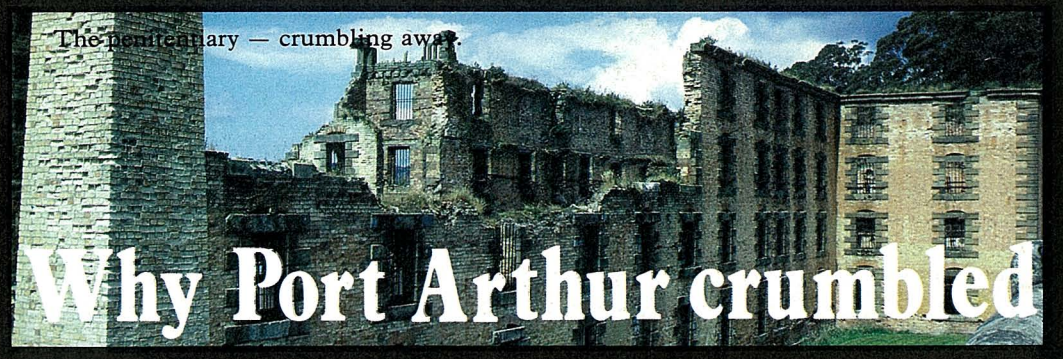
BACK BOX


The penitentiary — crumbling away.

Why Port Arthur crumbled

The convicts of the penal settlement of Port Arthur in Tasmania built their own prison, even down to the bricks themselves.

Indeed, brick-making was a major activity at Port Arthur. Records show that 68 300 bricks were made in March 1834, 160 700 in December 1841, and an average of 14 000 per month during the decade 1858 to 1868.

They were used in the large number of buildings erected at Port Arthur, and were sent to Hobart and possibly beyond.

Port Arthur is now in ruins, albeit picturesque, due in part to the poor quality of the bricks. Analysis of bricks by Mr John Hutton of the CSIRO Division of Soils, who is a Member of the Tasmanian Restoration Advisory Committee, has confirmed some earlier suggestions and investigations of what went wrong.

Mr Hutton has taken samples of bricks and has subjected them to modern techniques of X-ray fluorescence spectrometry and X-ray diffraction. The evidence shows that the bricks were under-fired and that some, at least, were puddled with sea water.

After the bricks were cemented into place, water movement conveyed the soluble sea-water salts through them and, at exposed surfaces, evaporation left salts behind. As the salts crystallized within their fine pores, the bricks began to disintegrate. Rain, wind, and sun have worked relentlessly at Port Arthur.

In a well-fired brick, temperatures above 1000°C lead to permanent changes in the mineral structure of the constituent clays. The unaltered nature of the clay minerals in some Port Arthur bricks indicates to Dr Hutton gross under-firing, probably at less than 700°C.

Many bricks show a salt composition similar to that of sea water, and some of them even show a salt glaze. This provides the evidence that the convicts used sea water to puddle the clay prior to moulding the 'green' bricks. They may have had no alternative to using it, because fresh water was not in abundant supply at Port Arthur.

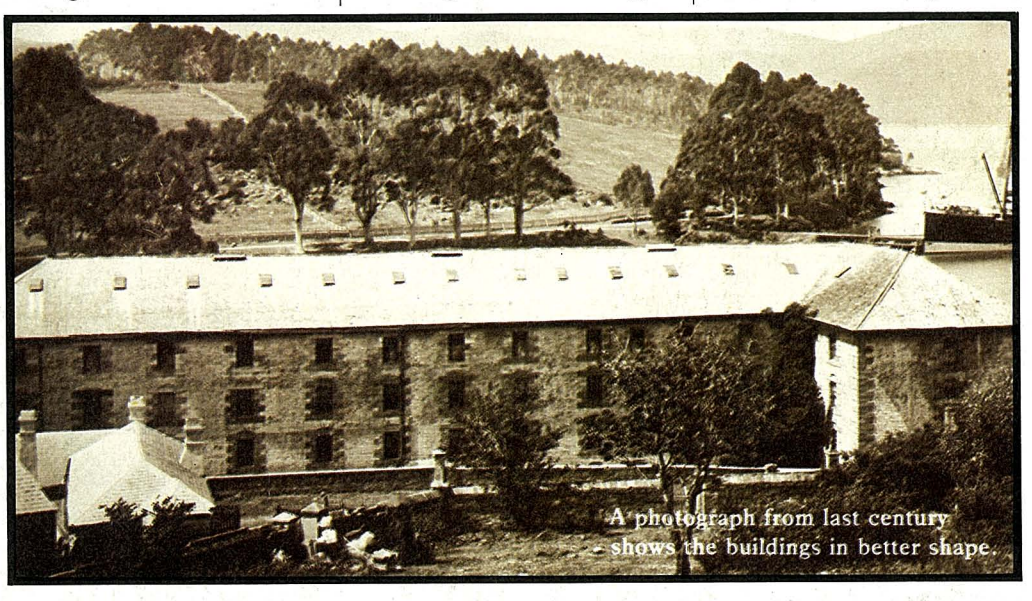
It has been suggested that sea-spray could, through accumulation, cause the bricks to show salt. However, even those bricks collected from under the floor of the Roman Catholic chaplain's cottage — which has been nearly continuously occupied since the early days of settlement — show the same saltiness.

On the other hand, the convicts didn't get it all wrong. The potassium content of all the bricks examined by Dr Hutton was above 1%, indicating that clays derived from dolerite — a low-potassium rock — have been avoided. Clays derived from dolerite can be found close to the penal settlement, but they require considerable amounts of water to make them plastic enough for moulding into bricks; and then, on drying (before firing), they shrink.

From 1830 until 1845, most of the bricks were made south of the settlement, and later on at a site to the north now known as Brickfields Hill.

Nevertheless, the quality of the bricks made at Port Arthur varied greatly. It appears to have deteriorated markedly towards the close of the settlement. In 1876, Henry Hunter, who was in charge of construction of the Cascades gaol at Hobart, wrote of the bricks brought up from Port Arthur: 'they are of such a wretched and worthless description that I cannot consent to their being used for any building purpose'.

Andrew Bell


A photograph from last century shows the buildings in better shape.

Clays and bricks of the penal settlements at Port Arthur and Maria Island, Tasmania. J.T. Hutton. *Proceedings, Royal Society of Tasmania,* 1981, **115** (in press).

Selective salt efflorescence as the result of ion exchange on convict-made brickwork at Port Arthur. N.K. Roberts and P.W. Kallend. *Journal of the Australian Ceramic Society* 1976, **12**, 5–7.