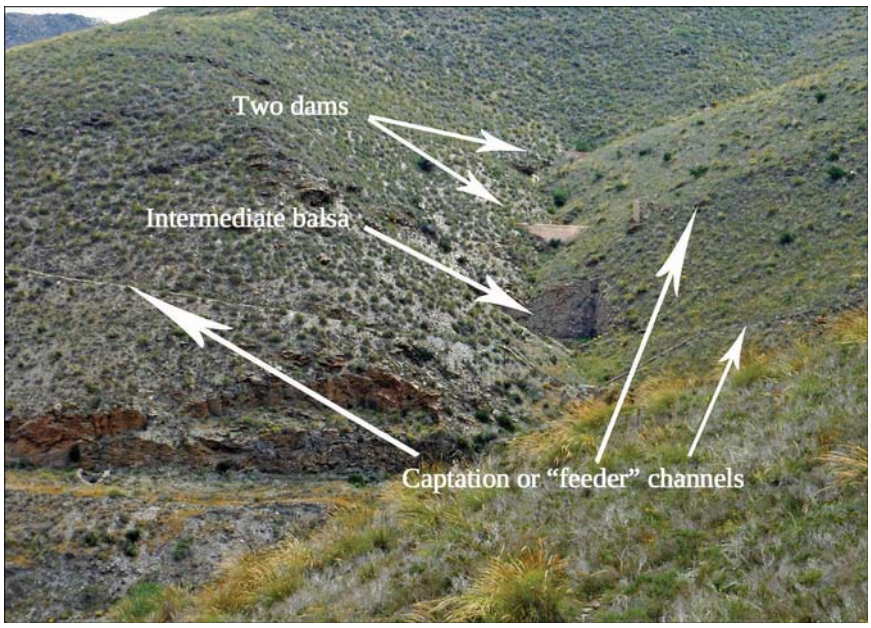
Two views of the Independiente's balsa showing the terracing and the feeder channel.

However, even the Independiente's system pales into insignificance when one looks at that of La Guzmana which was built in 1880, when the steam engine was installed.

Two views of the Guzmana balsa. To give some indication of size, I estimate its depth today to be about 7m. This is after a century of silt and rock being washed into it.



This massive 1500 cubic metre covered balsa was fed by a water collection, or captation system that extended right up the valley and comprised of a series of dams and smaller balsas. In addition, surface water from the surrounding hills was channelled into the system via a small aqueduct and a series of small canals, which extended away from the balsa for a considerable distance.



The dams and smaller balsa which formed the water collection system for the grand balsa.

The intermediate balsa had sluice gates which could be closed when necessary, allowing water to collect on either side of a low, raised wall. The wall has a depression along its length, and looks as if a pipe ran along it. I think that it carried water from the dam above it towards the main balsa. There are several small sluice gates along the way, where water could be diverted away from the balsa and onto the ore washing floor.

Above, the low wall used to conduct the water.

Right, the water could be diverted through the sluice gates.

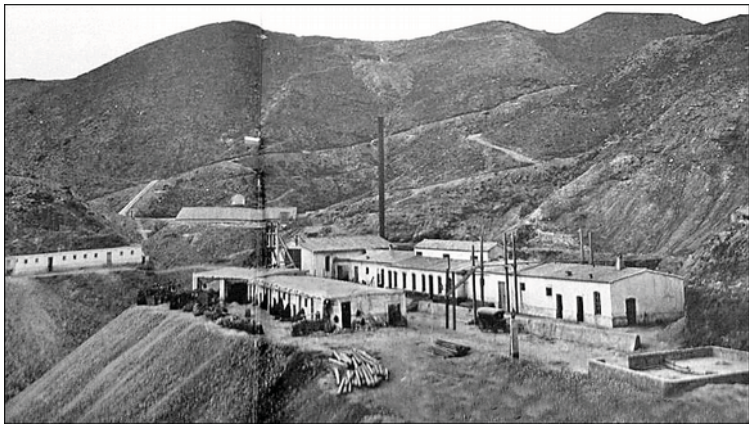
One of the channels used to collect water on the hillside. These used to be covered.

This aqueduct carried water channelled from the neighbouring hillside.

Water from one slope entered the balsa at this end via the aqueduct.

Water from the channels on the other hillsides entered at this end.

In the Spring of 1884, the local mining gazette recorded that, following heavy rain, the balsa had collected between 600,000 and 800,00 litres of water, and could have collected more. Heavy rain in the autumn of the same year saw all of the balsas in the Sierra full to capacity.



Mina Guzmana in the 1880's. The balsa can be seen centre left of the picture and the diagonal line running above it is a water channel. Humbolt installed the steam engine (note the metal stack). *Rodrigo.*

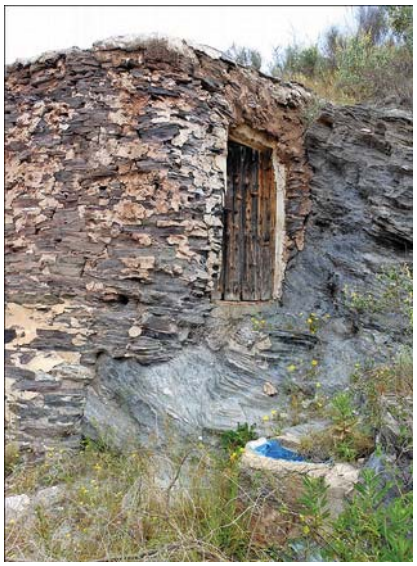
In contrast, the drought of 1905 saw every balsa in the Sierra bone dry. The wells were unable to supply sufficient water and all mining activities ceased as they waited for rain.

Although there was a higher annual rainfall in this part of Spain in the 19th and 20th Centuries, water was always in short supply. Before the mining boom, the only local supply came from ancient wells in the Barranco de los Guardos, in the section where it runs parallel to the A332, Los Lobos to Pozo del Esparto road. The remains of some of these wells can be seen from the steam-roller lay-by

The steam-roller lay-by, on the Los Lobos to Pozo del Esparto Road.

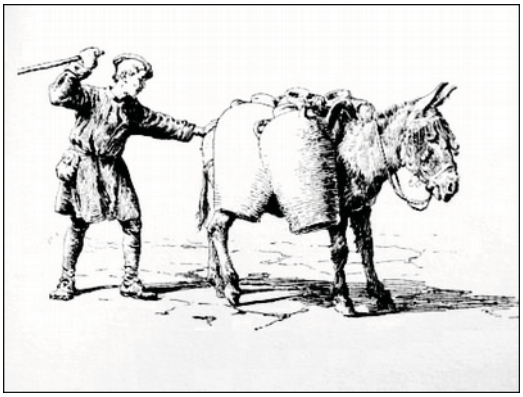
The remains of the ancient wells.

These few wells were unable to meet the demands of the growing mining industry and new sources of water were looked for. Several wells were sunk at the Boca de Mairena near to where the Barranco de Mairena and the Barranco de Granadinos converge. These provided a good source of water, as did wells sunk along the banks of the Rambla de Muleria and at El Tomillar.



Some of the newer wells at the Boca de Mairena.

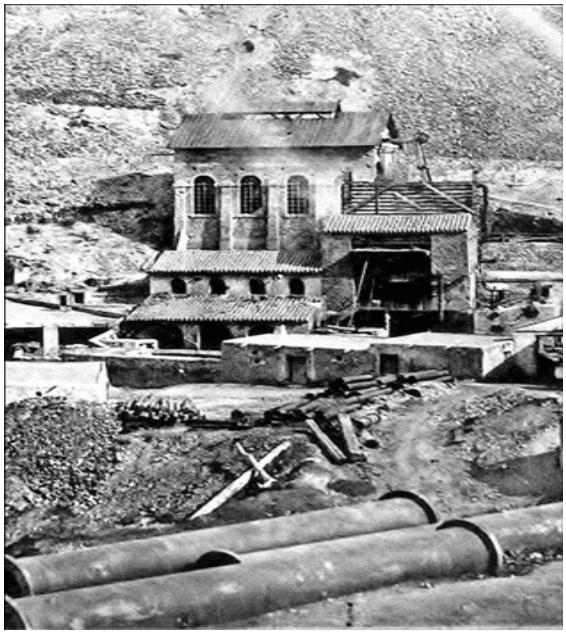
Mule trains, with each mule carrying four, 10 litre, canteens of water trekked daily up and down the dusty tracks to the various mines.



Water carrying mule.

The water was used for drinking and cooking and for the quenching of sharpened picks, mandrills and other tools. There was insufficient for any personal hygiene. As the demand increased, so did the price. It became one of the principal overheads, with a mule load of 40 litres costing between two and three reales, depending on the time of year and the position of the mine. (To put this in context, an unskilled mine worker's daily rate of pay was three and a half reales.)

The Jaroso pumping station, was hailed as the saviour of the mines. Unfortunately, the geothermal waters it discharged, contained large quantities of toxic mineral salts. This water filtered through the sandy bed of the rambla and mixed with that which fed the wells at El Tomillar. As a result, those wells were no longer able to provide water fit for human consumption. Opened in 1868, the socavón, Riqueza Positiva, drained the water from the desagüe in the other direction, to the sea. Whether the wells were ever potable again I don't know although they were still contaminated in 1890.



The desagüe in 1875. The original pumping engine was housed in the building to the front-right of the tall, later to be, engine house.

The beam and fence-like condensation pipes of the new engine can be seen above the old engine house.

Rodrigo.

All that remains of the Desagüe del Jaroso today. The stonework to the centre-left of the picture is the first window in the above 1875 photo.

The sorry story of the desagüe in the Barranco de Jaroso is chronicled in Volume 1. Its closure, in 1886, prompted La Guzmana to install a pumping engine of its own to enable it to continue deep mining. The toxic, underground water was first used in the ore washing process and then, further laden with heavy metal contaminants, discharged into the Rambla de los Granadinos. There was a general outcry when pumping started. The fear was that the wells, at the bottom of the barranco, would suffer the same fate as those at El Tomillar.

While there was a certain amount of contamination, it seems to have been resolved because some of those wells are still in use today, though probably for agricultural use only.

Above, a modern well-house at the Boca de Mairena.

Right, the earlier architectural styles were far more picturesque.