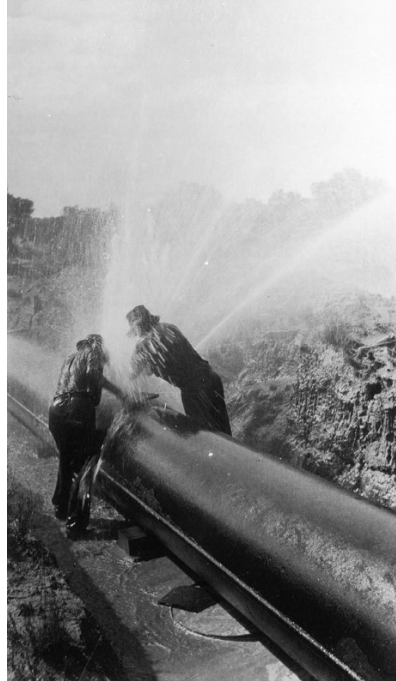


## Plugging leaks, c1930s



### Description

This is a black-and-white photograph from the 1930s showing two men in a trench repairing a leak in the pipeline that supplies water to Western Australia's arid gold fields. The escaping water is shooting metres into the air, drenching the workers and turning the bottom of the trench in which they are working into mud. The photograph measures 32 cm x 20 cm.

### Educational value

- The focus of this photograph is the gold fields water supply pipeline, which was completed at great expense in 1903 to transport water about 560 km from a dam near Perth to WA's inhospitable gold fields. The pipeline was a major engineering feat that attracted worldwide attention at the time and has since been declared a national engineering landmark. Constant maintenance is required to keep the pipeline delivering the maximum amount of water.
- In the 1890s prospectors rushed to the areas that became known as Coolgardie and Kalgoorlie following rich discoveries of gold but there was almost no fresh water in the arid gold fields. Some men literally died of thirst, while others died of diseases spread by lack of sanitation and clean water. A pipeline was the only viable solution to the problem.
- This photograph shows the first step in repairing a typical burst in a pipeline during its early years. Cone-shaped wooden plugs (not visible) were hammered into the pipe to stop a leak. More than one plug was often necessary and the pipe sometimes bristled with a dozen or more plugs, reminiscent of an echidna. Once the plugging was complete the tops of the plugs were sawn off so that the plugs were level with the pipe, and they were then covered with rubber sheeting and locked into position with steel bands. Nowadays a steel plate would be welded over a plugged leak.
- An original lead joint between pipe lengths can be seen. To make a lead joint,



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lengths of pipe were pushed together and a joint ring, or collar, placed around the join. Rope made from hemp was pushed into the space between the pipe and the joint ring after which molten lead, to be absorbed by the rope, was poured into the space. This process was known as caulking and when the lead cooled and solidified, it theoretically stopped the joints from leaking. The pipe shown here was originally buried in the trench to protect joints from the effects of expansion and contraction.

- However well made, all lead joints had the potential to leak with temperature change. Depending on the water pressure and the amount of movement, the leak could range from a 'wet joint' to a large leak. This photograph was taken at a time when losses from the pipeline were so serious they were threatening the sustainability of the supply, with a quarter of the water pumped being lost. There were 4,185 leaks in 1921, 9,704 in 1924 and 8,568 in 1927. Leaks at the lead joints were the most serious of all leaks.
- Water escaping at the lead joints became aerated on exposure, causing rapid corrosion of the pipe metal nearest to the joints. Severe corrosion resulted in the need for joints to be cut out and new lengths of pipe inserted. In 1930 a systematic overhaul of the pipeline was begun that included eliminating all lead joints and replacing them with oxywelded joints. This work comprised 90 per cent of all renovations carried out in the 1930s.
- The photograph features an example of the locking bar pipe, a pipe made with two full-length locking bars that joined two half-cylinders of steel to make a cylindrical pipe without the need for rivets. A riveted pipe has holes punched or drilled for the rivets and each hole represents a potential leak. Individual rivets might leak, but a line of rivets might also give under pressure. One engineer calculated that if riveted pipes were used and only 5 per cent of the rivet holes lost one drop of water a second, the water leaving the storage dam would all be lost before it reached Kalgoorlie. The decision to use the then newly developed locking bar pipe instead proved to be a wise one.

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