Tasmania

MINERAL RESOURCES TASMANIA

Archaeological Survey Report 2002/01

A brief examination of the 'Springvale' tunnel, Evandale Water Scheme

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Acknowledgements

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Mrs McKibben and her son are thanked for giving permission to enter their farm “Springvale” and for showing us the site of the former convict barracks.

INTRODUCTION

Following an enquiry from Jai Paterson of the Evandale Historical Society, a visit was made to the site of a former early 19th Century convict barracks, now a farming property known as *Springvale*. The purpose of the visit was to examine a convict-excavated tunnel that once formed part of an aborted water supply scheme for early Launceston.

THE TUNNEL

The Springvale tunnel is cut into the upper slopes of the north face of a low rounded hill. The current entrance to the tunnel is a cutting extending about six metres into the face of the hill but may originally have been a true portal. Collapses of the unstable weathered basalt at the entrance, and recent excavations to expose the mouth of the tunnel, have obscured the true form of the original entrance. It is unknown whether there was any ground support timbering at the tunnel entrance.

The tunnel is reported to be 160 yards (approximately 160 metres) long and trends approximately 175 degrees magnetic (taken at entrance) or almost due south. It was examined for a distance of approximately 90 metres.

The tunnel is basically square in cross section and measures approximately 1.7 metres wide by 1.5 metres high. The tunnel dimensions are significantly modified in the section closest to the entrance because the unstable weathered basalts have collapsed in places. Material that has sloughed off the roof is now piled centrally in the drive floor.

Deeper into the tunnel, beyond the depth where plant roots can penetrate the backs and where there is less weathering of the basalt, the tunnel is in remarkably good condition and has presumably changed little since it was first excavated. Only very small amounts of material have fretted from the walls and ceiling of the drive and the floor is mostly clean. Approximately 50 mm of clear water and a thin veneer of silty mud cover the floor. The walls are clean and dry and there is no dust covering them.

Organic Remains in Tunnel

This tunnel is remarkably free of the signs of animal life, possibly because it was completely sealed by the accumulated rubbish at the entrance for so long. The following remains were seen (identifications are tentative apart from the rat skull);

- Rat skull;
- Large bovine limb bone fragment (possible a joint of meat?);
- Three vertebrae of a small sheep or wallaby-sized animal.

Geology of the Tunnel.

Two rock types occur in the tunnel,

- Basalt (which makes up the upper part of the tunnel); and
- Mudstone, that forms the lower part of the walls and floor of the tunnel.

The tunnel has been driven along the contact between a layer of Tertiary terrestrial mudstone (light khaki brown in colour and finely bedded) and dark greenish grey basalt that is occasionally vesicular (originally contained gas bubbles). The basalt comprises the upper part of the drive and forms the ‘backs’ (or roof) while the mudstone forms the floor. The basalt was originally molten lava that flowed down a sediment-filled valley during a volcanic eruption and crystallised as it cooled.

The rock layers are basically flat lying, although they have a very gentle dip to the NNW. The mudstone-basalt contact thus gradually rises in the walls of the drive the further it penetrates into the hill. Mudstone forms the floor of the tunnel near the entrance and makes up about 40 % of the wall at 80 metres. The same mudstone-basalt contact can be seen in the embankment behind the *Springvale* farm sheds where the convict barracks once stood.

The ground conditions improve further into the tunnel, probably because of the lessening of surface weathering influences, groundwater penetration and tree/grass roots. Poor ground diminishes as weathering of the basalt diminishes. Roof collapses about 300-450 mm in zone of surface weathering influence (root line) – especially the zone in which tree and grass (?) roots can penetrate to the depth of the tunnel.

Evidence of Human Activity in the Tunnel.

The tunnel was excavated by convict labour and therefore is the product of human endeavour. A particular focus of this survey was to seek other evidence of the human presence that might provide details of the way the excavation was done. This type of evidence is usually left on the walls and ceiling of such a tunnel.

Pick marks

Large expanses of pick marks were seen on sections of the tunnel where the walls were clean and there had been little sloughing of rock. Pick marks occurred in clusters of closely spaced, triangular marks with the same orientation. Each mark represents one stroke of a pick.

I do not think that the pick marks were made during the excavation of the tunnel. They are probably the result of a systematic trimming and cleaning of the tunnel walls so that they were smooth and clean, with no projections. This clean straight surface could have been the final preparation of the tunnel for the final brick lining. It is also possible that the trimming and tidying of the drive walls by careful trimming with a pick simply shows that the miners were professionals. It is very common to find this type of careful trimming of drives and tunnels in early mines to make neat travelways and access points.

Survey Numbers

White numbers were painted in two places along the eastern (left hand) wall of the drive. The numbers were painted with white paint, possibly whitewash. The first number ‘50’ seen was in relatively poor condition due to the weathering of the basalt. The second number ‘80’ was in almost perfect condition and was painted with a similar white pigment. The numbers are assumed to represent the number of yards from a datum at the tunnel entrance and are considered to be survey numbers.

Associated with each number was a dark brown splotch of wax, clay or gum that is interpreted to represent a mounting medium and the wax drips from a candle that was used during a survey of the tunnel.

The tunnel appeared to be in a remarkably clean condition beyond the distance penetrated (c90 m). Therefore, it is likely that more numbers will be found on the wall at set intervals further in.

The owner of *Springvale* cannot remember any surveys being done in the tunnel in her lifetime (the last 70+ years). It is an apparent fact that no one has had any reason to survey the tunnel since it was first excavated (except perhaps when it was contemplated using the tunnel as an air raid shelter during the Second World War, Mrs McKibben, pers. comm.). It is therefore possible that the painted numbers and their associated mounting material patches could date from the mid-1830’s, the era when the tunnel was excavated. They may be ‘Royal Engineer’ survey marks and if so, their preservation is remarkable and they are highly significant remnants of this water scheme.

Where are the spoil heaps?

A large volume of broken rock has been removed from the tunnel but there are no obvious waste dumps at the site. So the question is, where is it? The most likely place is that the material was tipped over the side of the low hill and now forms the platform on which the small split timber and iron shearing shed is built.

INTERPRETATION

How was the tunnel excavated

Basalt is a very hard rock type and would have hampered, if not prevented, hand excavation. The hardness of the basalt comprising the upper part of the tunnel suggests that boring and firing of the face would have been necessary. Perhaps just a couple of holes were drilled and fired to loosen the basaltic ground for excavation by pick and shovel. It is also possible that the tunnel was excavated by digging out the lower soft mudstone layer by hand, and then dropping the basalt into the created void.

The final face at the end of the tunnel may preserve butts of the final drill holes bored to fire the face and this will confirm or refute the use of explosives. A careful examination of the well-preserved parts of the drive walls may also reveal hole butts, or marks of drill steels.

Pick and shovel excavation would have been possible in the softer and more weathered basalt in the outer tunnel, setting and firing of black powder charges takes experience and skill. Boring a face by ‘hammer and tap’ techniques is not an easily learnt skill and requires a team of two or three men. The team consists of one man holding the drill steel and rotating it a quarter turn between strikes of the hammer and one or two men with sledge hammers striking the end of the held steel in sequence as it is turned. If this system was employed in the tunnel, it suggests that skilled miners were involved in the tunnel excavation.

I would suggest that the tunnel was excavated by skilled miners, at least in part, and not by unskilled labour, because of the pick marks on the walls and their smoothness, regularity and cleanliness. The tunnel walls and backs have been carefully trimmed and smoothed by the careful use of ‘cousin jack’ picks, chipping and trimming the rougher edges from the walls. The pick marks show the care that was put into the trimming and tidying of the tunnel walls. This is generally considered to be a sure sign of professional miners. The careful finishing of the walls may also have been part of the preparation of the tunnel walls for a brick lining, that is suggested as having been planned for the tunnel walls.

Were the Engineers aware of the Geology?

It is possible that the engineers who designed this scheme chose the site of the mudstone-basalt contact for their tunnel because it made for cheaper and easier mining. The mudstone and basalt contact is exposed in the hillside cutting at the site of the former convict barracks at *Springvale* and it is possible that the engineers were aware of it. This location may have lessened the requirement for explosives, facilitated hand excavation and thereby lowered the mining costs.

Harris (1988;58–59) suggests that it was a lack of geological test work (boring) that caused problems with the tunneling. However the floor of the drive is in soft mudstone that is easily dug by hand.

On the other hand it may have just been fortuitous that the geological contact is present in the tunnel but it does raise the possibility that there was a detailed knowledge of the geology prior to commencement of the tunnel.

Lowering the floor of the tunnel by one metre would have placed the entire excavation in mudstone with the solid basalt as the roof. This could have been a very stable tunnel. In fact, the far end of the tunnel is in solid fresh basalt and it is in a remarkably clean and stable condition.

General Comments

A note on artefacts

There may be wood, metal, stone and organic artefacts buried in the roof collapse debris and beneath the thin film of water in the tunnel. Therefore, under no circumstances should the tunnel be cleared without proper archaeological excavation practices being employed. Valuable items and information may already have been lost in the clearance of the entrance. The high degree of preservation of the survey numbers and wax candle mounts suggests that if there are any organic materials in the tunnel, then they will be well preserved. The most interesting items may be found at the final face of the tunnel where work last took place.

A note on safety

Blind tunnels such as this one can accumulate toxic gases and can be dangerous places to enter. People entering such tunnels can be overcome and asphyxiated before they are aware that there are toxic gases present. The far end of the tunnel should not be entered before it is ventilated and only if there is a free flow of air.

Figure 1

View of portal from within tunnel. Note fine plant roots hanging from roof and the arched shape of the tunnel. This shape is due to weathered rock sloughing off over time. The fallen material is now piled on the drive floor. Artefacts may be buried beneath the material.

Figure 2

View near tunnel mouth. Note plant roots. View shows tunnel profile caused by weathered rock sloughing off roof. Debris is piled on floor and may cover artefacts.

Figure 3

Further into tunnel. The profile becomes more square because the basalt in the roof is less weathered and so less material is flaking from the roof. Note the pile of debris that diminishes towards the torch holder, the absence of plant roots, and the pale brown mudstone layer on either wall.

Figure 4

Approximately 70 metres into tunnel. Note the intact square profile of the tunnel, which was the original shape for its entire length, prior to roof collapses. Note mudstone layer in bottom third of walls. Basalt makes up the rest. Approximately 50 mm of clear water covers floor.
Note cuddy to right of person.

Figure 5

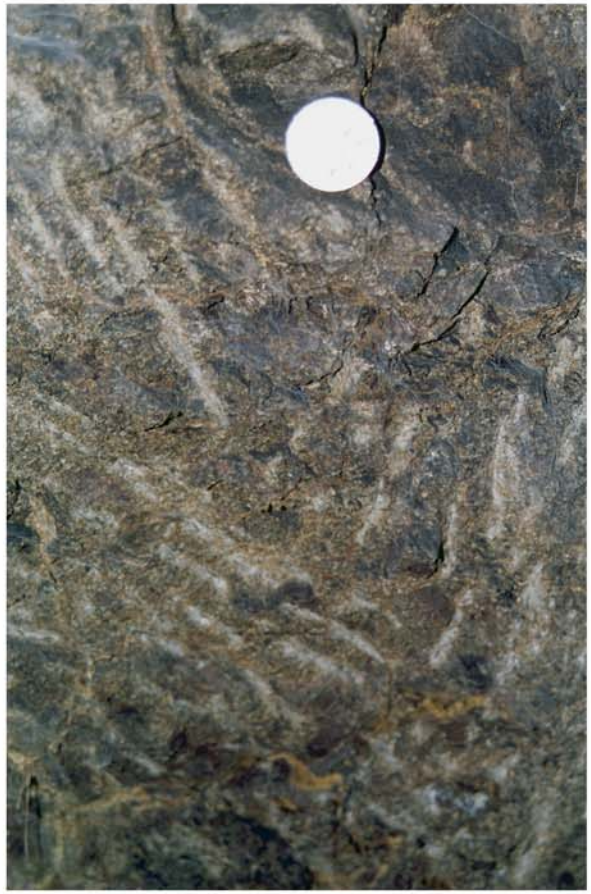

Figure 6

Pick marks on the walls of drive. Such pick marks were probably made by a 'cousin jack' pick and were made while trimming the rougher edges and protuberances from the drive walls as a final 'finish', possibly in preparation for brick lining. Pick marks such as these suggest professional miners, or at least workers trained or supervised by them. Note mudstone layer in base of wall.

Figure 7

White painted number '80' on eastern wall, presumably originating as a survey mark. White wash painted? (20 cent piece for scale). The mark represents 80 yards in from entrance. A similar mark, heavily deteriorated, was seen at 50 yards in, on the same wall. The first number was damaged due to weathered rock and dampness. The number could date from the original period of tunnel excavation in the mid 1830's. A splotch of shiny brown wax or clay, probably marking the place where a candle was placed during the theodolite survey, is seen to the lower right of the number. Note the boundary between the lower light brown mudstone and the upper dark blue-grey basalt.

Figure 8

Close up of the white number '80' on the eastern wall of the tunnel. Probably painted with white wash. Note pick marks in mudstone left and below the hand.

Figure 9

Close up of wax showing the probable position of a candle placed during the tunnel survey. A similar splotch of wax was seen below the number ‘50’ seen closer to the entrance (this was in poor condition).