Welding the pipes, 1930s

Description

This is a black-and-white photograph, taken in the 1930s, showing refurbishing of the pipeline that supplies water to Western Australia's eastern gold fields. One man is using an acetylene torch to weld a joint between two pipe lengths while in the background other workers are positioning lengths of pipe awaiting connection. There is a gas cylinder to the left of the pipeline. The photograph measures 6.35 cm x 8.90 cm.

Educational value

- The focus of this photograph is the gold fields water supply pipeline, which was completed in 1903 at great expense to carry 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. Men literally died of thirst, while others died of diseases spread by lack of sanitation and clean water. A pipeline from the better watered coastal area was the only viable solution to the problem.
- The 'locking bars', which join the two half-cylinders of steel to make a cylindrical pipe, can be seen running along the length of the pipe in this photograph, identifiable by the ridges on either side. The innovative locking bars used in the project did not leak or slow the flow of water in pipes, both of which occur when pipes are formed by a row of rivet heads. The pipeline still operates today and more than half still consists of original locking-bar pipe. At the time of the photograph, lengths of pipe were still being joined together with their bars lined up. Later they were laid at angles to one another to prevent rainwater accumulating on the bars.
- In 1930 a systematic refurbishment of the pipeline began. This became necessary due to losses of water so severe they threatened the sustainability of the water supply. By 1932-33 a quarter of the water being pumped was being lost. There were 4,185 leaks in 1921, 9,704 in 1924 and 8,568 in 1927. Leaks were due to external corrosion caused by

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pipes sitting in wet or saline soil, internal corrosion resulting from dissolved oxygen in the water in the pipes and corrosion at the lead joints.

- The photograph shows two lengths of pipe being oxywelded, a method of joining that was not available at the time the pipeline was built. Originally lead joints were used. To make a lead joint, 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, in theory, when the lead cooled and solidified, it stopped the joints from leaking.
- However well made, all lead joints had the potential to leak as a result of temperature change. Depending on the water pressure and the amount of movement, the leak could range from a 'wet joint' to a large leak. 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 joints needing to be cut out and new lengths of pipe inserted. In the 1930s overhaul, all lead joints were eliminated and replaced with oxywelded joints.
- The photograph shows the water supply pipeline being relaid above the ground to assist in the repair of leaks. Originally the pipeline was buried in a trench to stop lead joints from failing due to expansion and contraction from extremes of temperature. Despite this the joints did leak, so having them covered with soil became a disadvantage rather than an advantage. Consultants looking into the refurbishment criticised the original decision to bury the pipeline. By the time of the refurbishment, most of the pipeline had in fact been uncovered in the search for and repair of leaks.
- Refurbishing the pipeline was an enormous task. It involved lifting and re-laying the pipeline, rejoining lengths, replacing sections of the pipe, lining pipes with concrete to prevent internal corrosion and placing the entire pipeline on concrete collars above ground.
- The refurbishment took about 10 years. Lead joints between 60,000 individual pipe lengths had to be replaced by welds and 140 km of corroded pipe had to be removed and replaced, in some sections being replaced temporarily by wooden pipes. Recycled pipes made from the top halves of pipes were also used, with bottom halves that had corroded in wet and saline soils being discarded and two top halves rejoined. By June 1941 only 4 km of the pipeline had not been renovated in some way.
- Hundreds of men desperate for work during the Great Depression obtained employment refurbishing the pipeline under harsh working and living conditions. The Western Australian Government saw the refurbishment as serving two purposes, to save the Water Supply Scheme and to provide work for the enormous numbers of unemployed. The men worked for 'sustenance', or minimum wages, and were allocated work according to the number of their dependants. Families lived in makeshift camps situated along the length of the line.
- Oxyacetylene welding is a type of gas welding in which the flame from the combustion of burning gases melts the metal to be joined. Acetylene, a highly combustible gas composed of carbon and hydrogen, is used as fuel in the oxyacetylene welding process. Here, the gas cylinder can be seen to the left of the pipe and is connected by hose to the torch. At the time safety was less of a consideration than it is in today's workplace. Nowadays welders wear goggles and other protective clothing.

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