ARLTUNGA

A REMOTE MINING SETTLEMENT

An Archaeological Investigation of an Historic Site

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Notes:

1. Abbreviations used for archive material:

S.A.P.R.O.	South Australian Public Record Office
GRS 1	Incoming Correspondence of the Minister for the Northern Territory
GRS 4	Outgoing Correspondence of the Minister for the Northern Territory
AA(C)	Australian Archives, Canberra
AA(D)	Australian Archives, Darwin

2. Endnote references are occasionally abbreviated, and full details can be found in the reference section.

3. Imperial and metric measurements, etc. Rather than converting mileages, ounces, etc.:

1 mile = 1.61 kilometres
1 oz. = 0.031 kilograms
1 lb. = 0.453 kilograms
1 ton = 1.02 tonnes

There seems no point in attempting to convert the imperial currency, as it has little meaning in today's terms. To help place the value of the pound, the value of gold averaged £3/10/- per ounce, the average cost of living was £1 per week, and the average salary for employed miners was between £3 and £4 per week.

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Arltunga is a fascinating, beautiful place, and I can only hope that the efforts of myself, my field workers and supporters have made the significance of this historic site absolutely clear. Its cultural significance goes far beyond the boundaries of Central Australia, and I hope this can now be appreciated.

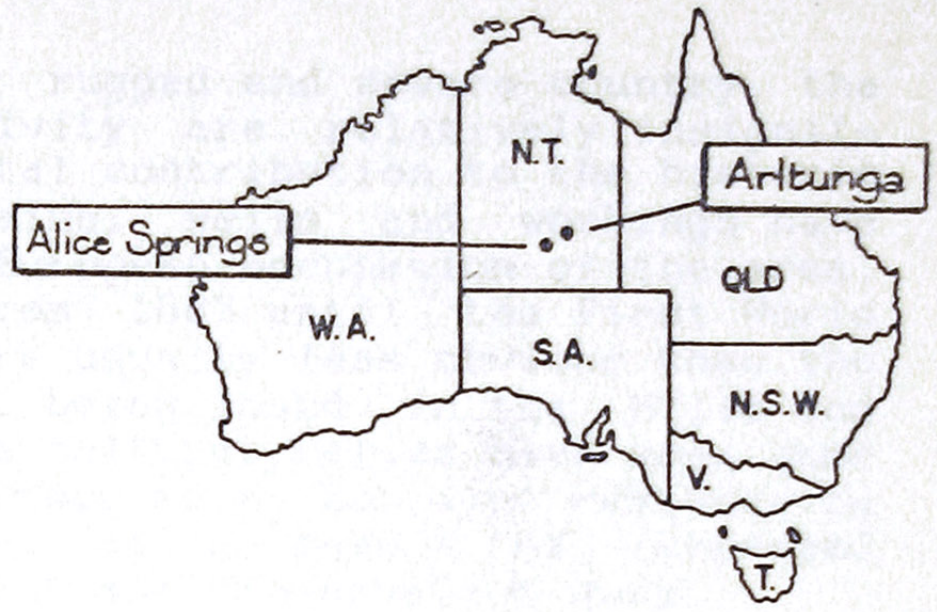
1. INTRODUCTION.

The Arltunga goldfield lies towards the eastern end of the MacDonnell Ranges, an area very old in geological terms. Formed in pre-Cambrian times, the Arunta Block consists of gneiss and schist hills, overlaid by more recently formed Heavitree quartzite. Folding and faulting during the Alice Springs Orogeny, plus subsequent erosion, formed the hills and ranges of the Arltunga area. The major plains, the Hale Plain on the northern side, and Paddy's Plain on the south-eastern side, probably resulted from a later subsidence. Heights vary from just under 600 metres to almost 900 metres, with the two smaller ranges, Cavenagh Range on the western side and White Range towards the east, reaching 854 and 899 metres respectively. The two major peaks are Mt. Gordon, in the western area, and Mt. Chapman in the north-east. This rocky landscape, with its allied arid climate (an annual rainfall of 250 mm with an average January temperature varying from 36 maximum to 22 minimum degrees, and in July, from 19 to 4 degrees)[1] is the habitat of hardy plant life. Larger eucalypts line the predominantly dry creek beds, while smaller trees and shrubs such as acacia and cassia, as well as varieties of spinifex, cover the hills where there is sufficient soil for them to take hold. Permanent, or semi-permanent water can be found in the rockholes scattered through the ranges. The best known of these rockholes, and the site of the first discovery of gold, is now known as Paddy's Rockhole.

The name, Arltunga, seems to have been used from the establishment of the first post office near Paddy's Rockhole in 1891[2]. Prior to this, the area was simply referred to as the Eastern MacDonnell Ranges area, the Hale River reefs, Claraville or Paddy's Rockhole fields. "Arltunga" seems to be the European version of the Aboriginal name for Paddy's Rockhole; J.J. East in 1888 thought the local name was Unarundingna[3].

Part of the Arltunga goldfield became an Historic Reserve in 1975 and is managed by the Conservation Commission of the Northern Territory. Access to both the reserve and the goldfield is now easy; 72k of the road east from Alice Springs are sealed, the remaining 35k are gravel, in reasonable condition, except during excessive wet weather. (Figure 1) The road has been upgraded for both tourism and mining requirements. Tourism is increasing in the East MacDonnell Ranges generally, and open cut mining commenced in the White Range area early in 1990.

As the fieldwork discussed here was carried out within or close to the boundaries of the Reserve, the latter will be used as the total survey area, rather than the actual, larger goldfield.



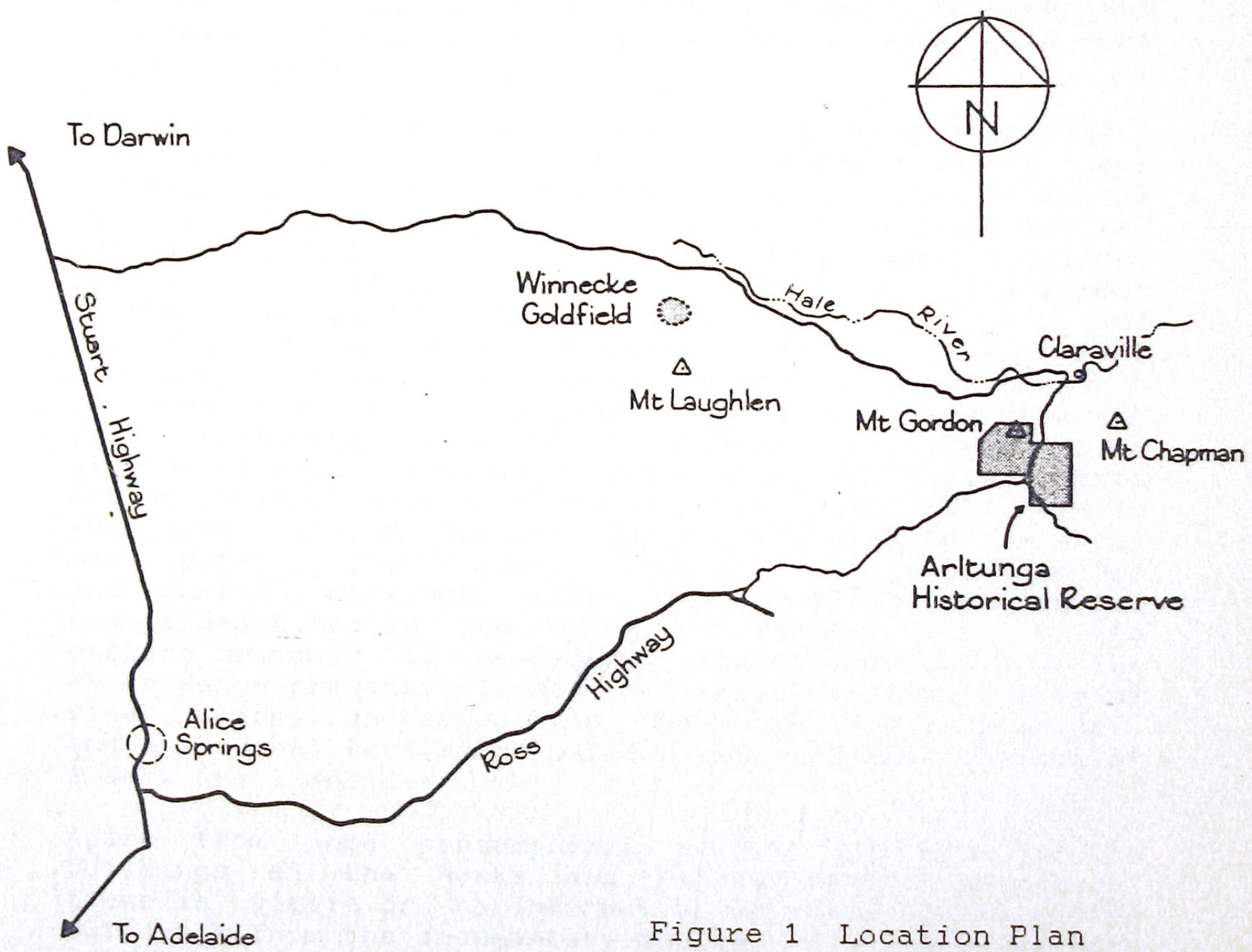
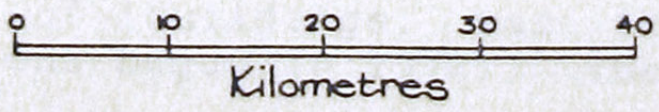


Figure 1 Location Plan



1.1 Aims of the fieldwork.

Within this beautiful but rugged and severe country, the signs of recent human activity are relatively insignificant, though making a vital contribution to the historic landscape. Roads and remains, wells and workings have survived from the first European occupation of the area, when gold was mined here from 1887 until the First World War. Mines and workings are usually less obvious than the roads and building remains, being found in the hills and gullies. Most of these cultural relics have seen some changes, modifications, further ruin but also restoration in the last two decades, as a result of increased visitation, closer management and conservation work.

The numerous stone remains have an immediate impact on the visitor. These buildings, or parts of buildings are found widely scattered over the Reserve, but in most cases tend to cluster in groups of varying sizes. These groups are centred around wells, or close to mines, or both, and have been designated precincts. They are described more fully in chapter 2.

The western area of the Reserve is the most accessible, with three small but important precincts. Two of these had been named before fieldwork began, as the Police Station or Kangaroo Creek Well precinct, and the Battery and Cyanide Works or Star of the North Well precinct. (Chapter 2, sections 1 and 4, Figures 2, 4). The former is the first precinct to be seen by the visitor, and includes obvious house structures - "formal" - as well as some more "informal" buildings. The nearby Works precinct includes machinery, buildings and foundations from the public treatment plant which served the goldfield, as well as domestic buildings both large and small. Mines are not obvious around these two precincts, but just to the east, the MacDonnell Range Reef area has recently been opened to the public. This includes several mines and surface workings, with minor, informal structures, and is described in section 4 of chapter 2. On the eastern boundary of the Reserve, and straddling it is the White Range precinct. It has the largest concentration of mines, tracks and associated buildings of any precinct, and an unusual settlement pattern, as discussed in chapter 2 sections 1 and 2.

Apart from some contemporary account of some of the buildings at the Works and Police station precincts, there is little or no information on the majority of the buildings from the documentary sources. As they make such an important contribution to the present landscape, and as my major interest is in the domestic aspect of miners' lives, fieldwork has concentrated on the building remains. The White Range precinct, with its number and variety of buildings, was the obvious area for the excavations begun in 1977. The research aims were very

broad, and can be summarised as follows:

> To investigate whether physical exploration, especially by means of excavation, could contribute significantly more to the study of an historic site of this kind than could be achieved simply by more traditional historical documentary based research.

Having started with such a broad and general aim, as recommended in at least one 1970s textbook[4], and as my skills lay in excavation, three sites at White Range were chosen for investigation. These sites, 98, 100 and 59 are discussed in some detail in chapter 2 section 3.

As part of the field seasons at White Range, other buildings were recorded, but it was not until 1980 that I was involved, with several others, in a major survey of the whole Reserve (see chapter 2, section 1). My involvement in this work, and subsequently in the conservation programme led to my greater appreciation of general and precinct surveys. Such work has provided information about settlement pattern, and differing uses of buildings or areas. The precinct surveys, at the Works, Police station and MacDonnell Range Reef, between 1983 and 1985, involved me in the collection and recording of surface artefacts from the vicinity of buildings. While this was largely a management exercise and not a strategy chosen by myself, the results (where completed) have contributed to this study. Annual, or bi-annual reports on most of the fieldwork have been lodged, either as part of previous postgraduate work, or with the Conservation Commission.[5]

These three forms of fieldwork, chosen and imposed, have helped refine my research aims at Arltunga. In addition, developments in the discipline of historical archaeology, and my understanding of them, led to more pertinent questions. Most of the discussion on developments in methodology and theory has occurred in America and England, with the Australian contributions being recent, and limited in number.[6] My aims now can be summarised as follows:

> How important were the actual or perceived effects of isolation and the environment on the lives of Arltunga residents, and the surviving archaeological record?
>
> Did the main purpose of the settlement (mining) and/or the timing (late 19th century) have any particular effect on the archaeological record?

The answers to these questions are suggested through the fieldwork in chapter 2, the contemporary documents in chapter 3, and the relative value of both is assessed in

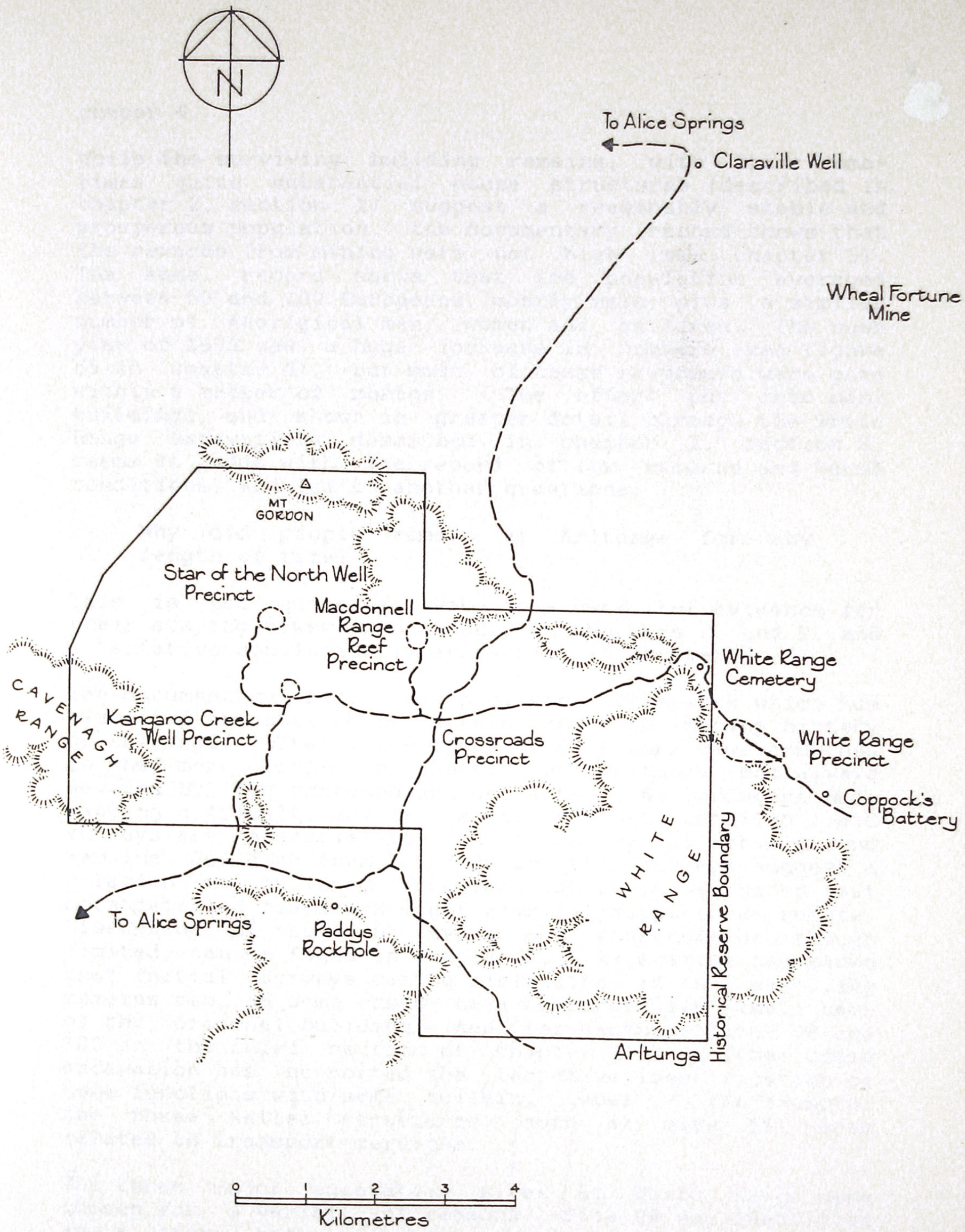


Figure 2 The Arltunga Historic Reserve, major precincts and landforms. .

chaper 4.

While the surviving building remains, with their sometimes quite substantial house structures (described in chapter 2, section 1) suggest a reasonably stable and prosperous population, the documentary record shows that the rewards from mining were not high (see chapter 3). The same record shows that the population averaged between 50 and 100 Europeans, mostly male, plus a similar number of Aboriginal men, women and children. The rush year of 1903 saw a huge increase in numbers (see figure 65 in chapter 4), but most of these newcomers were gone within a matter of months. The effort put into many buildings, and shown in greater detail through the White Range excavations described in chapter 2, section 3, seems at odds with the record of low returns and harsh conditions, and led to another questions:

> Why did people remain at Arltunga for any length of time?

This is not quite so easy to answer, but evidence for their staying power is presented in chapters 2 and 3, and a tentative conclusion is arrived at in chapter 4.

The documentary record has provided a framework which has clarified the settlement pattern and the mining history of Arltunga. The three types of fieldwork have combined to shed more light on aspects of Arltunga not always covered by the contemporary accounts. The landscape made mapping difficult, and it is clear that detailed field surveys are essential for the discovery of above ground remains. Building form noted during the surveys suggest a relation to building function, which it was hoped that more detailed fieldwork might clarify, support or refute. Discussion of building types and construction, though limited, can be found in chapter 2. Excavation has shown that initial surveys can be misleading, in that surviving remains can, in some cases, be a comparatively small part of the original building (see, for example, sites 98 and 100 in the third section of chapter 2). In other cases excavation has supported the tentative identification of some functions with some building types - for example, the three walled structures, such as site 59, seem related to transport services.

The three major excavation sites at White Range were chosen for a variety of reasons. Site 98 was identified as a store before work began, and apart from its importance in such an isolated settlement, had some documented history but little information about the actual buildings. Site 100 was chosen as from the above ground remains it appeared to be an ordinary miner's camp; the excavation did not support this aim, but certain artefacts provided information connecting one particular miner with this site. Site 59 was chosen partly because it was in

the early 1980s the subject of visitors' souveniring instinct, and also to investigate its irregular but clearly three-walled construction.

The collection of surface artefacts, carried out as a management strategy, has provided artefact information on a wider, precinct basis, though this aspect of fieldwork has been only partially completed. At the two major precincts studied in this way, the Works and the Police station, the artefacts have shown that both saw much longer occupation than at the mining precincts of White Range and MacDonnell Range Reef, which is confirmed by the available documentary evidence. Both precincts have also shown the effects of more recent tourist activity, though such artefacts have not been fully discussed in this study. The fine grid used during the surface collections was useful in pinpointing additional minor structures not found in prior surveys, while in some cases artefact clusters and patterns have suggested the presence of buildings no longer surviving above ground.

Excavations have shown, even more clearly than the collection of surface artefacts, that the occupation layers at Arltunga are very shallow, in common with so many sites in Australia, and that most artefacts are found either on, or very close to, the surface. This makes their displacement, or removal, by souvenir hunters or bottle collectors, so much more dangerous when attempting to link particular activities or functions to certain building types. The collection of surface artefacts, particularly in the Works and Police station precincts, has also shown that there can be a mix of material dating from the last one hundred years. Some of this has been dated, and quite accurately, but with little or no stratigraphy, other material cannot be allocated to its exact historical occupation. This mixing of artefacts is also a characteristic of accumulation deposits on a majority of Australian sites, and approaches to the interpretation of this material are still being developed.[7] The artefacts are discussed more fully in chapter 2, section 5.

From the artefact evidence it is also clear that Arltunga was very much a part of the world economy, especially in the 19th and early 20th centuries. At least some of the artefacts, where their origins can be identified, came from England, Europe and North America. As Australian industries developed, their products also appear at the site, and again where identifiable, show the change from imported to locally made products. A somewhat rudimentary attempt has been made to relate the artefact pattern from Arltunga with that suggested by Stanley South[8] for 18th century British colonial sites, with interesting results as shown in chapter 4.

All three fieldwork strategies have helped answer the original purpose of my work, in that they have contributed signficantly to the understanding of Arltunga by providing information not readily available from the documentary sources. Both the archaeological and documentary records have helped provide answers to my two main questions, and provided possible reasons for the third question. Arltunga does demonstrate the effect of an arid environment, and remoteness on living and working conditions. It is hoped that the results of this study will be of value in comparing it with other Australian sites, both in the arid outback and in the more temperate urban sites.

Despite the years of fieldwork, the archaeological possibilities of Arltunga have been barely touched on. Three excavations at the White Range have shown that several more types of building remains need to be investigated to establish the norm of mining life; the largely surface artefact collection in other precincts is only the beginning. One important precinct within the Reserve, the Crossroads, has not been looked at. Most areas outside the Reserve have been visited but detailed survey and conservation work is unlikely due to isolation and lack of protection.

1. The figures are from Alice Springs, where meterological data is available from the 1870s. The elevation of both Alice Springs and Arltunga means that temperatures are generally lower than those experienced in Tennant Creek to the north, and Oodnadatta in the south. See Kalma, J.D. & J.R. McAlpine, Climate and Man in the Centre, in Man in the Centre, CSIRO 1983.

2. S.A. P.R.O. 820, Newspaper cuttings on the Northern Territory, 1888-1911; cutting of April 1891.

3. AAC CRS A1640 1888/1074. Handwritten report by J.J. East on an exploring/prospecting expedition to the MacDonnell Ranges. Dick Kimber, local ethnographer/ historian has suggested that Arltunga could derive from Aldolanga, the Arrernte word meaning Easterners. Arltunga being in Eastern Arrernte country.

4. See Barker, P. Techniques of Archaeological Excavation, London 1977, p. 40. However the problems of such an approach had already been pointed out by Iain C Walker in his Historical Archaeology, Methods and Principles, originally published in 1967, seen in R. Schuyler (ed) Historical Archaeology, A Guide to substantive and theoretical contributions, 1978.

5. Holmes, K The White Range settlement area, Arltunga Goldfield, N.T. Presented for M.A., University of Sydney in 1980. Reports prepared for the Conservation Commission of the N.T. through Service Enterprises: Kangaroo Creek Well Precinct Archaeological Report, 1983; Site 256 Archaeological Report, 1984; MacDonnell Range Reef Precinct Archaeological Report, 1985.

6. For the American discussion see, for example, G.R. Willey & J.A. Sabloff, A history of American Archaeology, second edition, 1980; M. Salmon, Philosophy and Archaeology, 1982, and M. Schiffer, The Structure of Archaeological Theory, in American Antiquity 53 (3), 1988. For the importance of research design, see also Questions that Count in Archaeology, in Historical Archaeology, volume 22 no. 1, 1988, pp 5-42, Stanley South (ed) Research Strategies in Historical Archaeology, 1977. For discussion from England, see Ian Hodder, Reading the Past, CUP 1986. In Australia, discussion on theoretical has been limited, see D. Bairstow, Historical Archaeology at the Crossroads, in Australian Archaeology, No 18, June 1985 and Tim Murray's reply in Australian Archaeology No 20, June 1985. The possibilities of world systems theory have been canvassed by D. Jeans in his World Systems Theory: a theoretical context for Australian Historical Archaeology, in Birmingham, Bairstow and Wilson (eds) Archaeology and Colonisation, Australia in the World Context, 1988.

7. For example, at Sydney University's Centre for Historical Archaeology.

8. In his Method and Theory in Historical Archaeology, 1977, particularly the discussion on Frontier Pattern, p. 141 following.

2. FIELDWORK

2.1 Settlement pattern

At Arltunga it is possible to explore the three tiers of settlement as discussed by David Clarke and Bruce Trigger.[1] Both papers refer generally to prehistoric settlements, but even in such a short lived site as Arltunga with its main occupation from 1887 to World War I, considering the three levels is valuable in understanding the social structure of the goldfield. The three tiers are the site as a whole, the relationships between individual sites (or buildings, as is mostly the case at Arltunga) and the relationships within a site or building.

The following is a brief introduction to the historic landscape of the Reserve, to provide an idea of spatial relationships within it. It is described as if seen for the first time by a visitor without any background information. The precincts in the western half are described first, and then the eastern precinct at White Range. This is followed by a more detailed discussion of the individual precincts in the order that the fieldwork was completed - starting at the White Range and finishing at MacDonnell Range Reef (Figure 2).

The goldfield covers a considerable area, approximately 25 by 16 kms, of which the Arltunga Historic Reserve covers less than half. The modern access is from the south-east, though another unsealed road to the north, swinging back west to Alice Springs does provide an alternative route. The southern route seems to be the most popular, and probably follows the early tracks, as do the internal roads within the Reserve. In both cases, the roads have been upgraded and improved, changing alignments slightly, but the general routes appear similar to earlier tracks. The road to Arltunga travels adjacent to the main spur of East MacDonnell Ranges, and then turns directly through the ranges. On arrival at the goldfield the visitor is very conscious of this rugged country, backdrop to the signs of occupation left by miners who first arrived in the 1880s. The initial European inhabitants have left behind mines and workings, wells, remnants of ore treatment plant and machinery, plus hundreds of stone buildings or parts of buildings, substantial in number but often insignificant in shape and size.

All of the fieldwork discussed here has been carried out in, or very close to the boundaries of, the Arltunga Historic Reserve. However, it must be remembered that there are a number of mines, wells and buildings which occupy the wider goldfield area but are not under discussion. These are found to the north and north-east of the Reserve, with one small group, around Paddy's Rockhole, just to the south of the Reserve.

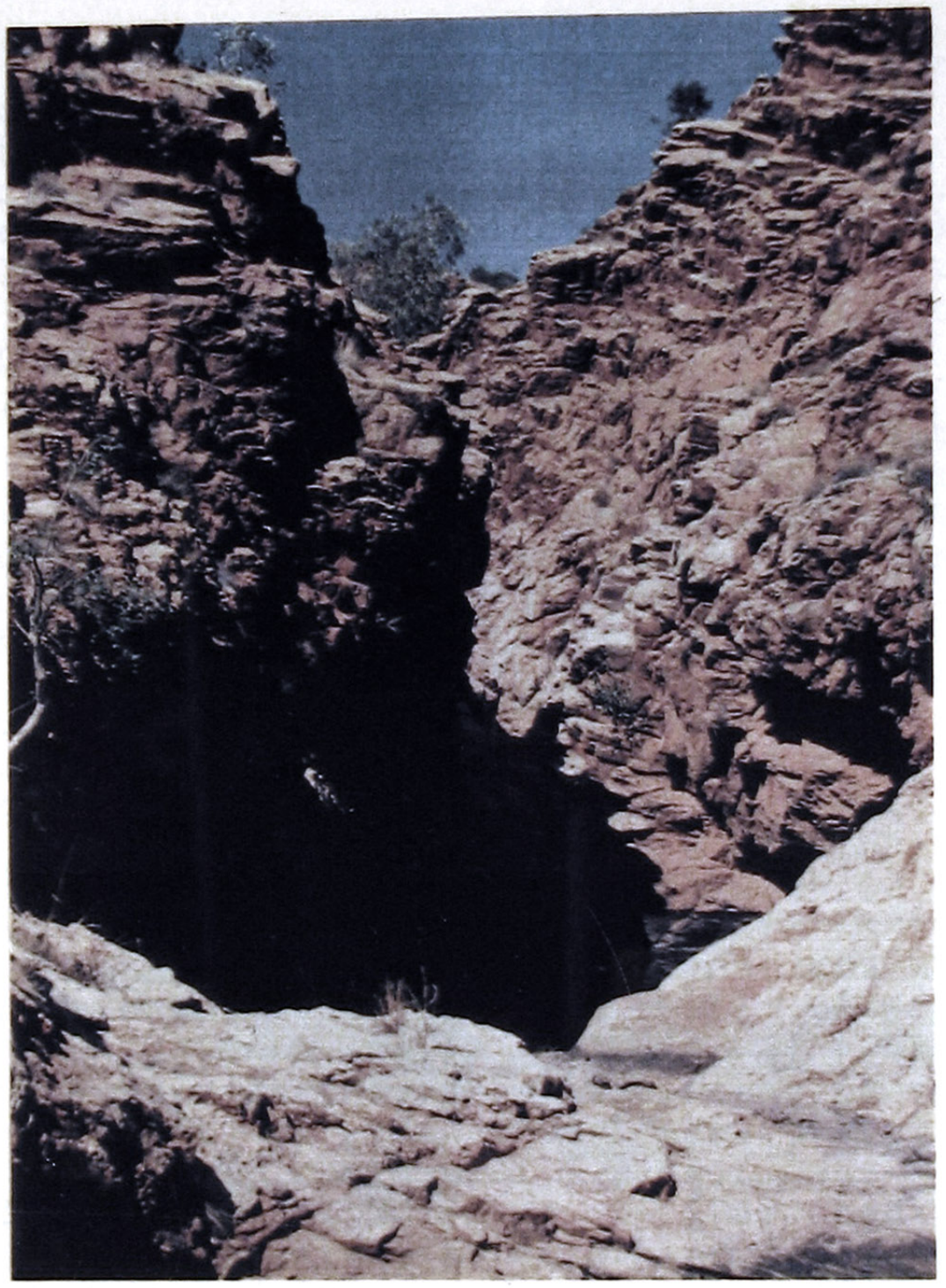


Figure 3 Above, Paddy's Rockhole

Below, the Crossroads in 1976. The main group of buildings (Jack Shaw's camp) have now gone, but the small stone structure, partly hidden behind a shrub, has survived.



Until very recently, access to Arltunga brought the visitor first to Paddy's Rockhole and its associated structures. The rockhole is a cleft in one of the quartzite ranges, with semi-permanent water, and marks the southern extent of the goldfield. (Figure 3) In the creek bed close to the Rockhole are signs of two wells, one now taken over for stock purposes, and the other partially collapsed. Along the north side of the road, and the creek, are a group of building remains: cement floors, signs of paths, and introduced trees; quite an extensive group of structural remains. On the eastern side of the road leading north, a rectangular stone structure survives, along with a single wall further to the east. Beyond that is a single grave with a carved slab of schist as a headstone.

The road from Paddy's Rockhole to the rest of the goldfield continues north, and hugs a creek bed, until the next area of occupation is found at a crossroads. In the 1970s this was inhabited by Jack & Jean Shaw, who lived in a small cottage on the south-east side of the crossroads. This was surrounded by shelters, work areas, broken down cars, a hen house on very high piles, and with a vegetable garden watered by an ingenious system of pipes and furrows from an adjacent well. (Figure 3) The house and its surrounds were destroyed in 1980, leaving only the well in this quadrant of the crossroads. Opposite the Shaw's house (on the south-west side) was another quite substantial stone building. This had at least three rooms, plus a possible baker's oven set into the chimney, and a corrugated iron roof. Other building remains on the north side of the crossroads were less significant with only two small stone remnants on the west side, and signs of a foundation plus a reasonably heavy scatter of artefacts, on the eastern side.

The road leading west from the Crossroads is the most travelled, with signposts to the police station and government works areas. (Figures 4 & 5) Along the edges of this road are occasional heaps of gravel, the unobtrusive signs of alluvial mining. Within two kilometres is a well, with one group of buildings to the north (identified as the police station) and another smaller group to the south-east. The well is marked by a substantial mound of greyish gravel, with some timber fencing around the well mouth, timbering at the top of the well interior, and part of a timber whip used for pulling up buckets. This whip was seen in 1977 but disappeared soon after. Standing between the well and the police station is a small two head stamper battery with two corrugated iron tanks nearby. The police station buildings are more better constructed than others seen at Paddy's Rockhole or the Crossroads. This group includes a two-roomed stone building, an adjacent chimney with cement floored area, and a solidly built but small one-roomed stone structure. The latter, like the two-roomed structure, is well made

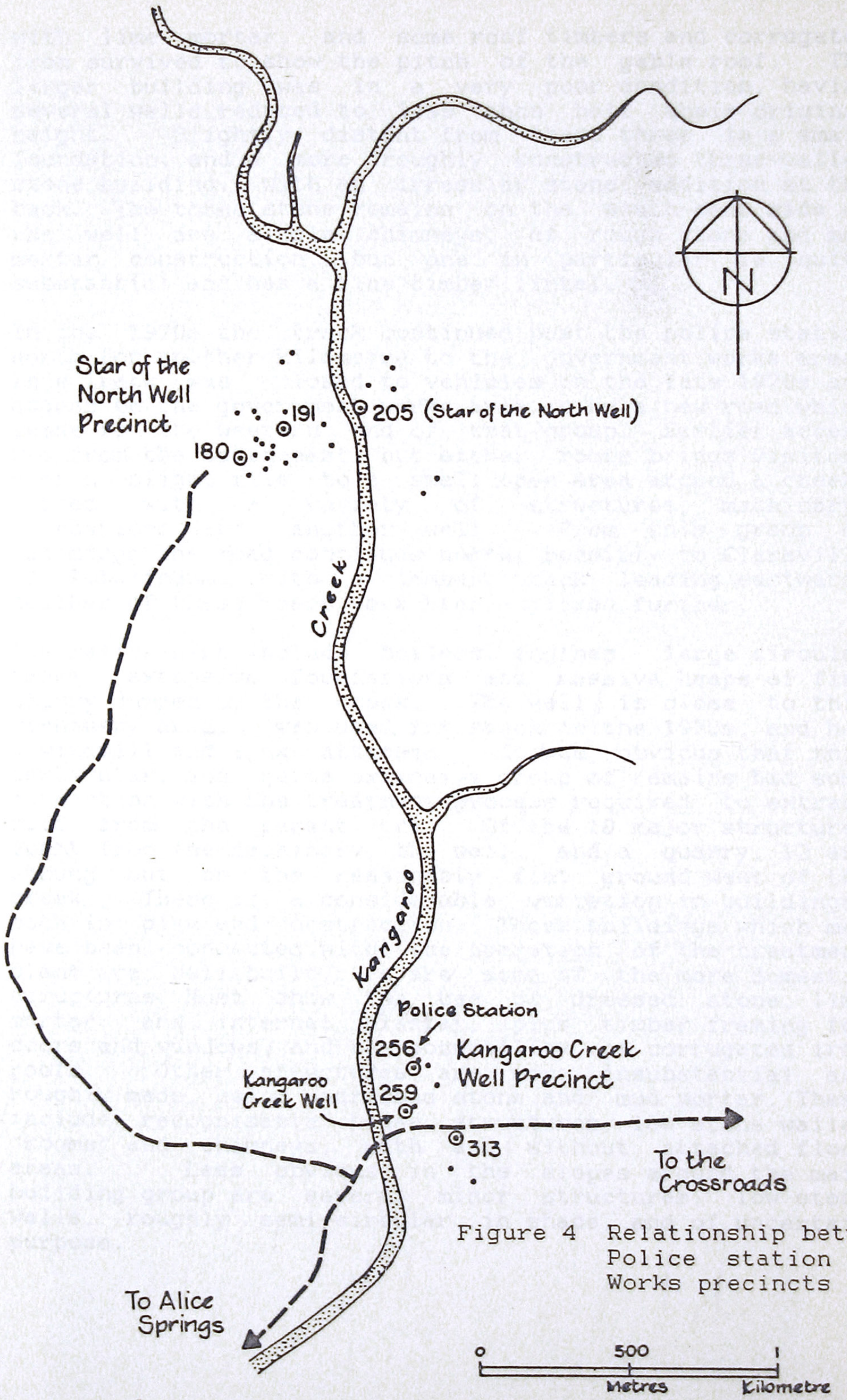


Figure 4 Relationship between Police station and Works precincts

with lime mortar, and some roof timbers and corrugated iron survived to show the pitch of the gable roof. The larger building was in a very poor condition, having several walls reduced to less than half their original height. Slightly distant from these three is a small foundation, and a more roughly constructed three-walled stone building, with an irregular stone addition at the back. The three stone remains on the south-east side of the well are single chimneys, of rough stone and mud mortar construction, but one in particular is quite substantial and has a fine timber lintel.

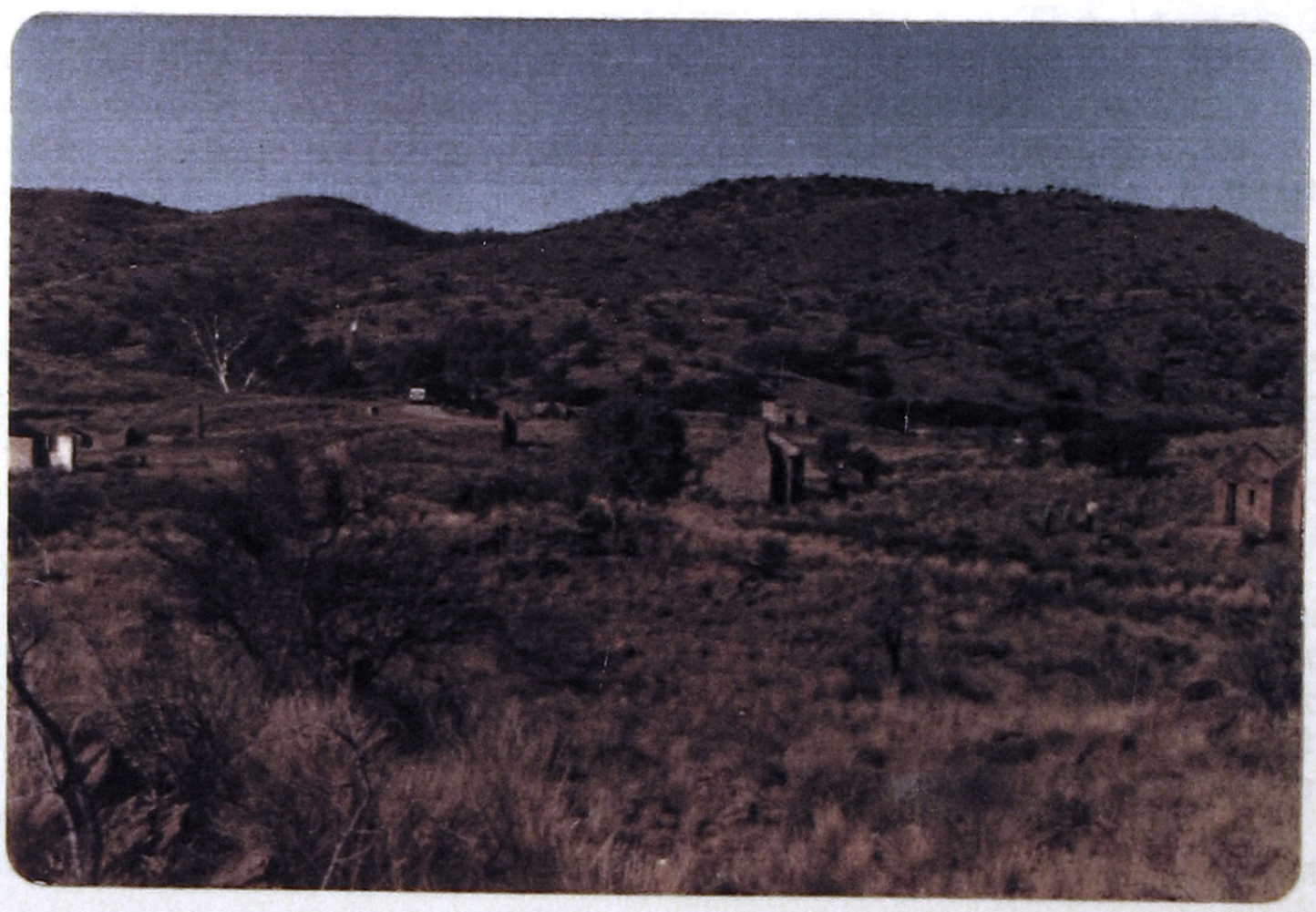
In the 1970s the track continued past the police station north for another kilometre to the government works area. This track was closed to vehicles in the late 1970s and access to the government works area is by a new road which leads to the western end of that group. Earlier access was from the south-east, but either route brings visitors over a slight rise to a small open area around a creek, dotted with a variety of structures, machinery, foundations and another well. From this group of buildings the road continues north, possibly to Claraville or Ambalindum, with a lesser track leading eastward; neither of these roads have been explored further.

The relics here include boilers, engines, large circular tanks, extensive foundations and massive heaps of fine slurry dumped by the creek. The well is close to this machinery area, was used for stock in the 1970s, and had a windmill and tank attached. It was obvious that this particular, and quite extensive group of remains had some connection with the treatment process required to extract gold from the parent ore. Of the 18 major structures apart from the machinery, the well, and a quarry, 12 are strung out on the reasonably flat ground west of the creek. There is a considerable variation in buildings, both in plan and construction. Those buildings which may have been connected with the operation of the treatment plant are well built, as are some of the more domestic structures. Most show the use of dressed stone, lime mortar, and internal plaster, plus timber framing for doors and windows, and the possibility of corrugated iron roofs. Other structures are more insubstantial and roughly made, using undressed stone and mud mortar. These include recognisable house structures, low stone walled "rooms" and chimneys, with and without attached floor areas. Less obvious in the slopes around the main building group are several minor structures: low stone walls, roughly semi-circular in shape, and of uncertain purpose.



Figure 5 Above, the police station buildings, with the small two head stamper in the middle background.

Below, the Works buildings from the west; both photographs taken in 1977.



Access to the Reserve has now been altered, with a road added west of Paddy's Rockhole bringing tourists to a Visitor Centre not far from the rangers' station; from here the traveller moves northwards to the police station and battery areas. The impact of these more substantial and recognisable house structures, especially since the major conservation work, and restoration of the police station, is thus much greater now.

Returning towards the Crossroads, an insignificant track leads off to the north just short of the crossroads, giving access to an area of mining and alluvial activity known as the MacDonnell Range Reef area, after the largest mine in the vicinity. Between the carpark and the major workings are some minor workings, while the mine area has three interconnnecting shafts to a depth of 8 metres. A number of very small stone remains are related to the mines, some being quite close, and others at a slight distance. Of those close to the mines, one was a reasonably high walled and roughly semi-circular shaped building, the other a small rectangular foundation. Some 150 to 200 metres down a slight slope and in an area of flatter ground were grouped four very small stone remains. One was a solid stone foundation, tentatively identified as a forge fireplace, while the other three were of the low walled semi-circular stone type, with one using part of a natural outcrop of stone as part of its walling. This area was not opened to the public until after fieldwork and certain safety measures to protect the mines, and visitors, had been taken.

From the Crossroads the eastern track leads to the White Range precinct, and although this track was in poor condition in the 1970s, (since upgraded) the White Range proved to be a most interesting area. The track leads east along the northern end of the White Range, then turns south to travel down the eastern side of this range. This gives a good view of the eastern face with its concentration of mine sites, showing from a distance as a series of whitish mullock heaps, usually running down a small gully. (Figure 6) Following the track/creek, there were also glimpses of stone structures, mostly in the schist foothills between the track and the range and a small cemetery. The track eventually comes to a slightly more open area, with a well, a variety of stone buildings, and a fork in the road - one leading up to some of the mines, and the other continuing south. While all the buildings were of interest, my earliest visit to this area was to find a building known as the store. This proved to be an extremely fine stone building, with a nearby paved area, and while searching for it, a number of other structures were noted. These ranged from obvious house structures, and large, irregular buildings to chimneys, low walled room shapes and minor structures as seen to a lesser extent at the police station and works precincts.



Figure 6 Above, White Range and its mines and mullock heaps, from the air and the north.

Below, view from the Range north-east across the schist foothills to the Harts Range in the far distance. Both photographs taken in the 1970s.



It was obvious that this was a major settlement area, with over 130 "camps" or single buildings. A feature of the White Range precinct is that in many cases individual structures seem to be related into "camp" groups. Such groups could contain as many as 6 individual structures. Another feature is that the buildings were very much more scattered than the clusters seen in other precincts.

The White Range is the most interesting precinct for investigating the domestic life of those early miners. Between 1977 and 1979 attempts were made to locate and record the many structures, signs of old tracks, and the mines above. In 1979 a group of students from Sydney University started a detailed survey of part of the White Range area, in the hope that it could be used in their studies. While the work was done, the results were not entirely satisfactory as a final plan was never completed. The first major survey of the goldfield, mostly within or close to the Historic Reserve was carried out in 1980, when a multi-disiplinary group saw buildings, or groups of related buildings, numbered, photographed, and recorded.[2] Even with the help of aerial surveys, and aerial photography, and my own familiarity with the White Range area, this survey was by no means complete. Many additional buildings have been added to the original lists in the last ten years. One area not surveyed as part of this 1980 initiative was the mines area at White Range where later fieldwork added over 100 structures to the original survey of 218. This comparison is not quite fair, as in the 1980 survey buildings that obviously made up one group or camp were given only one number; later each structure was given a number to raise the total numbers considerably.

The discovery of sometimes insignificant above ground structures has been greatly affected by the use of local stone. It is almost impossible to differentiate between natural stone outcrops and a partially collapsed building at a distance or on aerial photographs. The only really foolproof method is to walk the whole area, and the rangers stationed at Arltunga since 1982 have worked hard to fill in the earlier gaps.

While the whole goldfield has not been properly surveyed and recorded, those parts of it within the Reserve appear sufficiently representative to suggest a general pattern. Settlement is very fragmented, and dispersed over a wide area, with no obvious central point or town. However, there is a clustering of buildings in certain areas, and very few isolated, single buildings. The pattern of settlement is also very informal, with no obvious signs of planning, apart from the practicalities of access to mines and/or water, and transport routes. Within the precincts there seems to be an equally informal attitude to siting

of buildings. The layout of different precincts may be affected by the surrounding landscape as well as the major purpose of buildings within the precinct.

In the western part of the Reserve mines tend to be well scattered, and less obvious. The mines are found in hills and gullies, while the roads keep to the easier flat ground. Alluvial workings are even less visible, usually showing only as small piles of gravel. In the east and particularly in the White Range area there is a concentration of mines, and their placement on a quartzite bluff makes them much more visible. Sadly, current mining operations at White Range mean that access has been barred to this major group of mines and their associated structures. Open cut mining is destroying the original mine workings and the face of White Range.

It is presumed that gold was the major attraction in any particular part of the goldfield, but long-term development may have depended on water and ease of transport to treatment plants, as well as on the return from gold. Building remains can be seen associated with mine workings, but apart from the White Range precinct, these are generally few in number and informal in type. The White Range is quite different, showing a large number and variety of structural remains. Other precincts seem to have developed around a water supply - mostly wells, more rarely natural rockholes - and transport routes. In addition the two western precincts include buildings of a much more formal type, obviously professionally built.

The presence of more conventional buildings at the police station and works areas may be an expression of authority figures on the goldfield. Both precincts also include the more informal structures. The White Range buildings, which seem to be miners' homes, with some service buildings, are all of the informal type. Generally there is a wide range of types of buildings within the informal group, but the variety at White Range is higher than at other precincts.

The present historic landscape of Arltunga owes much to the use of stone for building purposes. Some of these stone remains are quite conventional, though small, buildings, while most remains appear as only part of the original structure. In attempting to differentiate between the formal and less formal structures, I am inclined to describe the latter as "bush" structures. This follows the meaning given by Ron Edwards when discussing the "bush made stone cottages" found in outback Australia.[3] For the former, the term formal, or conventional are equally applicable. An alternative terminology could be that the construction was either skilled or unskilled, but for reasons that will become obvious, I would prefer to use the terms conventional and bush. The conventional buildings are limited in number

and dispersal over the Reserve, while the bush structures are universal.

I have tried to organise the structures into four groups.[4] Type 1 is the conventional building, with full height walls, timber framed door and window openings, usually one but up to three rooms; dressed stone, lime mortar, and rendered walls are usual. Some have signs of verandahs, and most indicate corrugated iron roofs. Type 2 is a mix of conventional and bush techniques, being made up of larger buildings with walls partially or wholly missing or of rougher construction. Type 3 is definitely a bush type, which divides into two groups. Type 3a has low or medium height walls, usually rectangular in shape, occasionaly dugout, and is found with and without chimneys. Type 3b is the single chimney with or without signs of an attached area. Type 4 includes the minor structures: 4a is a foundation or floor area only, 4b a high or low walled semi-circular stone arrangement, and 4c is made up of small square solid foundations that I identify as forge fireplaces.

Type 1 is found at the works and police station precincts (sites 180, 185, 193, and 194). Type 2 is also found in limited numbers, but at three precincts: the works, police station and White Range (sites 191, 197, 198, 257, 1, 3, 59, 98 and 110). Type 3a is found at the three main precincts (sites 2, 11, 124, 125, 187) as is 3b (sites 9, 97, part of site 100, 111, 131, 186, 188, 313). Type 4a is found at both mining precincts (site 6, 169) while 4b is more visible at the same precincts. There are at least 46 examples at the White Range, plus two from site 11, and one from site 100; four of the MacDonnell Range Reef precinct structures are of this type (sites 170, 173, 174 and one unnumbered. Type 4c, the possible forge fireplaces are found at every precinct except the police station (at sites 3, 59, 100; site 170, and site 184 and 196). There are difficulties in typing buildings, as especially in the White Range precinct a number of types might be so closely grouped as to suggest one camp.
There is obviously a difficulty in evaluating the possible function/importance of a two roomed conventional structure as opposed to a quite sophisticated group of individual structures such as found at White Range site 11 or 100.

It must also be noted that the structures typed above are only those discussed in the following sections, and not necessarily the total numbers for each precinct. This is particularly the case with the White Range.

Stone may have been used because of its availability, but also because of its familiarity. South Australia has a long history of using stone for all sorts of building purposes.[5] The Cornish miners brought their traditional use of stone to the copper mines of Burra and Kapunda, and

with expansion into the dry north, stone was almost the only locally available material.[6] It is very likely that this tradition was brought to Arltunga, as the main access to the goldfield was through South Australia. However, there are other traditional uses of stone in the arid areas of America, for example which reinforce the availability argument, rather than cultural familiarity. The use of stone chimneys, and square or rectangular low walled structures is recorded in a railway camp in Utah[7], while larger house-like structures, some similar to Arltunga examples, have been noted in Arizona.[8] Some use of stone in foundation has also been reported in Hardesty's publication on mining in Nevada.[9] Stone "houses", similar in appearance to those at Arltunga, have also been recorded near Cobar in New South Wales.[10] This is particularly interesting as both brick and timber was available for building purposes in the town.

1. D. Clarke, Spatial Information in Archaeology, in his (ed.) Spatial Archaeology, London, 1977. B Trigger, Settlement Archaeology, in Brian Fagan (ed.) Introductory Readings in Archaeology.

2. This information, along with discussions of various aspects of Arltunga, can be found in P Forrest, A Report on Historic Sites and Materials at Arltunga, 3 volumes, 1981.

3. R Edwards, Australian Traditional Bush Crafts, 1975 p. 22-3.

4. These groups are based partly on my own surveys and partly on the suggested typology of Richard Allom, the conservation architect involved in the Forrest Report. Allom has divided the remains into types A to O, but I do not agree with all his groupings, and decided to simplify the types. See P. Forrest, op cit, particularly volume II.

5. D.W Berry & S.H. Gilbert discuss both rural and urban structures in their Pioneer Building Techniques in South Australia, 1981. Also H. Pearce, Homesteads of the Stony Desert.

6. R.K Johns,Cornish Mining Heritage, Adelaide 1986; for South Australian examples, see J. Selby (ed) South Australia's Mining Heritage, 1987, particularly the chapter by Horn and Fradd, Goldmining in South Australia, the first fifty years, and the last three chapters on conservation, interpretation and reconstruction. Also J. Chilmun, Silver and a Trace of Gold, Adelaide 1982, particularly the last chapter on heritage.

7. A.B. Anderson, Ancillary Construction on Promontory Summit, Utah: Those Domestic Structures Built by Railroad Workers, article in A.E. Ward (ed) Forgotten Places and Things, 1983.

8. C.A.Hoffman, A Survey of Historic Sites in the Little Colorado Valley, Arizona, in A. Ward, op cit.

9. D.L. Hardesty, The Archaeology of Mining and Miners: A View from the Silver State, 1988.

10. H. Boughen, Towser's Huts, Cobar, New South Wales: Historic Ruin or Ruined History? in Australian Journal of Historical Archaeology volume 4, 1986.

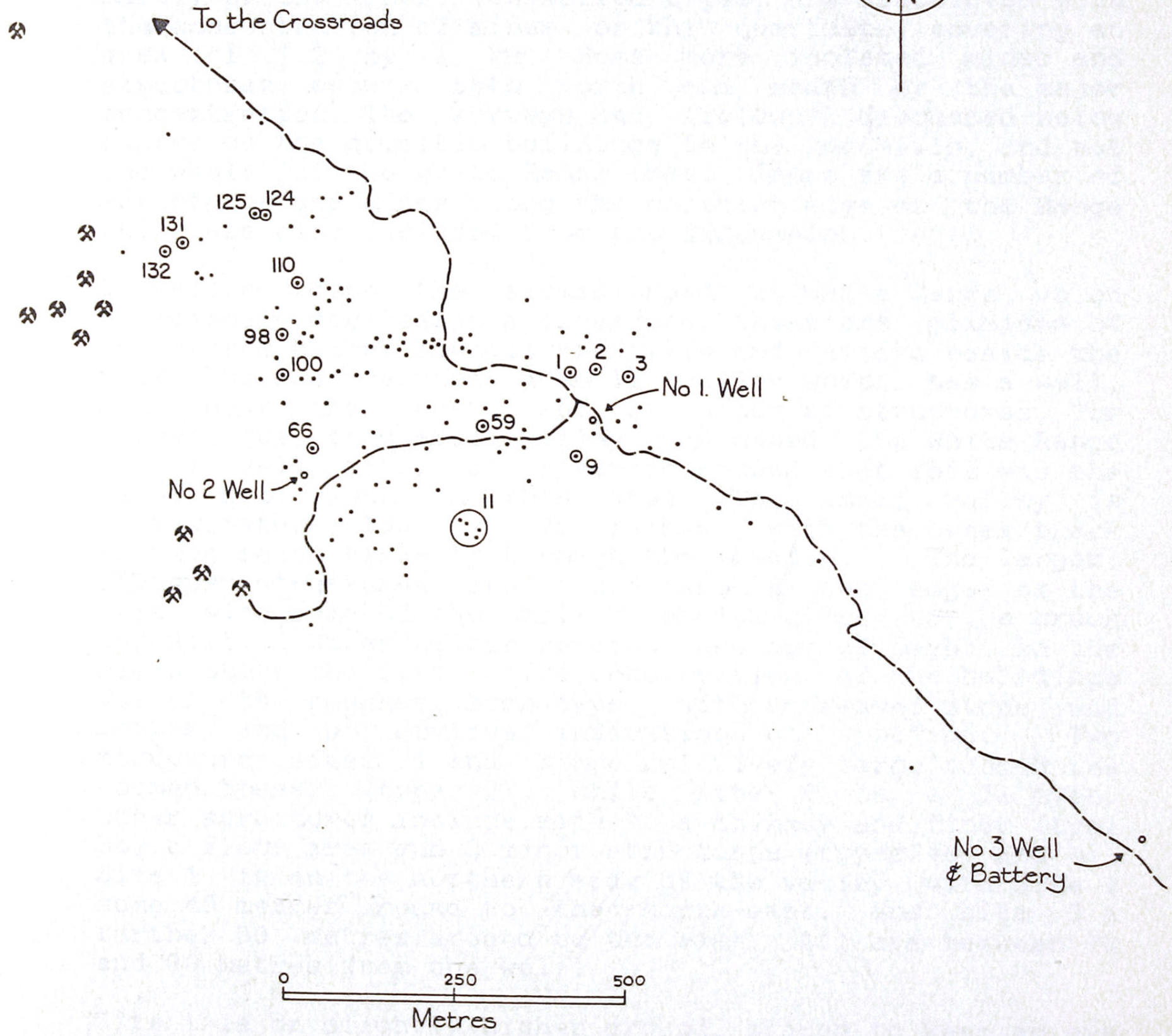


Figure 7 White Range precinct - location of sites.

2.2 The White Range precinct - introduction

This is the largest known precinct, both in terms of size and number of building remains. In the foothills below the quartzite bluff of the Range itself the structures cover an area of approximately 700 by 600 metres, with a few buildings to be found in the 1 kilometre to the south of the main settlement. (Figure 7) Additional buildings, mostly of the minor, low-walled types, are associated with the concentration of mines on the quartzite, covering an area of 1.2 by 1 km. Some more isolated mines and structures occurr both north and south of the major concentration. The surveys and fieldwork discussed below centre on the domestic buildings in the foothills, and not the whole of the White Range area. There are a number of structures and mines along the northern edge of the Range which are also excluded from the discussion.

Travelling down the access road to White Range, which occasionaly doubles as a creek bed, there are glimpses of structures hidden amongst the hills and valleys beside the road. The road reaches a small valley which has a well, sunk near the creek, and a number of structures. For convenience, this small valley was named the White Range No. 1 well site, as research showed that this was the first well sunk in this area. The small valley is approximately 150 by 120 metres, with the creek/track running south-easterly through the middle. The larger, obvious structures are found around the edges of the flat, with some of the smaller remains close to the creek and well. Other minor remains are out of sight, in the hills above the flat. The construction of the buildings was of the rougher bush type, with undressed stone, mud mortar and no obvious indication of roofing. Two structures sites 1 and 3 are relatively large though one roomed houses, (type 2), while site 2 is a 3a type. Other structures include site 9, a chimney and floor (type 3b) a floor area and 3 minor structures (types 4a and b). Site 1 is on the northern side of the valley, with site 2 some 40 metres around to the north-east, and site 3 a further 50 metres around to the east. All are between 70 and 80 metres from the well.

Site 1 is on slightly higher ground, placed to keep an eye on the access track, and has a clear view up to the mines on the Range. It is rectangular in shape, some 8 by 4.5 metres, with a chimney added on the east wall. It has a door and window opening on the long east wall, and signs of alterations to the west and south walls. The walls have survived to an average height of 1.5 metres, in places reaching two metres, and along part of the east wall has collapsed to only 0.5 metres. A possible window opening on the west wall has a piece of bush timber in one side, presumably to help support a lintel which has not survived. The changes in stonework on the walls suggest that a doorway could have been blocked in on the south



Figure 8 Above, general view of site 1 from south-east.

Below, detail of alterations on west wall



wall, while the western wall has a much broader area of infill. (Figure 8).

Site 3 is a more complete, robust structure, though slightly smaller at approximately 5.5 by 3.2 metres. The fine chimney at the north end has a double timber lintel, and is 1.6 by 1.9 metres. The doorway is on the western side, and there are two windows with stone lintels, on the south and east walls. It now has a pipe for a ridgepole which is presumed to be a more recent addition but shows how a timber ridgepole could have supported a canvas or bough roof. The floor is flagged, there is a rather roughly constructed addition on the western side, and an outside small solid structure, possibly an additional oven. (Figure 9)

Site 2 is a more basic type, being made up of two apparently related stone structures, one just a rough rectangle of low stone walls and the other, with a small chimney id partly dug out of the hillslope. The first structure is some 6 metres long, and 3.4 metres wide. The entrance is on the north-west side, and the walls too low to show window openings. The second, closer to the hillside, uses bedrock for most of its eastern wall, the chimney section built onto this bedrock. The addition of stones along the eastern side suggest that this "wall" was almost 4 metres long. (Figure 9) The use of natural stone outcrops, and/or the lie of the land is quite common in the White Range area.

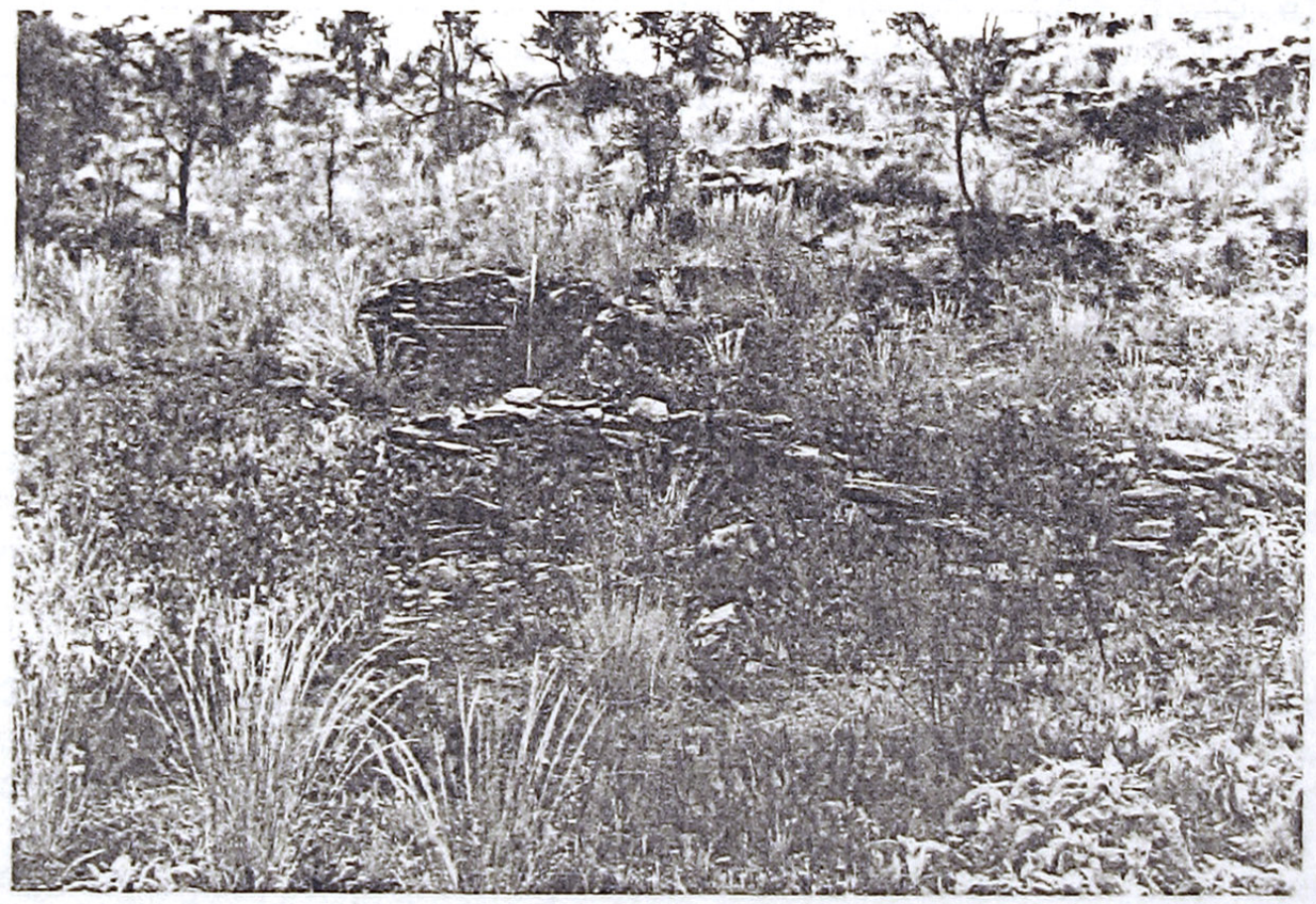
Other remains are more insubstantial. Site 9 is a single chimney and floor space; the chimney is 1.9 by 1.5 metres, the walls 40 cm thick, and the floor area is 4.1 by 3.3 metres. Site 6 is a foundation, 8 by 5.1 metres, just south-east of the well. Finally there are 3 or 4 smaller, indeterminate low walled roughly rectangular or semi-circular structures. These are found on the southern and western sides of the small flat, slightly closer in some cases to the well, site 7. This was sunk just to the west of the small creekbed, and showed as a low, wide mound of gravel with the actual well a rectangle of 1.75 by 1.17 metres. The top three metres are timbered, and in the 1970s the water level was some five metres below the top of the well.

The track branches near the well, one part continuing south to a machinery area, where a two head stamper and associated plant are sited near a collapsed well. The structures between this machinery and the valley site were only five in number, of the small type, but there are also signs of mining activity in the schist foothills in this area. The road further south deteriorated badly, and no other sites were found as far as it was possible to explore. This road has now been upgraded to give additional access for the current mining operation at White Range.



Figure 9 Above, site 3 from the west.

Below, site 2, general view of the two structures from the south.



Returning to the No. 1 well site, the other branch of the track leads westward and upwards to the most southerly of the mines grouped together on the White Range. A number of structures are visible from the road, while others are hidden in the hills on either side. They include another well, sunk at the point where the White Range quartzite dipps below the schist foothills. This well is very deep and apparently dry; the well mound is very large, and the timber is now affected by a small gum tree growing out of the mound. The structures south of the track are scattered, with some standing on a small plateau below the mines, and others tucked away in the small gullies. They include 3 huts (3a types), 2 single chimneys (3b types), and small and irregular type 4 structures. The most impressive building group in this part of White Range is that making up site 11.

This group is well hidden in a small valley, apparently isolated but only 250 metres from the No. 1 well in a direct line. It is made up of five structures in all- two separate rectangular huts of quite unusual details, (3a types), a small solid foundation possibly a forge fireplace, (type 4c) a low stone structure, roofed over with stone and possibly a store/coolroom (an unusual 4b type). Last, and slightly isolated, was a high walled semi-circular structure, (4a type) suggesting a privy except that its siting to the south-east of the main group would have been poor positioning, as south-easterly winds prevail at Arltunga.

The two main huts guard the entrance to the camp,and both make use of bedrock for part of their walls. The western hut has an unusual double wall on the south side - the main wall has a second, curved section from the front edge, which peters out into the natural slope of the hill. The hut is approximately 3.5 metres square, with an entrance on the east wall, at the southern end. The eastern hut has an extended platform/floor area out the front or northern side, some 5 metres long. The hut is 3.5 by 3.2 metres, with a small additional chimney section, and the lower wall on the south side has an extra width, or ledge, to it. The possible cool room, and the forge, lie further south, and the "privy" to the south-east. (Figure 10)

Immediately north of the track are sites varying from the obvious site 59 (see below) to the minor structures surrounding the second well. Once into the hills above the track, it is obvious that this area, roughly triangular and bounded by the White Range on the west, and tracks on the south and east, contains the majority of domestic sites. Some are scattered about on the tops of hills and plateaux, while others seemed to cluster along valleys or areas of gentler slopes where it is possible to see signs of old tracks. Major structures include site 66, a large and somewhat irregular house-like

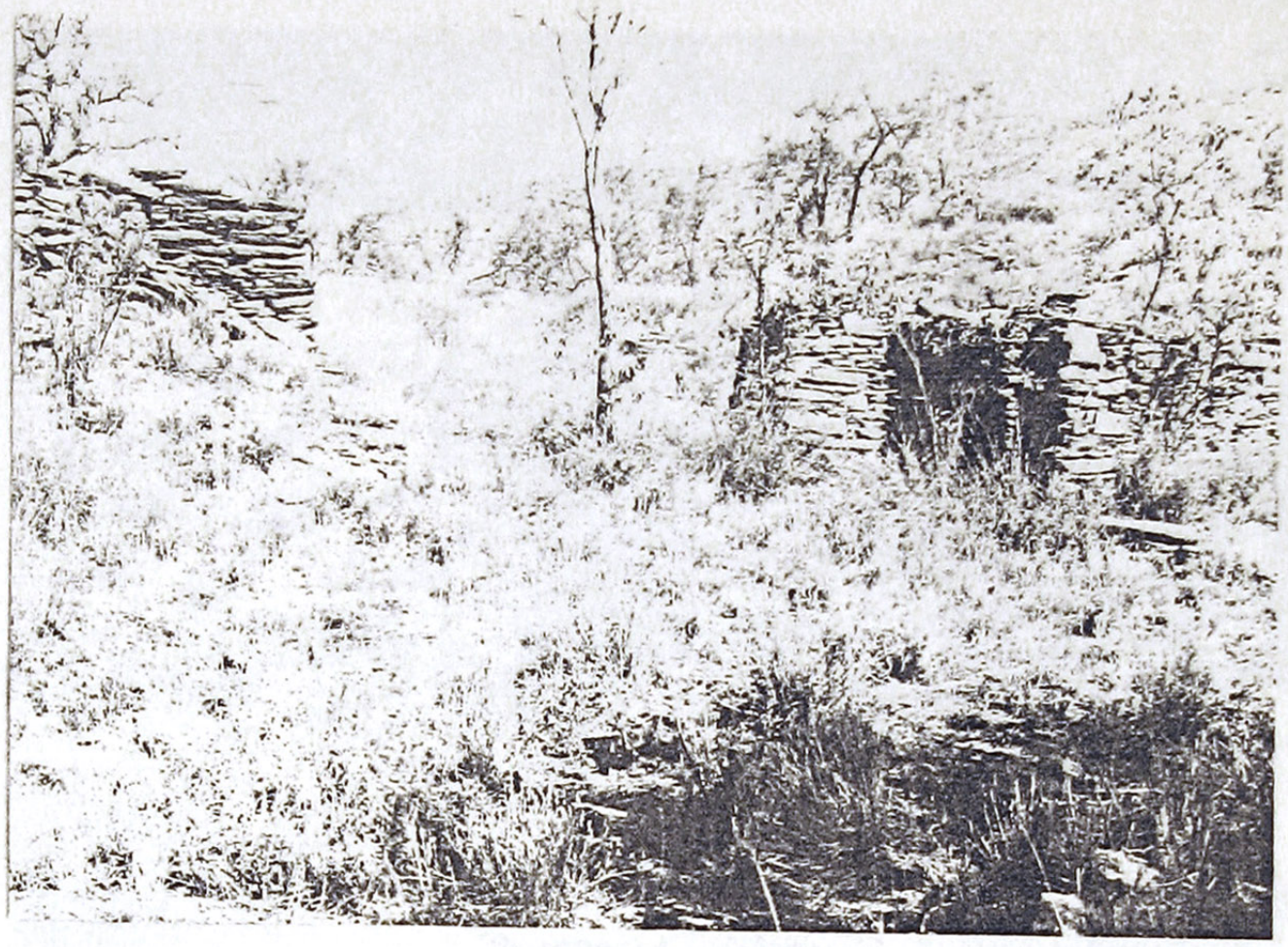


Figure 10 Above, general view of site 11, or the two main huts, and the forge, from the north.

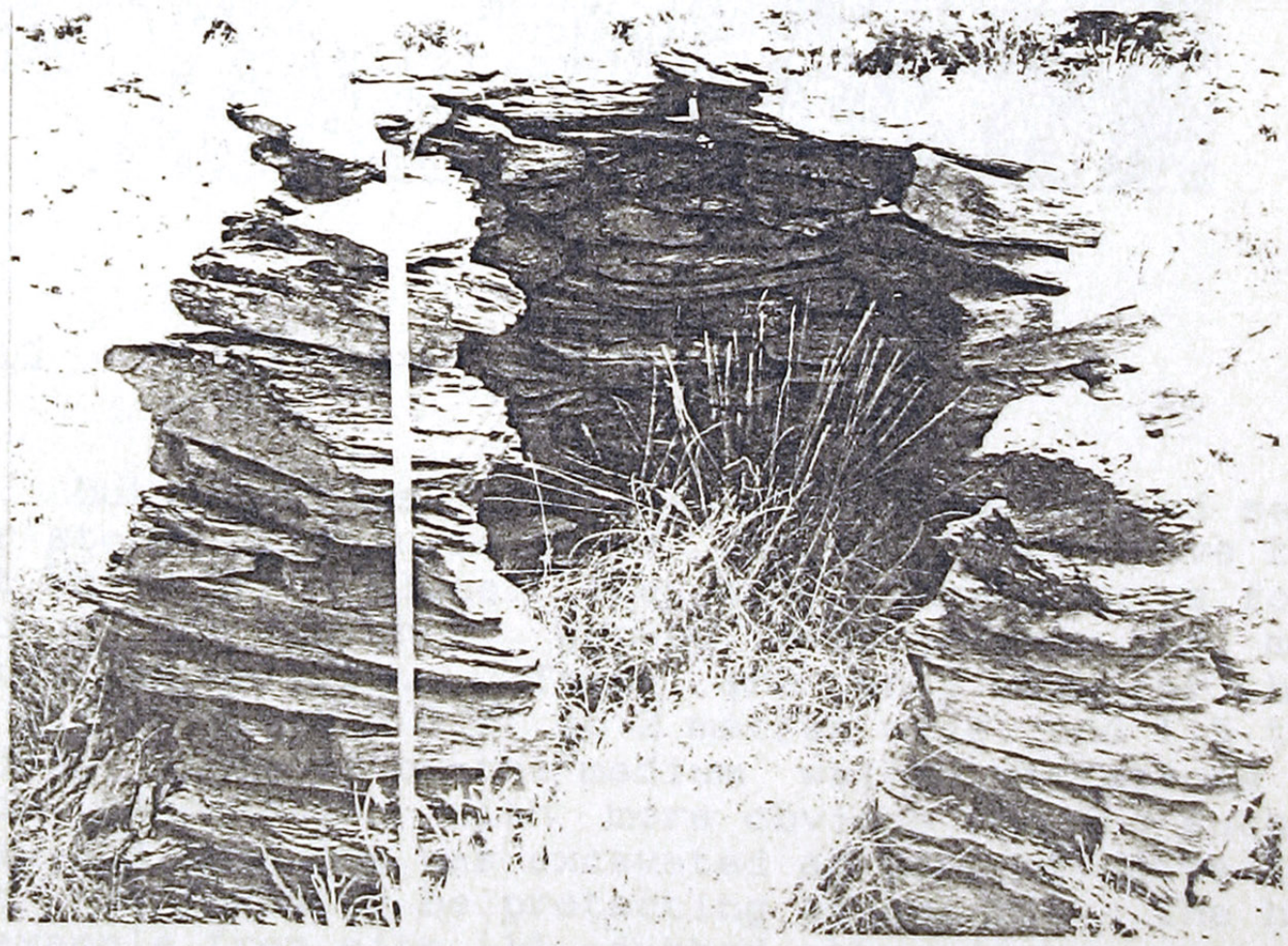
Below, detail of the "double wall" of the west hut





Figure 11 Site 11, detail of the eastern hut, and its platform to the north

Below, the high walled semi-circular structure.



building, and sites 98 and 110 (discussed further below).

Less substantial are groups such as sites 124 and 125, (3 types). 124 is just a low rectangular walled shape, but made of river stones rather than the usual quartz and schist, and fitting metric measurements rather than imperial. It is 6 by 4 metres, with an entrance on the south wall. (Figure 12) The site is also notable for the small but well filled rubbish dump to the north-east of the building. Site 125 is an interesting chimney largely hollowed out of a small cliff, with some low walls suggesting two rooms associated with it.



Figure 12 Site 124, from the south-east.

Unusual, but numerous are the very low walled semi-circular stone structures, type 4b: 46 in all have been noted at White Range alone. They are almost always found in groups on higher ground overlooking the more substantial structures. These are only two or three courses high, roughly 1.5 to 2 metres wide, and 1.5 to 3 metres deep. Some of of the medium walled variations are found in association with more obvious remains such as chimneys, and one one was excavated as part of site 100, where it was found to be protecting an ash pit. The high walled example from site 11, dubbed the privy, may also have been a store room of some sort, so the general function of semi-circular structures may vary quite considerably. A proper survey of the exact differences between the possible variants has yet to be carried out.

All of the discussion so far has concentrated on stone building remains. The White Range also has two timber structures, one in this domestic precinct, and one further north. These are the only two known timber or timber framed structures found associated with any major precinct in the Reserve. Site 132 sits on the edge of the schist foothills area, just below the quartzite, and quite close to some of the mines. It is a very irregular structure, using three trees for corner posts, and giving an impression of a very transient camp. (Figure 13) Pieces of corrugated iron still remain close to the site. The other timber structure, site 153, though outside this part of the White Range is found at the north-east end of the Range. It is a much more conventional timber framed structure of two rooms and still has remnants of the twigs used to make the bough walls, and low posts set into the ground to make a bed frame. Neither of these structures have been investigated very closely as yet.



Figure 13 Site 132, one of the few timber (or tree) framed structures.

There were, in addition to the building remains, faint signs of tracks between some of the more open areas, e.g. between site 98, winding around past site 110 and so onto the main track. Another obvious track leading up to the more northerly mines leaves the access track close to site 124 and passes north of site 131. Other small cuttings and possible tracks show that there was quite a

road system over the foothills and between the camp sites. Up on the quartzite range were quite extensive, and very winding tracks leading to, and between, the mines. The increased visitation to White Range in the late 1970s, and mining activity since the late 1980s has seen most of these tracks upgraded or obliterated.



Figure 14 Signs of an old track leading up to the north mines, and north of sites 124 and 131. Taken in 1977, from the east. The track has now been upgraded for modern use.

A detailed description of every building at White Range is not the main purpose of this study. Over 130 buildings, or groups of buildings, were noted in the 1980 survey of the foothills, encompassing all types except for type 1. Most building remains fall into a recognisable domestic category, although some of the shapes, such as in site 66, and 110, are very unconventional.

The great variety of stone buildings, or part buildings here suggests some permanency, and some skill in building, although the construction is rarely as high as the standard of the type 1 buildings seen in the two western precincts. This impression of stability may be quite mistaken, as stone was available where timber was scarce and corrugated iron possibly expensive. The lack of timber is a result of the arid environment and even today the large river red gums (Eucalyptus camaldulensis) are confined to the larger creekbeds. The smaller ghost gums (E. papuana) can survive in the ravines and gullies that mark the ranges. While it seemed probable that timber would be used in association with most of the stone buildings, even the most complete, the extent of this use was not clear from the surviving remains. Apart from its availability, the use of stone for buildings and especially for chimneys, had some practical advantages. Bushfires would be particularly dangerous in this arid environment, so extra care was needed to confine any fires; stone may also have regulated temperatures to some extent. It is likely that canvas was used, particularly in conjunction with the low stone walled structures. The walls would have provided additional space, coolness and possible protection from small animals and been more comfortable than a simple tent. Even the larger house structures, such as site 3, probably had a canvas roof.

To provide more information about the details of individual buildings or related groupings, excavations were carried out at three sites, 98, 100 and 59. Two others, sites 110 and 131 have seen some limited excavation and minor study. A summary of the field work is given below.

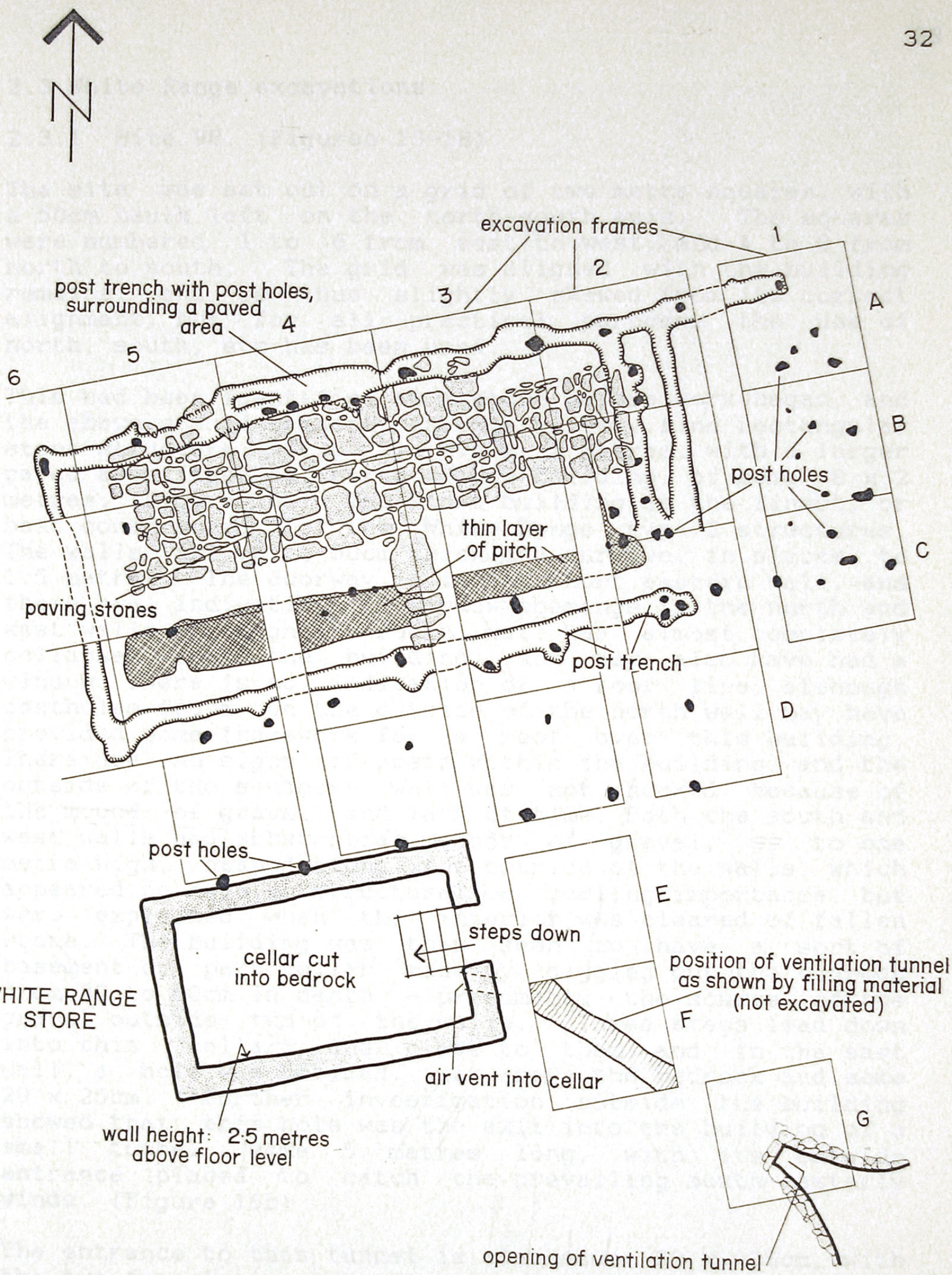


Figure 15 Plan of the excavation at site 98

2.3 White Range excavations

2.3.1 Site 98. (Figures 15-18)

The site was set out on a grid of two metre squares, with a 50cm baulk left on the north-south axis. The squares were numbered 1 to 6 from east to west, and A to G from north to south. The grid was aligned with the building remains, and is thus slightly skewed from its correct alignment, but for all practical purposes the use of north, south, etc has been used.

This had been identified as a store before work began, and the above ground remains include a very fine rectangular stone structure, (type 2) 4.6 x 3 metres, with a larger paved area (type 4a) north of the building, of some 8 x 2 metres. (Figure 16a) The stone building is the finest, or best constructed, of the White Range type 2 structures. The walls are up to 50cm thick and survive, in places, to 1.5 metres. The doorway is in the short eastern wall, and there are indications of window openings in the north and west walls - though the south wall has almost completely collapsed into the building, and may also have had a window. There is no indication of a roof line, although postholes found on the outside of the north wall may have provided some framework for a roof over this building. There are no signs of posts within the building, and the outside of the southern wall was not checked because of the mound of gravel, and lack of time. Both the south and west walls had substantial mounds of gravel, up to one metre high, heaped along the outside of the walls, which appeared to have no structural or cooling importance, but were explained when the interior was cleared of fallen stone. The building was then seen to have a sort of basement or part cellar made by digging out the bedrock from 30 to 60cm in depth - presumably the source of the gravel outside two of the walls. Three steps lead down into this "cellar", and close to them, and in the east wall, a hole was noticed, just above the bedrock and some 20 x 25cm. Further investigation outside the building showed that this hole was the exit into the building of a small tunnel, some 5 metres long, with its outside entrance placed to catch the prevailing south-easterly winds. (Figure 16b)

The entrance to this tunnel is also some 20 x 25cm, with the two funnel arms extending over a metre from the actual entrance (in square 2G). The northern arm is almost straight, while the southern, longer arm is more curved. The walls are formed from schist stones laid in up to 8 courses; the entire tunnel was not excavated, but a check in square 3F showed that the wall construction was similar along the tunnel. The roof of the tunnel was paved with large flat stones, and in 3F was found 30cm below the present ground surface. Of the fill material, some 28cm was a light grey gravelly rubble, obviously a fill deposit

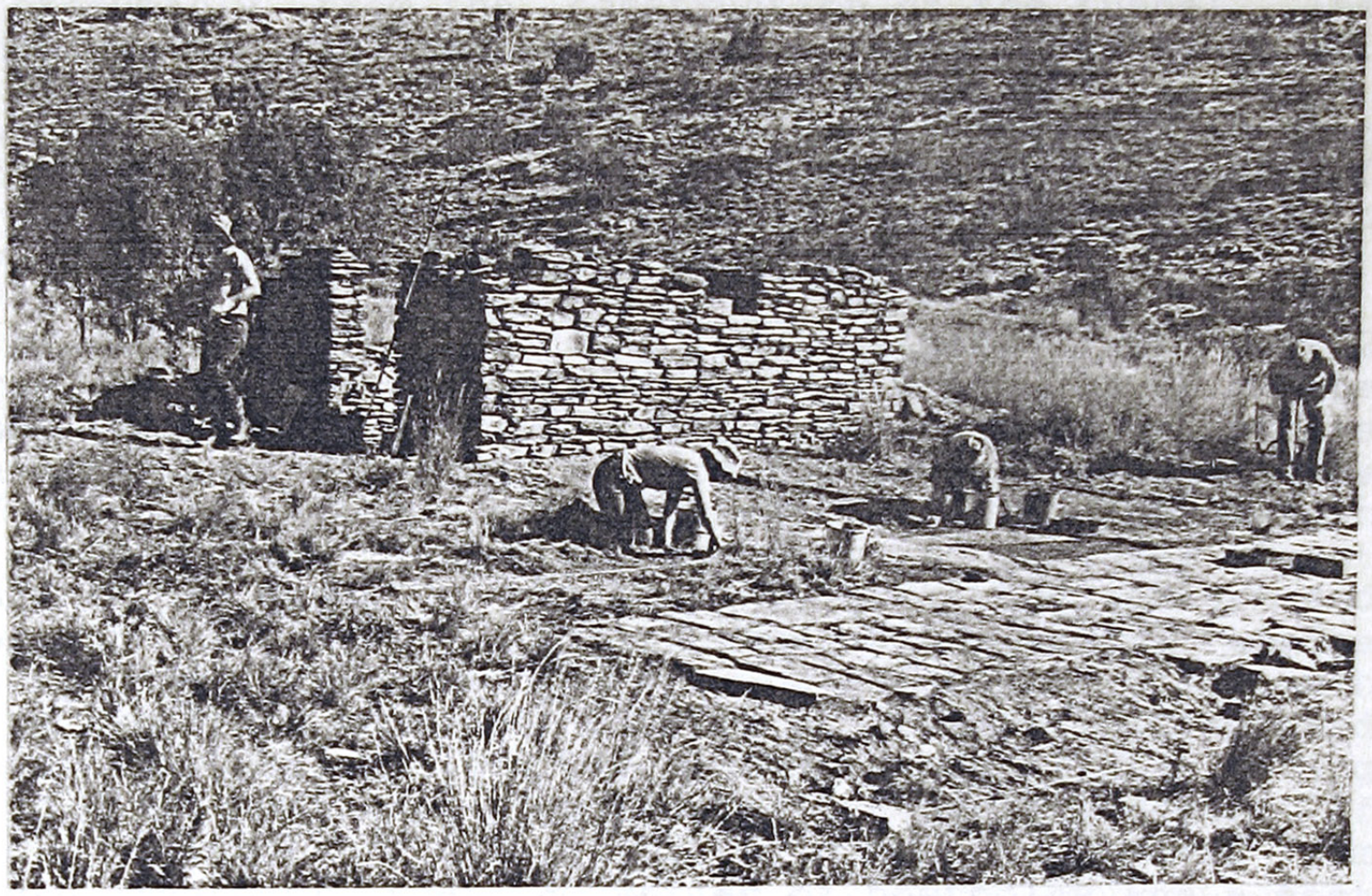
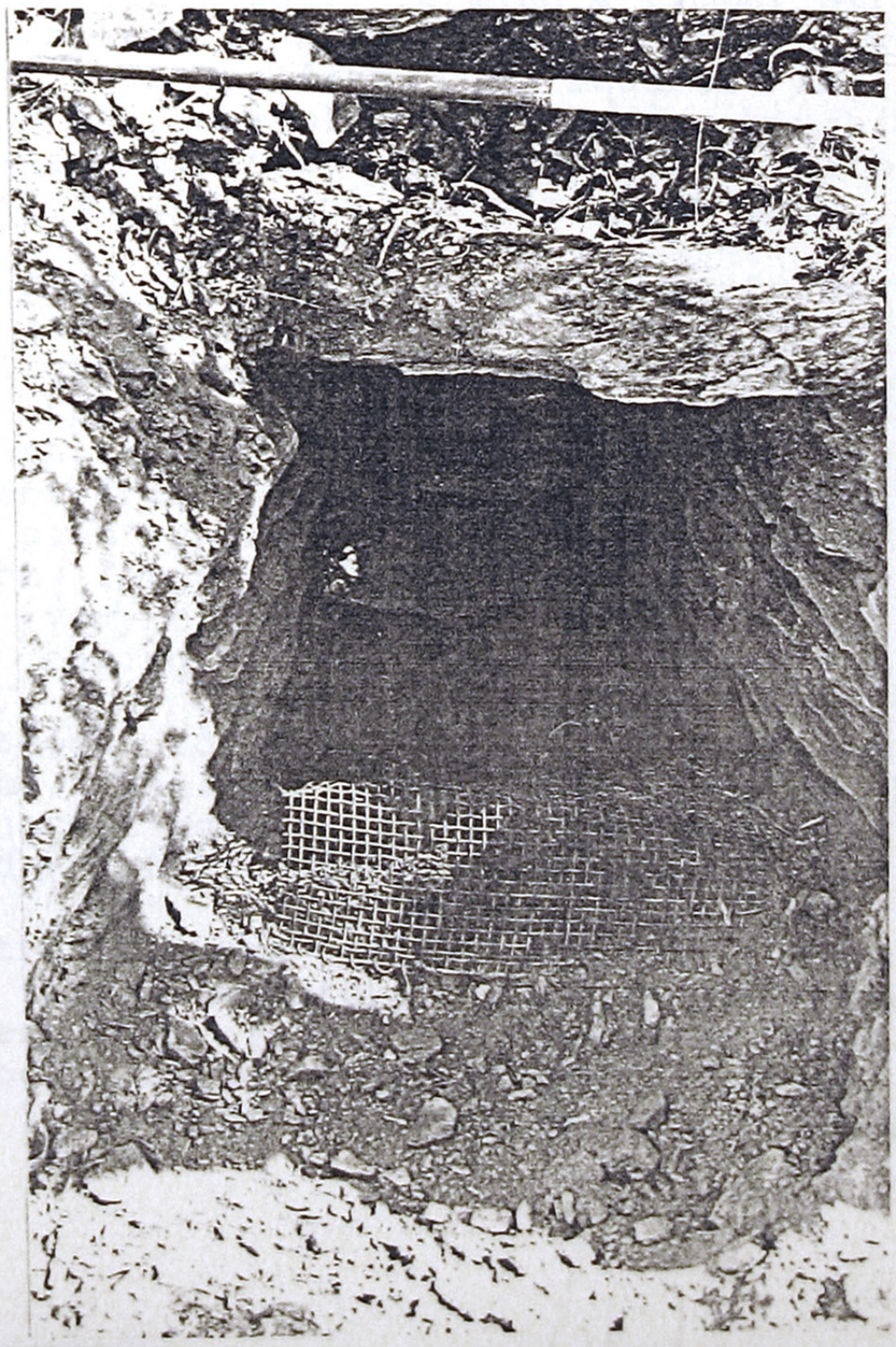


Figure 16a General view of the site as work began in 1977. From the north-east.

16b The entrance to the wind tunnel, in square 2G, from the south-east.



and presumably from the construction of the tunnel. The trench dug for the tunnel showed up very clearly in 3F, against the more usual orangey-brown soils, and was between 50 and 70cm wide. Additional material had been mounded over the end of the tunnel, in 2G, and a square of coarse mesh was found at the entrance, presumably to prevent animals getting into the tunnel.

The paved area, 8 metres long and between just over 2 metres and 1.5 metres broad lies 4.5 metres north of the stone building, with a small "path" of four stones extending from the south side of the paving, at about the halfway point. This "path" corresponds with the eastern end of the stone structure, and seems to mark the slight change in the width of the paving, with the eastern end being narrower. The southern edge of the paving remains in good condition, showing a very clear edge, while much of the northern edge was blurred by apparently displaced stones. Excavation along the southern side of the paving showed first that there was a broad but shallow deposit of pitch, the length of the paving but slightly removed from it, and south of that, a series of postholes and a post trench were uncovered. The post trench was explored and found to continue around all four sides of the paving, with a break possibly marking the main entrance, in the south-east corner. The postholes and trench follow the east and north edges of the paving fairly closely, but are set back slightly at the west end, and 2 to 2.5 metres along the south wall, forming a timber structure of almost 9 x 5 metres. A number of postholes were found further east of this building, in squares 1A to C, of unknown purpose but possibly some were for hitching rails. One at least was a mistake, and backfilled with rubbish- a complete beer bottle, cans and part bottles.

On the south side of the paving, and parts of the north side, the paving stones were set into a thin layer (5-10cm) of soil above bedrock, but the section of paving in 4A was found to have much deeper deposits below the stones. In fact, the area of paving in the 4 squares is a little different from the paving both to the west and the east, as the plan shows that the paving stones there are generally much larger. The post trench, with four postholes, is very close to the paving in 4A, and when some of the paving stones were lifted for further investigation, the underlying deposits were up to 20cm deep. The reasons for this are not understood, and the deposits became shallower towards the edges of the square and in the adjacent squares. It is possible that the bedrock dipped naturally just in this area.

The post trench had been relatively difficult to differentiate from the natural orangey-brown bedrock, or the soil resulting from the breaking down of the underlying rock, being only slightly darker brown in colour, and a little softer. The actual postholes were



Figure 17 Above, the paving when first cleared of grass, etc. From the north-west.

Below, the paving, post trench and post holes. From the north-west.



much easier to see, being usually packed with a fine gravel fill, greyish in colour, and the dark brown staining from the posts indicating their exact position. Thus the paving was part of a large timber-framed structure, with walls and roof possibly of corrugated iron, canvas or even a roof of boughs. The trouble taken to dig the ralatively large post trench seems unnecessary if the walling was iron or canvas, and there was not enough staining in the fill material to suggest bough walls and roof. The distribution of nails is not particularly helpful, though numerous. (Figure 18) Some 373 flat head, round shaft nails were found, with perhaps a slight concentration in front of the stone structure; 98 roofing nails (42 of the home-made variety) were found well scattered, with a slight concentraiton in 1C, 2C and 2D, at the south-east end of the timber structure. Tacks were relatively few, only 38 in all, and no canvas eyelets were found, suggesting that canvas was not one of the roofing options used. A relative absence of wire, especially loops, also suggests that the timber structure was more than just a basic frame for a bough shed. It thus seems likely that corrugated iron was used for roofing both structures, and possibly as walling for the timber building. (The artefacts are discussed in some detail in the following section).

Excavation of the area between the timber framed building and the smaller stone building (squares 2-5D) produced more postholes, suggesting an additional roofed area between the two main structures. Three of the postholes, in 4 and 5D had been partly under the north wall of the stone building, suggesting that they pre-dated it, and the eastern postholes continued the length of the timber structure. These could indicate a verandah area, and the western posts could also have been used to support a roof for the stone structure.

It is quite possible that further postholes would be uncovered by extending the area of excavation, as few of the postholes or the post trench were clearly indicated on the present surface, or even after the first cleaning of the squares. One other area was investigated, a small hollow some 8 metres to the east of the paving stones. When excavated (as part of squares 10 and 11 A and B) the hollow proved to be a roughly circulare shape, dug rather unevenly from the bedrock, approximately 1.1 metres in diameter and some 25cm deep. The deposit within the hollow was medium brown in colour, containing a number of small stones and gravel and a high proportion of artefacts. Rusty tin cans and fragments, tobacco tabs, wire, nails and some glass were the most obvious, plus a small concentration of wood in 11B which may have suggested a post, but the remains were slight. The purpose of the hollow is not clear, apart from its use as a small rubbish dump.

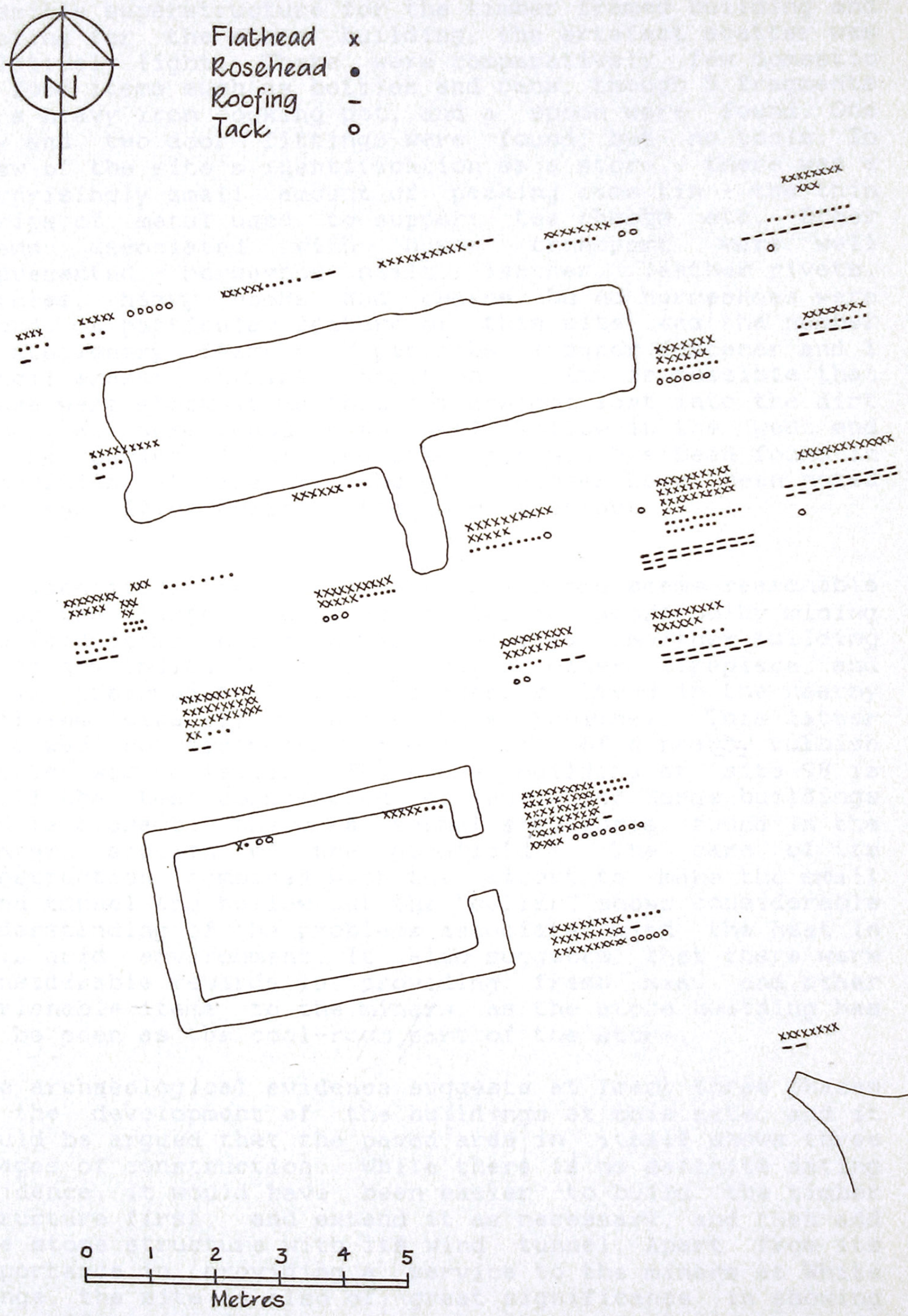


Figure 18 Distribution of nails at site 98

Apart from the nails, discussed above in relation to the possible superstructure for the timber framed building and roofing for the stone building, the artefact scatter was relatively light. There were comparatively few domestic or food items such as bottles and cans, though 5 fragments of a heavy iron cooking pot, and a spoon were found. One key and two door fittings were found, but no tools. In view of the site's identification as a store, there was a surprisingly small amount of packing case tin - the thin strips of metal used to support tea chests etc. Other items associated with horse transport were well represented - horseshoe nails, leather, leather rivets, buckles, heavy hooks and chains, bu no horseshoes were found. A particular feature of this site was the number of stationery items - 7 pen nibs, 1 paper fastener and 1 pencil eraser, in mint condition. It is possible that these were stock items that somehow got lost into the dirt floor; all were found in the small hollow in the west end of the paving. Only one other pen nib has been found in excavation, at site 59, though a number have been noted from the office areas of the works precinct.

The identification of the site as a store seems reasonable given the large structures needed to store bulky mining and food items in such an isolated area. Neither building gives any indication of a chimney or other fireplace, and it is presumed that the storekeeper lived in the nearby building (site 97) which does have a chimney. This latter site was not excavated, though part of a nearby rubbish scatter was collected. The stone building at site 98 is still the best constructed of the White Range buildings and is close to the more formal structures found in the western section of the goldfield. The care of its construction, combined with the effort to make the small wind tunnel and hollow out the "cellar" shows considerable understanding of the problems associated with the heat in this arid environment. It also suggests that there were considerable rewards in providing fresh meat and other perishable items to the miners, as the stone building has to be seen as the cool-room part of the store.

The archaeological evidence suggests at least three phases in the development of the buildings at this site, and it could be argued that the paved area in itself shows three stages of construction. While there is no definite dating evidence, it would have been easier to build the timber structure first, and extend it as necessary, and then add the stone structure with its wind tunnel. Apart from its importance in providing a service to the miners at White Range, the site is also of great significance in showing the efforts made to adapt to the arid environment and provide some passive cooling to at least one building. It is not clear why the paving did not extend over the whole of the floor area of the large timber-framed structure when such a floor would have been useful in keeping down

dust, and protecting stores. The layer of pitch along the south wall seems to have been an effort to keep vermin at bay.

The probable extensions to the larger building, and the effort put into the stone structure suggest that business for the store built up, though over how many years is not clear. The size and complexity of the structures suggest that this was a thriving business, providing plenty of profit, which along with the plethora of camp sites and mines found in the White Range area, suggest that it was an economically attractive gold mining area.

Site 100 (Figures 19-24)

This site is made up of a group of small structures just 300 metres across a small plateau from site 98. It was chosen because on the surface the relatively insignificant stone remains suggested an ordinary miner's camp. The most obvious buildings are set along the edge of a small flat, with a smaller grouping set on the slope to the back and south of the main remains; further down the gully was a rubbish dump. A chimney with paved floor dominated, (type 3b) with a low walled square stone structure to the west (type 3a) and a smaller, partly solid stone rectangle to the east (not a type 4c, and so rare that it has not been typed). There was a low "wall" of stones to the north, (an unusual type 3a) set out further into the flat. On the slope the smaller group was made up of a large forge fireplace, (type 4c) a very insubstantial cluster of stones, (a very low type 3a) and a semi-circular low stone structure (type 4b). The rubbish dump was reasonably well hidden in the gully, to the west of the small group, and south-west of the main group of buildings.

The site was laid out on a more open plan than site 98, on a grid of 2 metre squares with no baulks; on the flat the initial excavation area of 10 x 12 metres was strung out from in front of the obvious remains along the south edge of the flat. This area was cleaned over (surface weeds, stones and the top 1 to 2cm of soil removed) to show the underlying deposits, before excavation concentrated on the individual structures. The initial area was extended to include all the stone remains as required. On this site the familiar "natural" and/or bedrock appeared as an orange-brown colour as at site 98, with some of the built up deposits showing similar colouration. Fortunately, on site 100 the building deposits showed much more clearly after the surface clean over than had similar deposits on site 98.

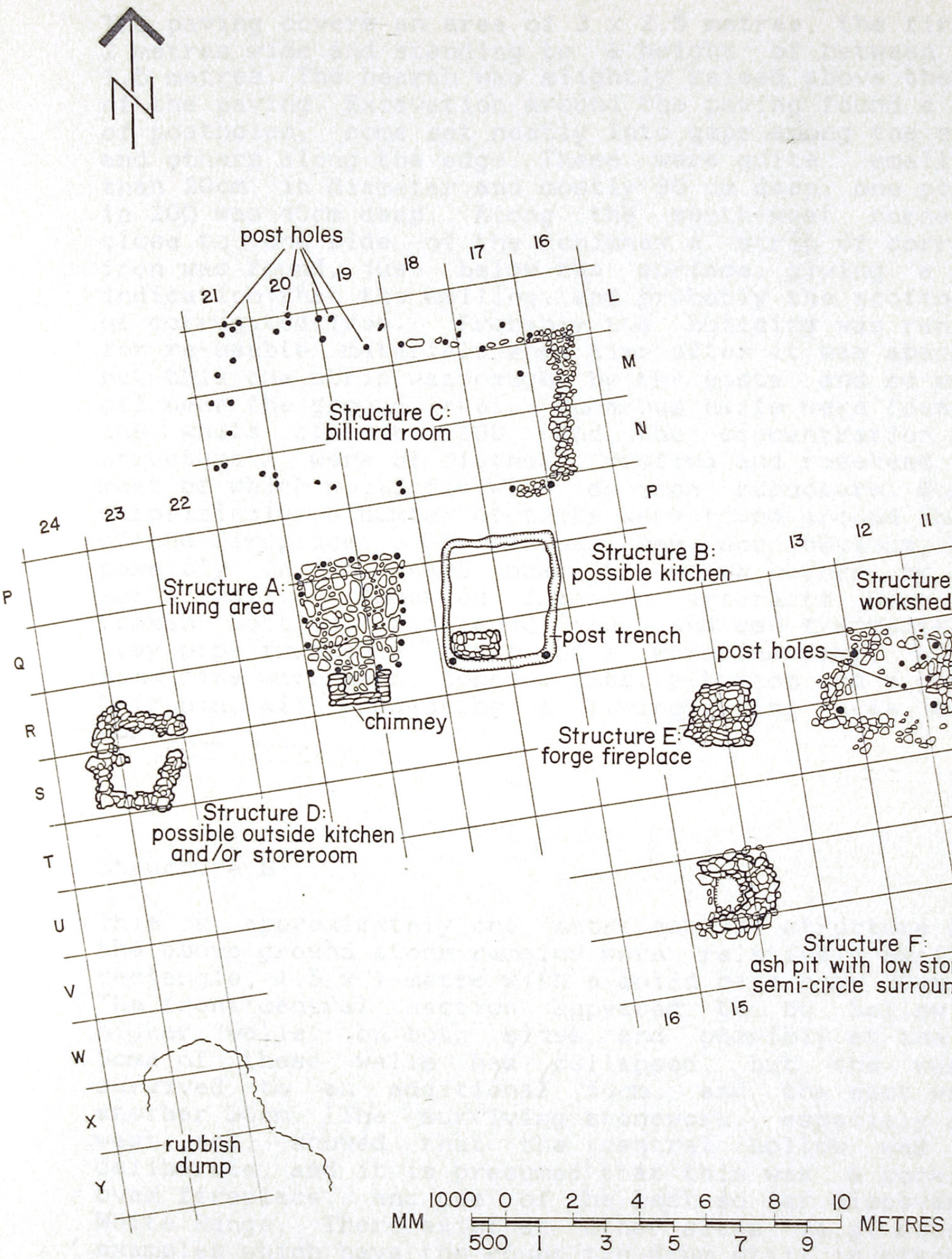


Figure 19 Site 100 plan of the excavation

Structure A, the chimney and paved floor area:

The paving covers an area of 3 x 2.5 metres, the fireplace 2 metres wide and standing to a height of between 1 and 1.5 metres. The hearth was slightly raised above the level of the paving. Excavation around the paving found a number of postholes, some set neatly into gaps among the stones, and others along the edge. These were quite small, less than 20cm in diameter and mostly 30 cm deep; one posthole in 20Q was 40cm deep. Along the south-west corner, and close to one side of the chimney a strip of corrugated iron was found, just below the surface, giving a strong indication that the walling, and probably the roofing, was of corrugated iron. Probably the building was ransacked for re-usable materials some time after it was abandoned, but this one strip was caught by the posts, and so was cut off near the ground level. Numerous nails were found over the whole of site 100, and the concentration around structure A were of flathead, roofing and rosehead nails, most of which would fit with an iron structure. Somewhat surprisingly, a number of tacks were found around the back of the fireplace. A doorway was not obvious, though possibly in the east near the north corner, or in the north wall. Numerous domestic artefacts were found- broken bottles, flattened cans, and can fragments, some clay pipe fragments, parts of a kerosine lamp, a hinge, some fine wire mesh, tobacco tabs, a button and a possible hair pin, all suggesting a living/eating area of some sort.

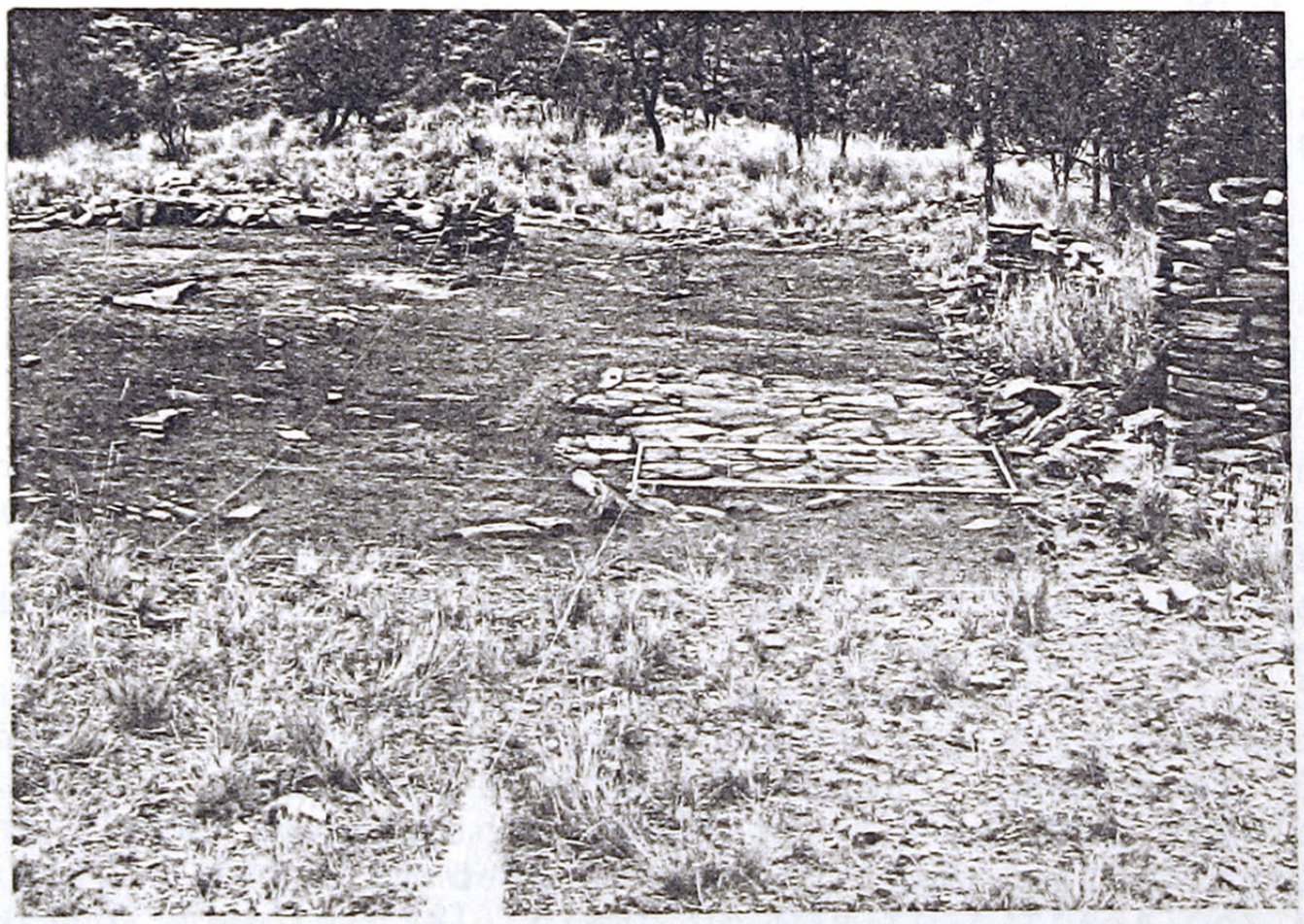
Structure B

This is approximately one metre east of structure A, and the above ground stone remains were relatively small - a rectangle, 1.5 x 1 metre with a solid base some 30cm high. The front central section appeared to be hollow, with higher "walls" on both sides, and possibly at the back. Some of these walls had collapsed, but the west end survived to an additional 50cm, and the east wall to another 30cm. The surviving stonework, especialy at the west end, showed that the central hollow was quite deliberate, and it is presumed that this was a cooking or oven fireplace, and one of the best so far discovered at White Range. There exist at other sites (e.g. site 110) examples which have the round tin drum still in place. It appears that the drum acted as an oven, with the space around it holding the actual fire. Modern campers still use a camp oven in which food can be roasted or baked; the oven is placed into a pit with ashes both below and above it. The technique may have been similar with these oven structures.



Figure 20 Above, site 100 before work began, showing the above ground remains of structures D, A, B and C. From the west

Below, similar view when the site was first cleared.



Excavation showed that the oven was set in the south-west corner of a structure some 3.5 x 3 metres, indicated by a slab post trench showing that the walls were timber, of saplings or branches, with some mud plastered into the gaps. Some of the remains of these posts were found in part of the trench, badly burnt, and lumps of clay found both in the trench and within the structure suggest the mud plaster, and that the building, or part of it probably burnt down and collapsed. There was relatively little ash found, but the interior, shallow deposits (some 10cm deep) were generally very black, or mixed with orange clay, and even the underlying bedrock showed signs of burning. The trench was only 20-40cm deep, 10-20cm wide; the south, back wall was shallower but had two deeper postholes set into the corners,which were approximately 40cm deep. A number of stones across the trench in the north-west corner may indicate a doorway.

The artefacts included a large number of nails - flathead, rose and roofing, and a slight concentration of tacks at the back of the building. As most of the walling is definitely timber (though the back wall had less obvious timber remains) it is probable that the roof was of iron, as a bough roof that collapsed during a fire would have left a greater deposit of ash around the structure. Other artefacts seem to fit with its use as a kitchen - the only pottery utensil, a large jar was found here, its many fragments being found from the surface to bedrock, again suggesting that deposits were laid down in a very short time. Several lamp fragments, numerous heat affected glass bottle fragments, flattened cans and fragments, part of a mincer and two padlocks were also found. Most of these indicate domestic use, with the mincer, cans and some of the bottles identified as sauces, etc, point slightly towards the kitchen/ eating use of the structure.

Structure C

This appears as a low stone wall, almost 5 metres long, with a short extension on the southern end. It was fortunate that the initial excavation area was reasonably large, and that the area west of the wall was completely cleaned over. This indicated a dark brown deposit extending from both ends of the stone "wall" suggesting some sort of large structure connected with the stone remains. This apparent building feature was some 50cm wide, and later excavation found it to be very shallow, between only 1 and 7 cm deep. Another interesting feature noted during the initial clean up was that the floor had been artificially levelled by adding some fill material in the north-eastern section, supported by some large stones acting as a small retaining foundation. The dark deposit which appeared to outline a structure of some 10 x 4.5

metres was found to be very shallow, masking a series of post holes, most of them paired. The single postholes were from 15 to 40 cm in diameter, while the paired postholes were much smaller, barely 10cm in diameter; depths varied from 20 to 50cm. (Figure 22) These double postholes, and the shallow dark brown deposit above them suggests that this was a bough shelter, with the walls of boughs threaded between the posts; the roof may have been of similar construction, or of canvas. The low dry-stone wall at the eastern end may have been extra protection against prevailing south-easterly winds. Comparatively little excavation was carried out within the structure, as it appeared that large areas had been artificially filled in, but a number of interesting and unusual artefacts were found.

Nails were not found in the same concentration as around structures A and B, but many more tacks were found, which, along with two canvas eyelets, suggests that canvas may have been used for roofing, and possibly walling material. The most important artefacts, which helped to identify the probable use of this large building, were found all over site 100 - numerous fragments of slate. (Figure 22) The slate was not natural, was quite thick and obviously had some purpose, and when someone told me that billiard tables had a slate bed, the problem seemed to be solved. A small billiard table would be a popular recreational activity with miners, and would explain both the size of this structure, and the need to have the floor as flat as possible. In addition there were a number of pottery fragments, several unusual small metal objects possibly related to upholstery, a large amount of bottle fragments, some can fragments, wire and tobacco tabs. The identification of the billiard table was particularly significant as it was possible to check the contemporary records to find out who had a licence at Arltunga.



Figure 22 Above, structure C, the billiard room, from the west.

Below, fragments of the slate bed of the billiard table.



Structure D

This was a small squarish building, approximately 2 metres square, with low, partly collapsed walls now 45-70cm high and 60cm thick. The obvious entrance was a gap in the north-east corner, though there appeared to be another gap in the middle of the west wall. When the fallen stones were removed and excavation began, several large fragments of bottle glass were found in the south-east corner which later were pieced together to produce one pale blue patent medicine, Clarke's World Famed Blood Mixture, and two pale green beer bottles. Other artefacts also concentrated in this corner included the metal part of a spade handle, and an unusual can showing double-seamed ends and with a small lead-foil label, in French and English, indicating the contents were petit pois. Deposits within the structre, and around the north and west sides included a lot of fine grey ash and charcoal, and there was a concentration of charcoal and wood fragments in the south-east corner suggesting a post in this area. The ash to the west of the structure continued for almost 3 metres, and artefacts within it included numerous nails, 9 clay pipe fragments, several buttons, a small clothing buckle and a small metal fork.

The relatively complete bottles, and a number of cans suggested this may have been some sort of storage area; the amount of ash suggested a possible cooking area, or certainly that the roof may have been of boughs to provide shelter during cooking. Some timely visitors to the site, including a number of long-time Centralian residents felt that this was an outside kitchen, for use in very hot weather. The low stone walls would provide some protection for the fire, and the lack of upper walls would have allowed whatever air or breeze was available to cool the cook. The actual fireplace or oven area was not obvious, so the exact mechanics of cooking under these conditions is still uncertain.

Structures E, F, G - the "work" area.

The three possible structures were grouped close together, and slightly apart from the domestic area. Structure E is probably the largest forge fireplace so far identified at Arltunga, a solid stone structure, approximately 1.5 metres square and varying in height now from 60 to 85cm. It was placed on a slight slope, and there had been some collapse of stone down the southern side. The southern wall may originally have been as high as 1 metre, and would have made the central hollow for the fire more obvious.

An area around the forge was checked to see if there were any postholes which may have suggested some shelter over it, but no such structure was found. The artefacts tended

to reinforce the identification of this as a forge, as a metal part of a small bellows was found, along with rough pieces of lead and iron, a small wedge, a horseshoe, several lengths of wire; other more common finds included nails and bottle glass fragments.

Just two metres east of the forge was a large scatter of stones, too loose and low to even be called a wall or foundation covering an area of almost 4 x 3.5 metres. However, it was sufficiently structured to suggest some sort of building, and excavation produced four corner post holes, and four smaller internal posts, possibly for a table of some sort - structure G. There were even remains of fallen, burnt posts in the north-east corner. The greatest concentration of nails, particularly flat headed nails, in all the work area was found around this structure, which is thought to be a store room or work area. The loose stones suggest that canvas was used for the walls, the stones helping the keep the canvas in place on the ground. The roof could have been canvas, or possibly boughs, and several tacks were found. Other artefacts were not particularly helpful - the usual domestic scatter of bottle glass, a clay pipe fragment, some of the large pottery jar, most of which was found around structure B, wire loops, a small wedge and can fragments were found. The only other slightly unusual fact was that the nails were generally in very bad condition, quite eroded away.

The last in this group was the semi-circle of stones, almost 4 metres south of the forge, and some 2 metres wide and deep, structure F. Such structures are reasonably common in the White Range, though most have been found in isolated groups. There had been some suggestion that this could be a privy for the camp, but in fact it had another, though equally practical use. When the interior of the structure was cleaned over it was found to contain a thick layer of fine pale grey ash. This was found to continue below ground level, into a deep pit that had been dug out of the bedrock. This was rectangular, 1 x .7 metres, and 70cm deep. This was obviously the ash pit for the forge, a necessary protection against the spreading of fire in this arid area. The semi-circular stone wall added 30 to 40 cm in height, and it was not clear if it was built at the same time as the pit, or added as further protection when the pit began to fill up. The artefacts found within the ash were in poor condition, as would be expected, and included nails, bone fragments, clay pipe fragments and small pieces of unidentified metal. The bones suggest that the kitchen ashes may also have been deposited in the pit.

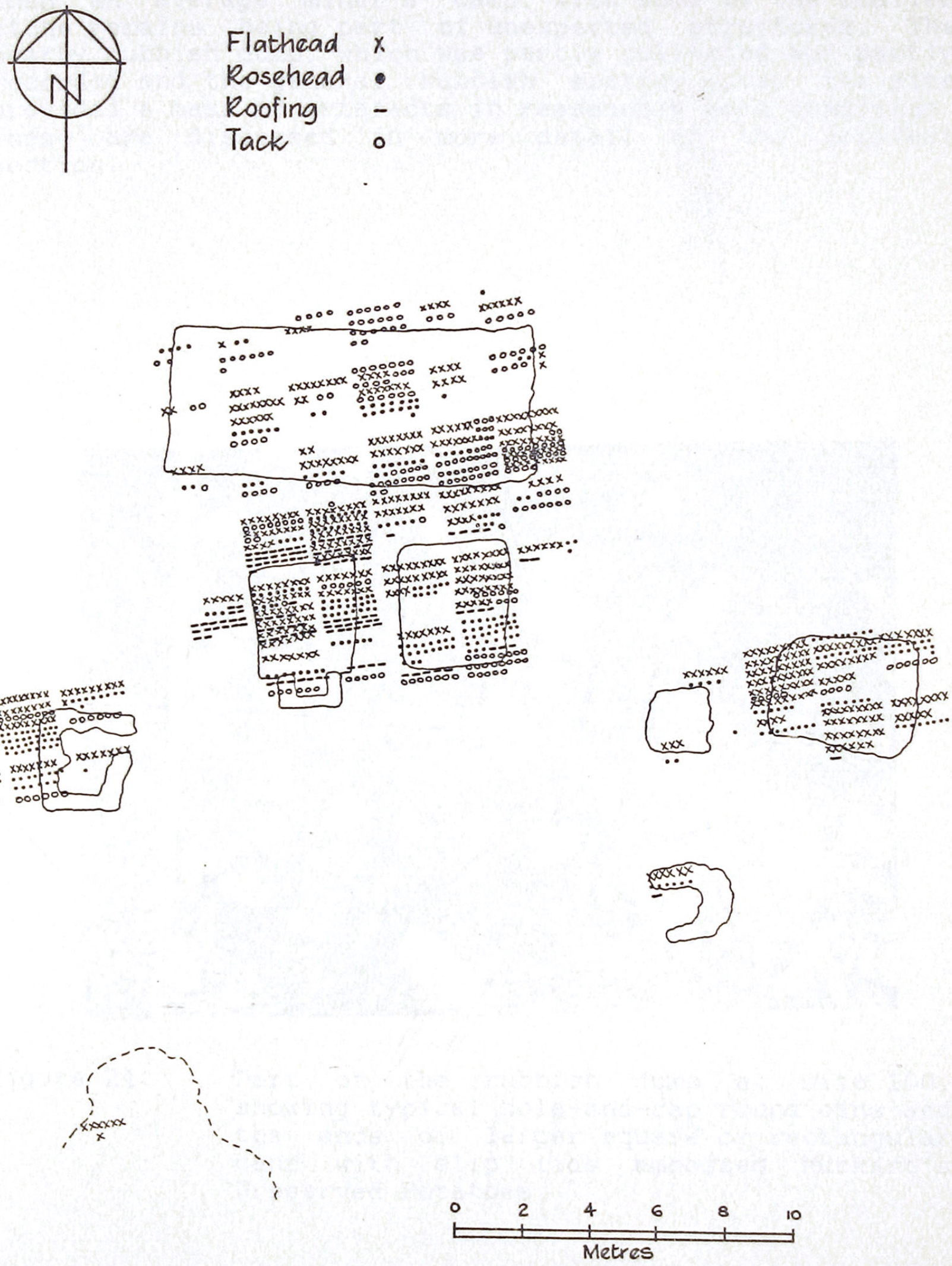


Figure 23 Distribution of nails at site 100

Altogether, site 100 proved to be rather unusual, rather than an average miner's camp, with some of the smaller stone remains being part of unexpected structures. The nearby rubbish dump, which was partly collected and partly recorded and the general rubbish scatter over the site provided a mass of artefacts in reasonably good condition. These are discussed in more detail in the artefact section.



Figure 24 Part of the rubbish dump at site 100, showing typical hole-and-cap round cans and the ends of larger square or rectangular cans with slip lids embossed Muckart's Preserved Potatoes.

2.3.3 Site 59 (Figures 25-31)

This site is made up of three structures on a narrow piece of relatively flat ground close to the track running up from the White Range well to the southern mines. The main stone remains are at the south-eastern end of the flat, and show a three-walled structure with an addition at the north-west (type 2). Close to the open, western end of this building is a much smaller possible structure, surviving as two parallel lines of stones set on edge into the ground (an unusual type 3a). At the other end of the flat, some 8 metres from the smaller "structure" is a small solid stone forge fireplace, (type 4c) and a small rubbish dump was found north-east of the forge.

The one metre grid for this narrow, rectangular area was not set out on proper compass axes, partly due to the lie of the land, partly the position of the structures, and partly following the pattern of earlier White Range excavations. However, for convenience in describing the relationships between parts of the major structure, and when referring to sections, etc., it has been assumed that the grid was correctly aligned. Therefore references to the long south wall are actually to the south-east wall; the inner eastern part of the building is actually to the north-east; the north room is to the north-west.

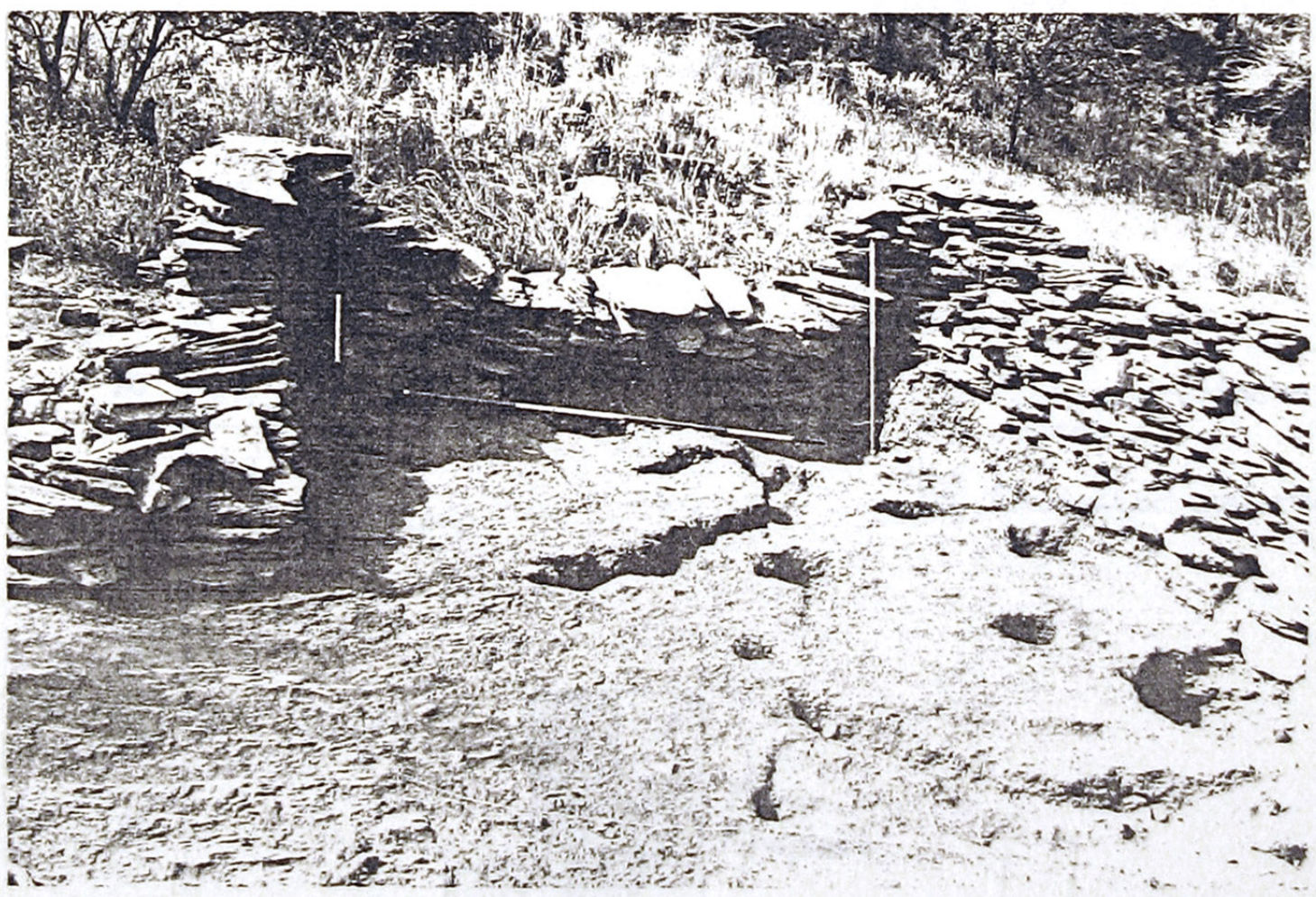
Excavation concentrated on the main structure which was unusual in shape. The lightly mortared stone walls survived generaly to approximately one metre, with most of the fallen stone, coming from the collapsed section of the eastern wall. Part of the north wall had also collapsed outwards (Figure 25). The remaining wall may have been formed by canvas or possibly brush. The long southern wall could have been built in two sections, as the angle changes quite abruptly to make the "front" open-sided section much wider. (Figure 26, 27) This extra width has been emphasised by an apparent extension on the north-western side, where an additional "room" has been partly hollowed from bedrock.

Work began in the inner, eastern area, a rectangle of just over 3 by 2.5 metres, although the south wall extends almost four metres before angling out to the south. Most of this area had a surface layer of a pale brown mortary deposit above a thick layer of ash, between 20 and 30cm deep. This ash deposit became shallower towards the wider open area and eventually disappeared into the natural orangey-brown soil. The ash varied from pale to dark grey, with charcoal scattered throughout, and suggests that a timber and brush roof covered the inner area and was destroyed in a fire. Bedrock, and a sterile rather clay-like orangey-brown natural appeared below the ash, so the fire was intense enough to reduce any occupational deposits (shallow enough at the White Range anyway) to



Figure 25 Above, general view of site 59, from the south.

Below, the major structure when excavated, from the west.



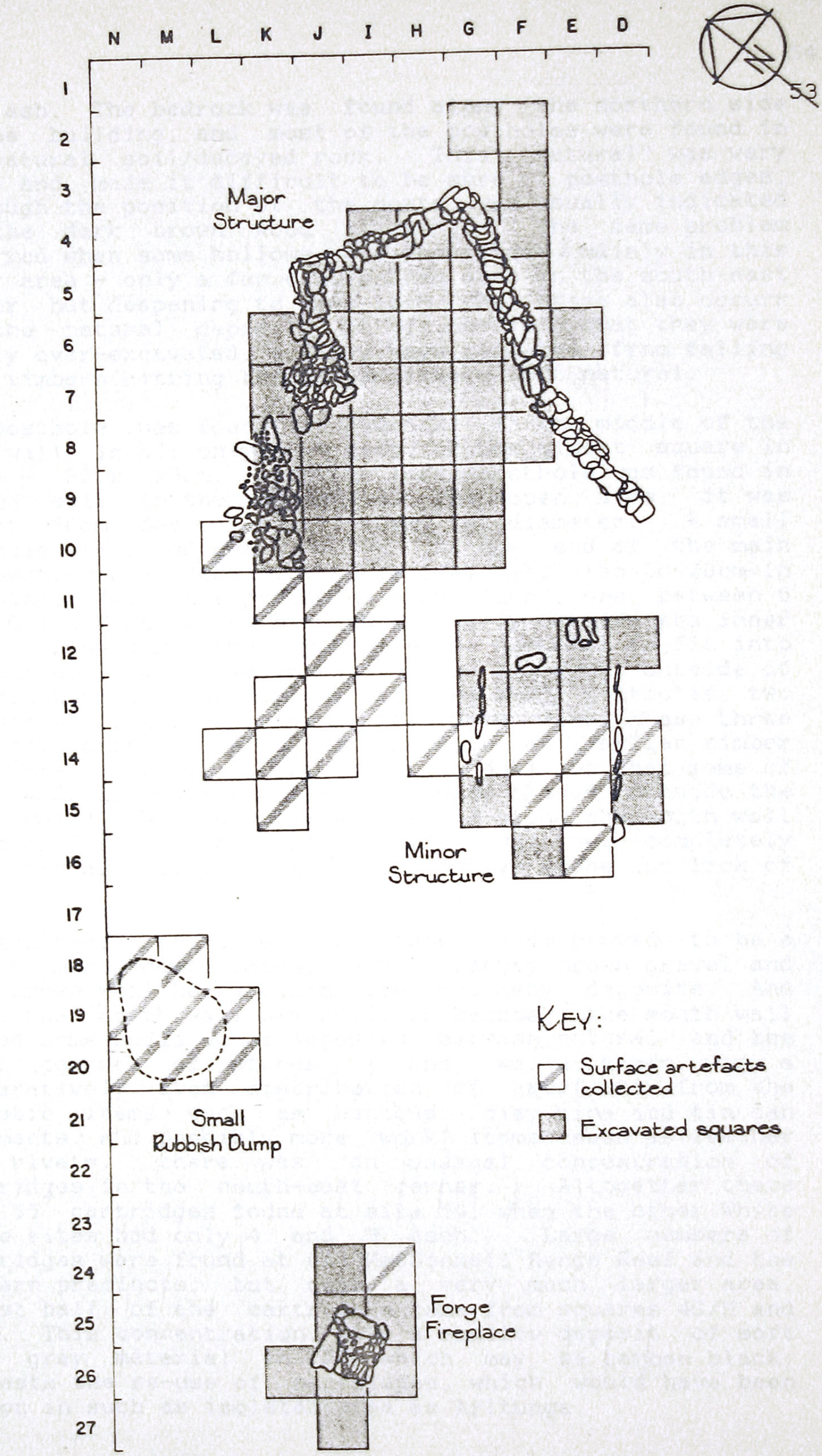


Figure 26 Site general plan

fine ash. The bedrock was found along the northern side of the building, and most of the postholes were found in the natural soil/decayed rock. This "natural" was very soft, and made it difficult to be sure of posthole edges, although the position of the posts was usually indicated by the dark brown wood staining. The same problem occurred when some hollows were indicated, mainly in this inner area - only a few centimetres deep in the south-east corner, but deepening to some 10cm. As these also occurr on the natural deposit, it is possible that they were partly over-excavated, and may have resulted from falling roof timbers hitting the comparatively soft natural.

One posthole was found in bedrock, in the middle of the east wall, in 5I; only 30cm deep, it was almost square in shape - 30 x 25cm. Another large posthole was found in 6H, not quite in the middle of the open side; it was almost 60cm deep, and 10-20cm in diameter. A small posthole was found nearby in 7H, at the end of the main hollow/trench - just over 30cm deep and also 10-20cm in diameter. Two other postholes were found, one between 6 and 7G and another in 7H which is really outside the inner area. These three small postholes do not seem to fit into any pattern, though later excavations along the outside of the southern wall produced three more small postholes, two of which formed a narrow rectangle with these three internal ones - which may suggest an earlier timber structure was built before the stone one. Or that some of the timber uprights for the roof were placed outside the stone walls. No postholes were found along the north wall on the inside, and the outside was not completely excavated due to the amount of fallen stone and lack of time.

The south-east corner of this inner room proved to be a little more complicated, with orangey-brown gravel and dark brown soil being mixed with the ashy deposits. And while the north wall was built on bedrock, the south wall showed some build up of deposits between natural and the first course of stones. And while there was a comparatively even distribution of artefacts from the domestic items such as buttons, clay pipe and tin can fragments, and possibly more "work" items such as leather and rivets, there was an unusual concentration of cartridges in the south-east corner. Altogether there were 65 cartridges found at site 59, when the other White Range sites had only 4 and 3 each. Large numbers of cartridges were found at the MacDonnell Range Reef and the western precincts, but over a very much larger area. Almost half of the cartridges came from squares 4G/H and 5G/H. This concentration, plus a shallow deposit of soft dark grey material in 5G which may be carbon black, suggests the re-use of cartridges, which would have been common in such as isolated area as Arltunga.

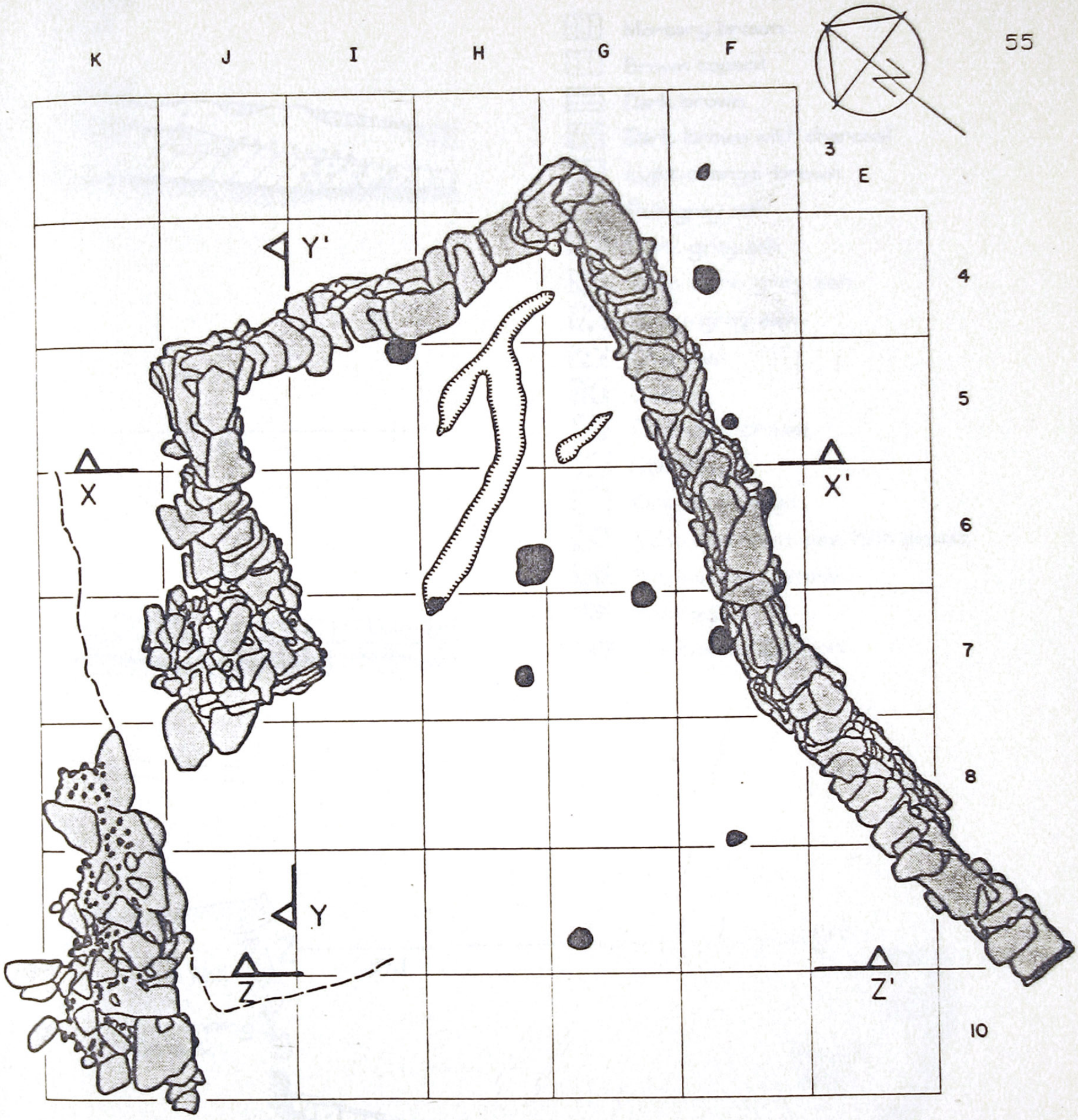
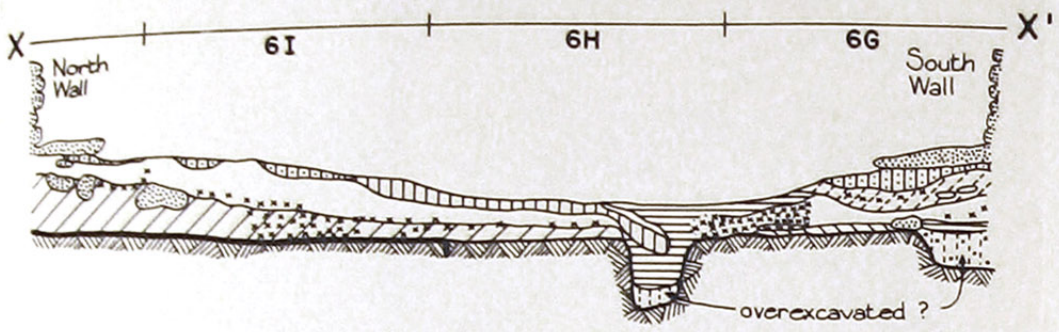
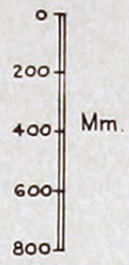


Figure 27 Plan of the major structure

East Section X - X'

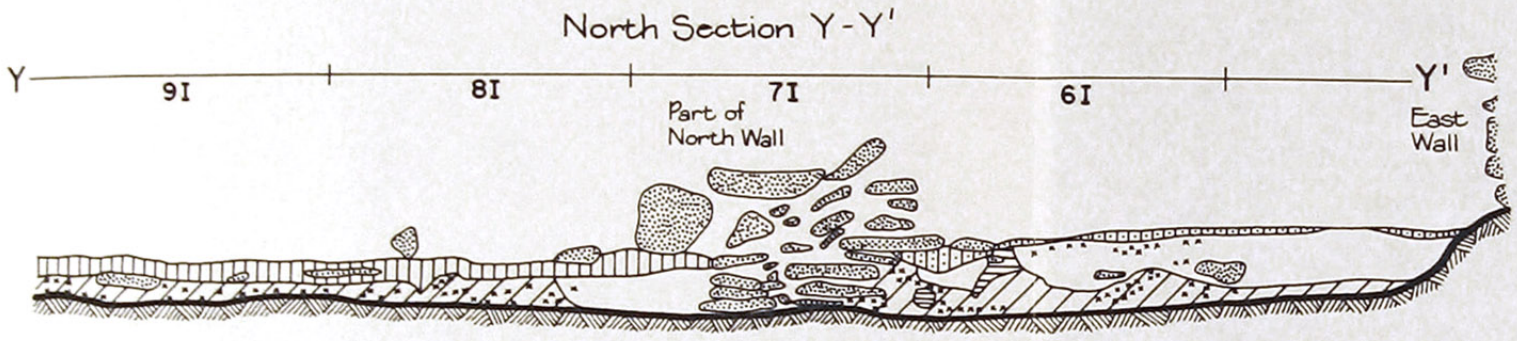




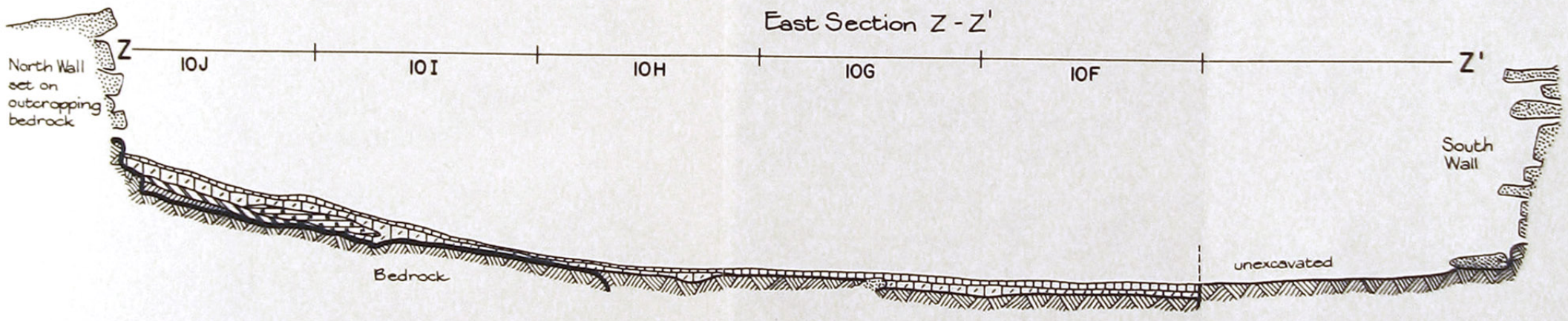
KEY:

- Mortary brown
- Brown topsoil
- Dark brown
- Dark brown with charcoal
- Light orange-brown
- Pale grey ash
- Dark grey ash
- Soft dark grey ash
- Pinky-grey ash
- Charcoal
- Stone
- Orangey-brown
- Natural
- Bright orange
- Yellowy-brown with fine gravel
- Brown with gravel
- Bedrock
- Limit of excavation

North Section Y - Y'



East Section Z - Z'



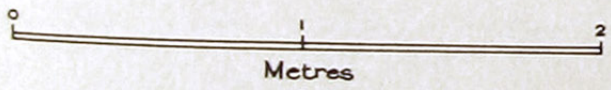


Figure 28 Sections across the major structure

Most unusual was the scrap of silver, found in the large posthole in 6H; stamped at the Birmingham Mint in 1903, it has one scalloped edge and a faint design, and may have come from an item of glass or table ware.

The significance of the small "north room" was not realised until excavation showed the extent of the area hollowed out from the bedrock. At first, the room appeared to be almost 2.5 by 2 metres, with its north wall formed by some stones set on top of outcropping schist. Then it appeared that the original excavation from the bedrock continued further along the outside the the north wall of the inner, eastern room, and this was partially investigated into 6K. The area between the wall and the hollowed bedrock was just over one metre, and although a number of artefacts were found in the relatively small areas excavated, it is not certain if the additional space in 6J/K and 7J/K was part of the north room, or a sort of foundation trench to facilitate the building of the main inner area.

Deposits in the north room were slightly shallower than in the main inner room, between 8 and 15cm in depth. The surface layer was a shallow brown soil above grey ash, similar to that in the inner room and also varying from pale to dark grey, varying in depth from 10cm in 8I to approximately 5cm in the 9 squares where the ash was more mixed with gravel and brownish soil. The bedrock, although obviously hollowed out, retained more of a slope in this north room, which must have made it more difficult for living purposes. And an unusual combination of artefacts were found - almost 80% of the numerous bone fragments, combined with the majority of leather fragments and rivets, half the buttons, most of the clay pipe fragments and the reed box from a concertina or accordion, suggesting an eating, living and working area combined. A concentration of tacks in this room, combined with the reduction in the amount of ash, suggests that the roof may have been of canvas rather than brush.

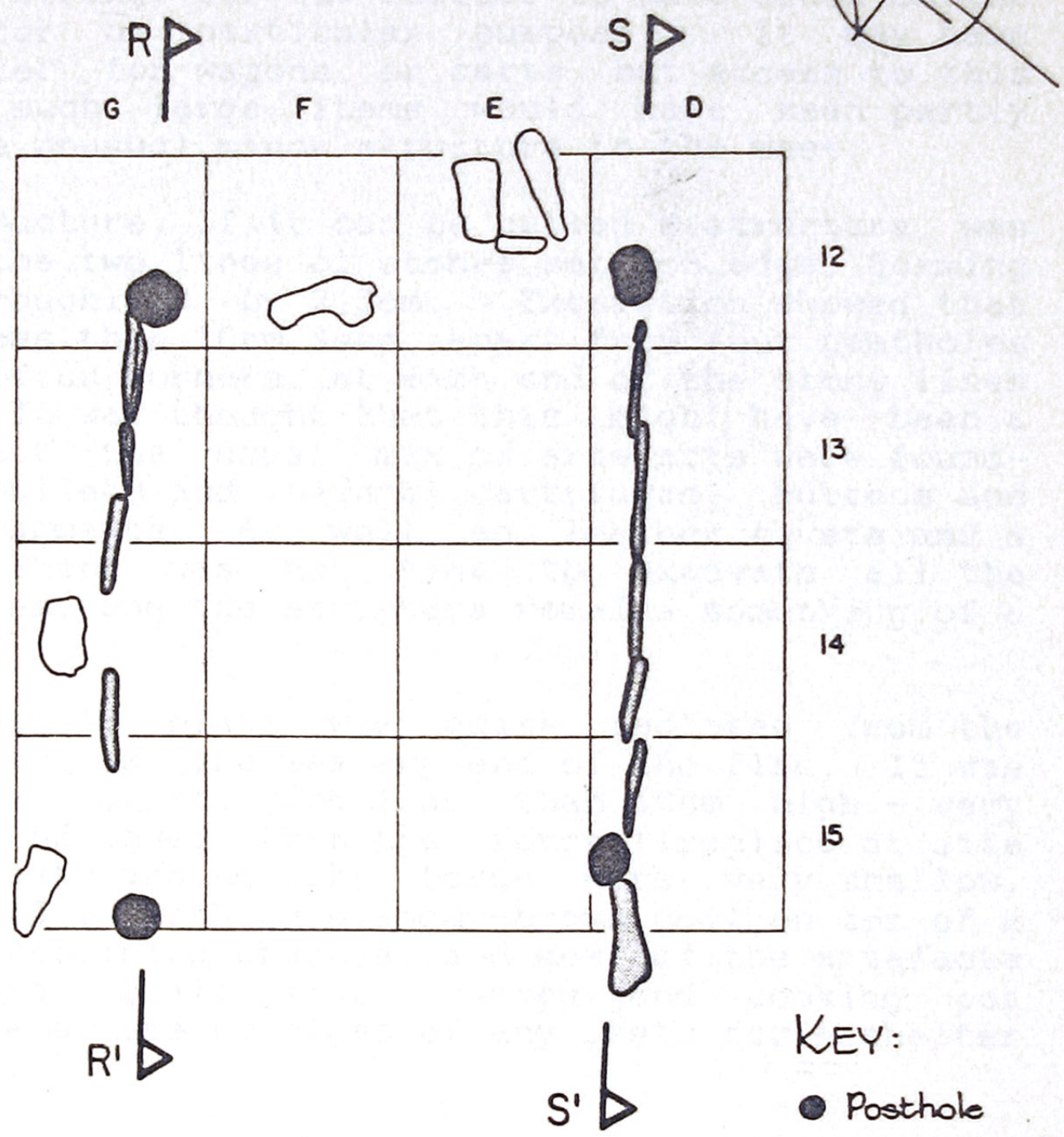
The wider, open area on the west side of the main structure, covered by part of some of the 7 squares,and the southernmost of the 8, 9 and 10 squares showed the gradual change from the comparatively thick, ashy deposits of the inner room, continuing into the 7 squares, to the shalow orangey-brown deposits only 3cm deep in the 10 squares. It was expected that this wider area may have been utilised as a work area, but if so, there are comparatively few artefacts to prove it. Most of the artefacts came from the 7 squares, which are almost in the inner room, the other squares producing some glass, a few nails, one cartridge, some No. 8 wire and two fragments possibly from a split pin. Not all the squares were excavated, particularly along the extension to the wall,

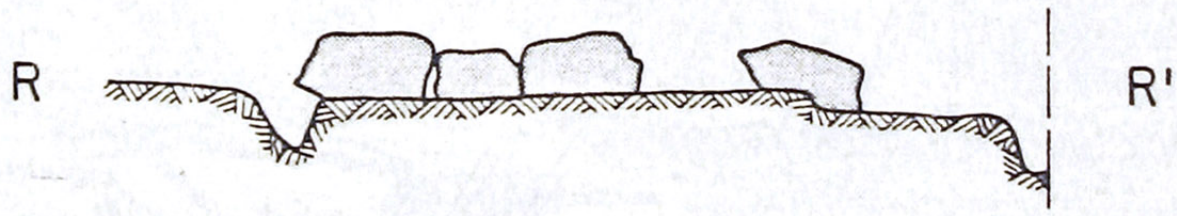


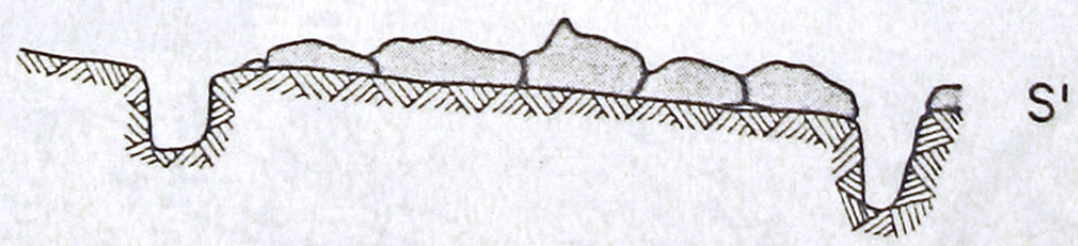
Figure 29 Above, the "North Room" from the west

Below, the "foundation trench" dug from the bedrock north of the major structure, from the west.









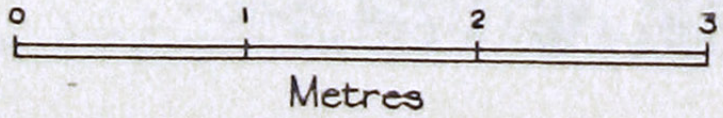


Figure 30 Detailed plan minor structure

but it seems strange for the builder to have added on the angled wall for no particular purpose. It may have provided shelter for wagons, or carts, but access to this section for such large items would have been partly blocked by the unusual minor structure to the west.

This minor structure, if it can be called a structure, was indicated by the two lines of stones set on edge, forming a rectangle roughly 3 by 2.5cm. Excavation showed that bedrock was less than 10cm deep, apart from four postholes found at the four corners, at each end of the stone lines (Figure 30) . It was thought that this might have been a work area, but the usual mix of artefacts were found- nails, three bullets and several cartridges, buttons and clay pipe fragments, as well as leather rivets and a horseshoe. There was not time to excavate all the interior squares, and the structure remains something of a puzzle.

The small forge fireplace was quite isolated from the other structures, at the western end of the flat. It was only 1.2 metres square, and less than 50cm high - very much smaller and lower than the forge fireplace at site 100. The deposits around the forge were very shallow, between 2 and 5cm, with an orangey-brown soil on top of a darker brown containing charcoal and most of the artefacts - clinker, some small iron wedges and cooking pot fragments. There were no signs of any posts for a shelter over the forge.

Figure 31 Below, the small forge fireplace



A small rubbish dump was found between the forge and the minor structure but further north, close to the natural hill slope. This contained most of the bottle fragments, cans and other small metal items, and covered an area of a little over two by three metres.

The site produced a number of new types to add to the early bottle inventory from the White Range area. One was a Walkerville beer bottle, with body embossing and a low pushup, which may suggest a slightly later date, perhaps in the 1910s. Another was an oval, clear bottle, with base embossing of N & Co., an English bottle maker Nuttall & Co., which was one of several companies to form United Glass in 1913 - so the bottle must date (at least in manufacture) to before that time. These two artefacts suggest slightly different dates for this site, though the Walkerville bottle is by no means closely dated. Other artefacts, such as the delicate strip of silver, and possible signs of comfortable furniture might suggest the presence of a woman. The amount of rivetted leather suggests that the male occupant was a saddler and possibly involved in the carting industry. One surface artefact that was noted in the 1970s was part of a wagon axle, which had disappeared before fieldwork began at the site. Archaeologically shallow sites, such as found here at Arltunga, with a high proportion of surface artefacts, have suffered from the depredations of visitors.

While the three main excavation sites have shown a certain similarity of artefact assemblage, the variety at each site have been helpful in suggesting functions for the buildings. The excavation at site 98 has supported the initial designation of it as a store site (i.e. the large buildings, and comparative lack of domestic artefacts). Site 100 proved to be an unexpectedly large site, with the surface remains giving little indication of the eventual size, and very varied purposes of the structures. Initially it appeared to be a fairly average miner's camp, but the discovery of the billiard table slate, and room, showed that the site hid another possible service to the locals. With site 59 also possibly fitting into a service industry, an "average miner's camp", if there is such a thing, has yet to be investigated. In addition the variety of artefacts suggests that either inhabitants brought a reasonable amount of personal belongings with them, or had access to a wide range of consumer goods at or near Arltunga.

2.3.4. Minor excavations, sites 110 and 131

Site 110

This site is interesting because it is a two "roomed" structure (type 2). One part is a three stone wall type, similar to the main structure at site 59, but in this case a much more substantial building. Attached to it is a rather large, but low walled, rambling room containing a kitchen oven. (Figure 32) Excavation was confined to the three-walled section, where part of the dry stone wall remained to its probably original height of almost 2 metres; it was felt that this could be in danger of collapsing, and that it might need to be braced. One posthole was found at the end of the wall, suggesting that the fourth wall may have been of timber, and possibly a wide door. There has been little analysis of the artefacts, but among the usual domestic items, some heavier wagon fittings were found, plus clinker and iron offcuts from around a low possible forge within the main area.

The wall bracing has not been done, but the wall appears to have survived more or less intact. As the site is close to the main track to the White Range, and with easy access, the current increase in mining activity may cause some problems, and the dry stone wall should be carefully monitored.

Site 131

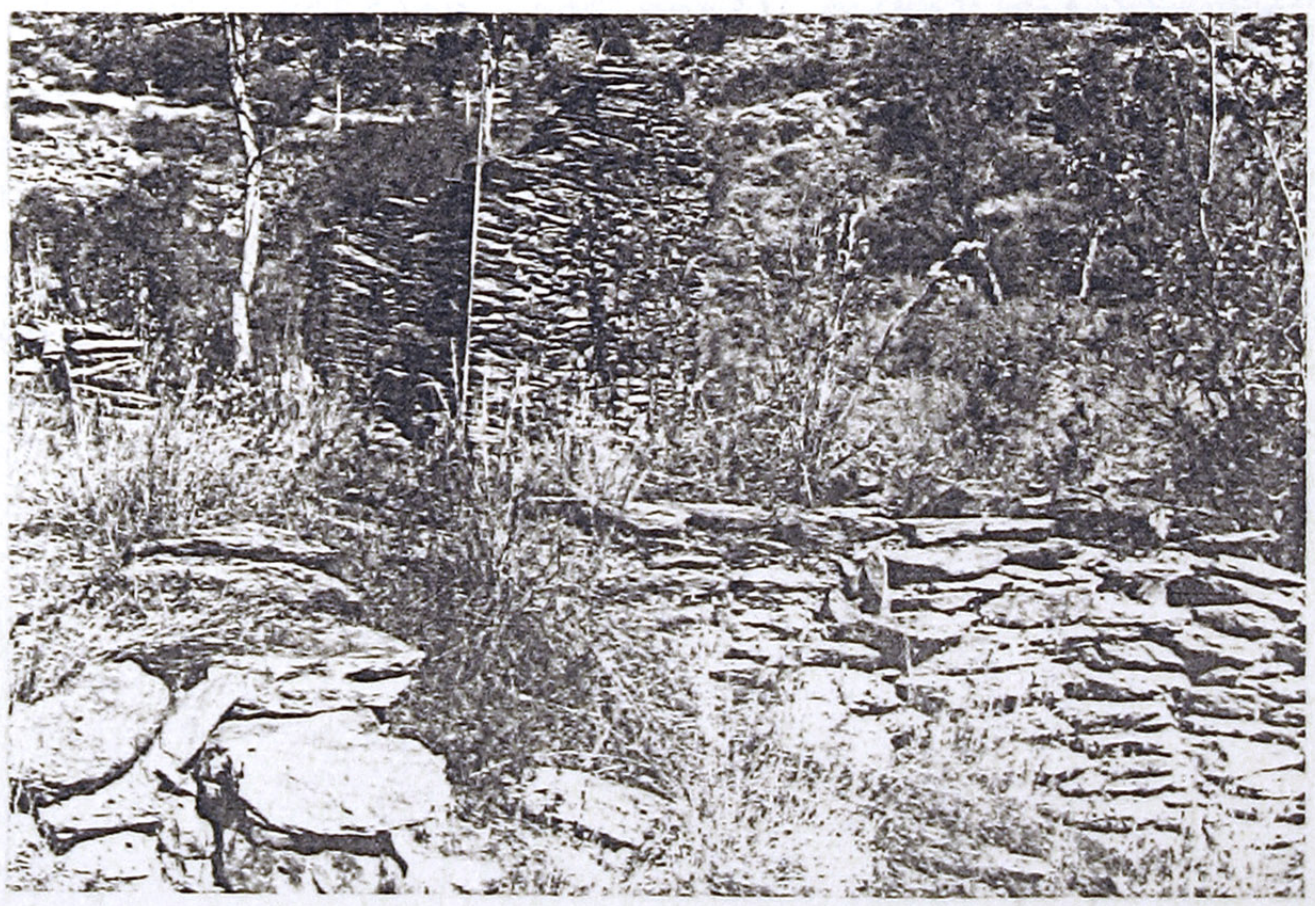
The structure, a rather fine chimney and paved floor set close to a narrow gully, is near the northern edge of the "residential" area of White Range. It is also close to the track to the more northerly of the main White Range claims. At one stage it seemed that some exploration work would be done here in 1987, and a quick recording/limited collection of surface artefacts was done. It has not been possible to do much beyond sort out these artefacts, and catalogue the unusual items. One bonus was the finding of two complete bottles - one a Chateau Tanunda brandy bottle, and the other a rich red/amber spirits type, which may have contained rum, or possibly port. More unusual is the Rosella chutney bottle base, embossed with the M of the Melbourne Glass Bottle Works, and made before 1915. And perhaps the most surprising of all was a Peter Dawson whisky base, showing the entwined AGM letters, suggesting manufacture in Australia and from 1916, when the Australian Glass Manufacturers was formed. This is the only artefact evidence for occupation at White Range at this relatively late date.



Figure 32

Above, site 110, from the east. The 3 walled area is on the right, the irregular addition to the left.

Below, site 131 showing part of the built up platform for the extended floor area. From the east.



2.4 SURFACE SCATTER COLLECTIONS

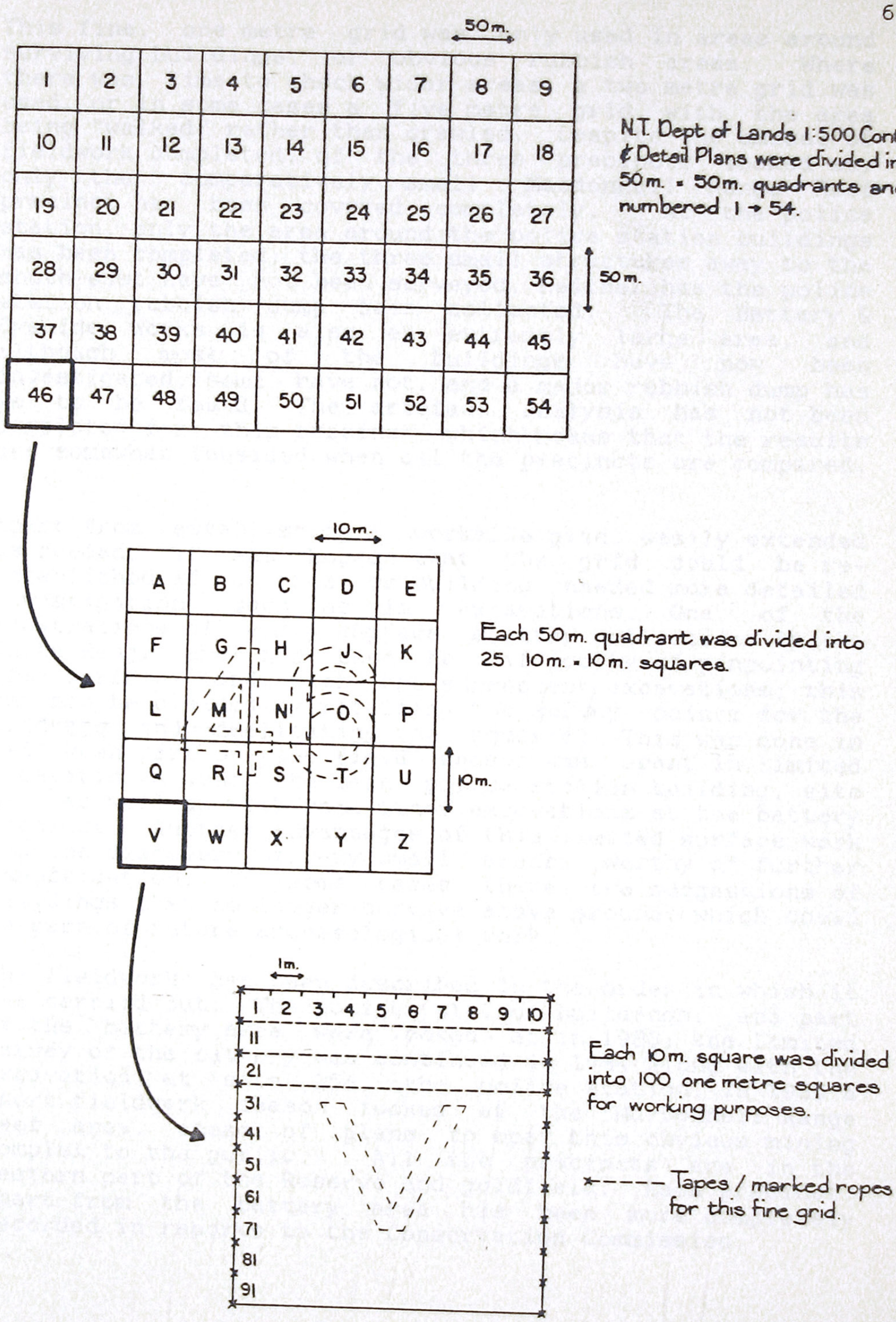
The major conservation programme carried out from 1983 centred on the most visited parts of the goldfield, the police station buildings near the Kangaroo Creek Well, and the battery & cyanide works at the Star of the North well. Later, a small survey was carried out at MacDonnell Range Reef. The archaeological work for this programme was limited to paving the way for the required conservation work on the above ground remains, with very limited excavation possible. In view of the vast array of surface artefacts in the two major precincts, the work concentrated on the collection and recording of those artefacts. This would not only provide additional information about the use of buildings throughout mining and tourist occupations, but have the added advantage of "cleaning up" the precincts of unsightly rubbish. It was clear that the very obvious building remains at these two precincts had attracted a good deal of visitor attention in the recent past, and that recording of these "modern" artefacts would be of value in the future management of the Reserve. The inclusion of the modern material has been criticised by several Conservation Commission staff, although not all the examples were kept for further study. It was, and is, my contention that such material was part of Arltunga's archaeological history and was thus of interest in broad terms, even if not particularly valuable at this time. Secondly, the presence or absence of recent artefacts was useful in assessing the possible alteration to surface artefact assemblages. Some early artefacts such as complete bottles and small metal matchboxes are possible souvenir items, and their presence/absence could be affected by recent visitors. Finally, in considering future management of buildings and precincts, the presence of modern material provided information on the recent use of, and interest in some buildings rather than others. This information should be useful to the Conservation Commission.

2.4.1 Methodology

The surface scatter collections began at the police station precinct, and continued at the battery and cyanide works. Both precincts are large when compared with the individual sites at White Range. A more effective survey system was used, based on Department of Lands maps, and the Australian Map Grid. The Lands maps used a 50 metre grid, and so this was adopted as the base unit, each 50 square metres being called a quadrat and numbered between 1 and 54, depending on its position on the map. These became the basis for the transfer of points from paper to the ground; the four points of the quadrat were surveyed in and marked by star pickets, wherever possible. In some cases, only part of the quadrat was to be investigated, and sometimes the buildings were placed across the base lines, and intermediate points were needed. Each quadrat was then divided into 25 ten metre squares, and lettered- omitting I, which can be confused with the letter J. These squares were marked by nails with blue tape attached, and were positioned using tapes from the quadrat base points. The ten metre squares were then divided into 100 one metre squares and numbered. Identification started at the north-western point, and moved to the east and the south. (Figure 33).

Each quadrat was strung out according to the number of ten metre squares to be surveyed; the latter were also strung, to avoid the confusion of one square with another. Tapes and marked roped were used to mark out the one metre squares - these were attached by nails, and occasionally rocks when the ground was too hard, at the western side of the squares, and unrolled to the eastern end. In this way it was usual to work on two, or even three, ten metre squares at once, to save time in setting out the nails, and changing the tapes/ropes. The field assistants would start from the west, and work steadily along the tapes to the east, usually crawling along on hands and knees, to be sure of seeing all the artefacts. The work was made more tedious in 1983 by an extraordinary lush growth, following heavy rains in March and April; eventually most of the survey areas were mown, to our relief. One of the mine precincts, the Macdonnell Range Reef area, was quite different, being extremely rocky and barren, a well camouflaged background for the many metal artefacts.

As each square was checked, the finds were placed in a plastic bag and left for subsequent labelling, collecting and cleaning. Such was the volume of material, it was necessary to spend each afternoon in washing finds, and in 1983 there was a backlog to deal with at the end of the field season. Recording of the finds was extremely time consuming, with some being overlooked, thus leaving a slight gap in the following discussion. Only the most basic of sorting has been done for most artefact categories at this stage.



N.T. Dept of Lands 1:500 Contour & Detail Plans were divided into 50m. × 50m. quadrants and numbered 1 → 54.

Each 50m. quadrant was divided into 25 10m. × 10m. squares.

Each 10m. square was divided into 100 one metre squares for working purposes.

*----- Tapes / marked ropes for this fine grid.

Figure 33 Methodology

This fine, one metre grid was only used in areas around surviving buildings, or obvious rubbish areas. Where there was time to check wider areas, a two metre grid was used, or in some cases a five metre grid, with the area being "walked" rather than crawled. Despite the amount of fieldwork completed, of the three precincts looked at, only the comparatively small Macdonnell Range Reef precinct has been covered completely. At the police station, only the area around the police station buildings has been completed; the three small structures away to the south-east have not been surveyed. Neither has the police station rubbish dump been collected. The Battery & Cyanide Works is also an extremely large area, and although most of the buildings have now been investigated, some have not, and a major rubbish dump has yet to be found. The artefact analysis has not been completed for this precinct, which means that the results are somewhat lopsided when all the precincts are compared.

Apart from establishing a workable grid, easily extended as needed, it was hoped that the grid could be re-established if an area or building needed more detailed investigation, such as in excavations. One of the frustrations of early surface scatter collections in the White Range area had been the difficulty of pinpointing some surface finds with the subsequent excavations; this can now be avoided by retaining the survey points for the quadrats, and duplicating the squares. This was done in 1984 when part of the field season was spent in limited excavation around the main police station building, site 256, as well as with some minor excavations at the battery precinct. Another advantages of this limited surface work was the discovery of very small areas worthy of further investigation. In some cases there are suggestions of buildings that no longer survive above ground, which could be part of future archaeological work.

The fieldwork has been described in the order in which it was carried out. The police station buildings, and part of the battery area were looked at in 1983; the limited survey of the battery was continued in 1984 along with the excavation at site 256, the police station. In 1985 a short fieldwork season looked at the MacDonnell Range Reef area, ahead of plans to open this obvious mining complex to the public. All the precincts are in the western part of the Reserve and goldfield. Each precinct, apart from the battery area has been more completely recorded in reports to the Conservation Commission.

2.4.2 The police station buildings at Kangaroo Creek well

The precinct is one of the smaller ones, divided into two sections by the present road, which has developed from the original access tracks. The surviving stone police station buildings (sites 254 and 256, type 1, site 257 type 2) are grouped together north of the well, and beside the original track to the battery and cyanide works. Nearby is the so-called blacktrackers quarters, site 255, (type 2) which may well have been a stable/ shed, and there are other minor structures probably relating to the police occupation. Between these buildings and the well is a small two head stamper. Quite separate from the structures in the northern half are the remains of two buildings on the slight rise to the south-east - the two chimneys, sites 313 and 315, (type 3b) other smaller remains, and a multitude of surface artefacts. An old track leads past these structures back towards Paddy's Rockhole, and may have been the original access to this area. (Figure 34)

The precinct has always been popular with visitors, and includes a major car park/recreational area south of the well, making good use of the larger river red gums within and close to the creek bed of the Kangaroo Creek. For most people it is their first sight of the surviving buildings at Arltunga, and for many these buildings, and the battery remains at the Star of the North well precinct were the only accessible historic areas.

Most of the Kangaroo Creek well precinct was covered by one Lands & Survey map sheet, 131-158, with a slight intrusion north into 131-159. The initial surface scatter collection in 1983 concentrated on the police station buildings, as they are the most obvious to the visitor, and site 256, the stone building, was an important part of the conservation programme. Six of the 50 square metre quadrats were looked at, either wholly or in part, as circumstances and time dictated. A limited excavation took place around site 256 in 1984, largely to pinpoint the original verandah posts.

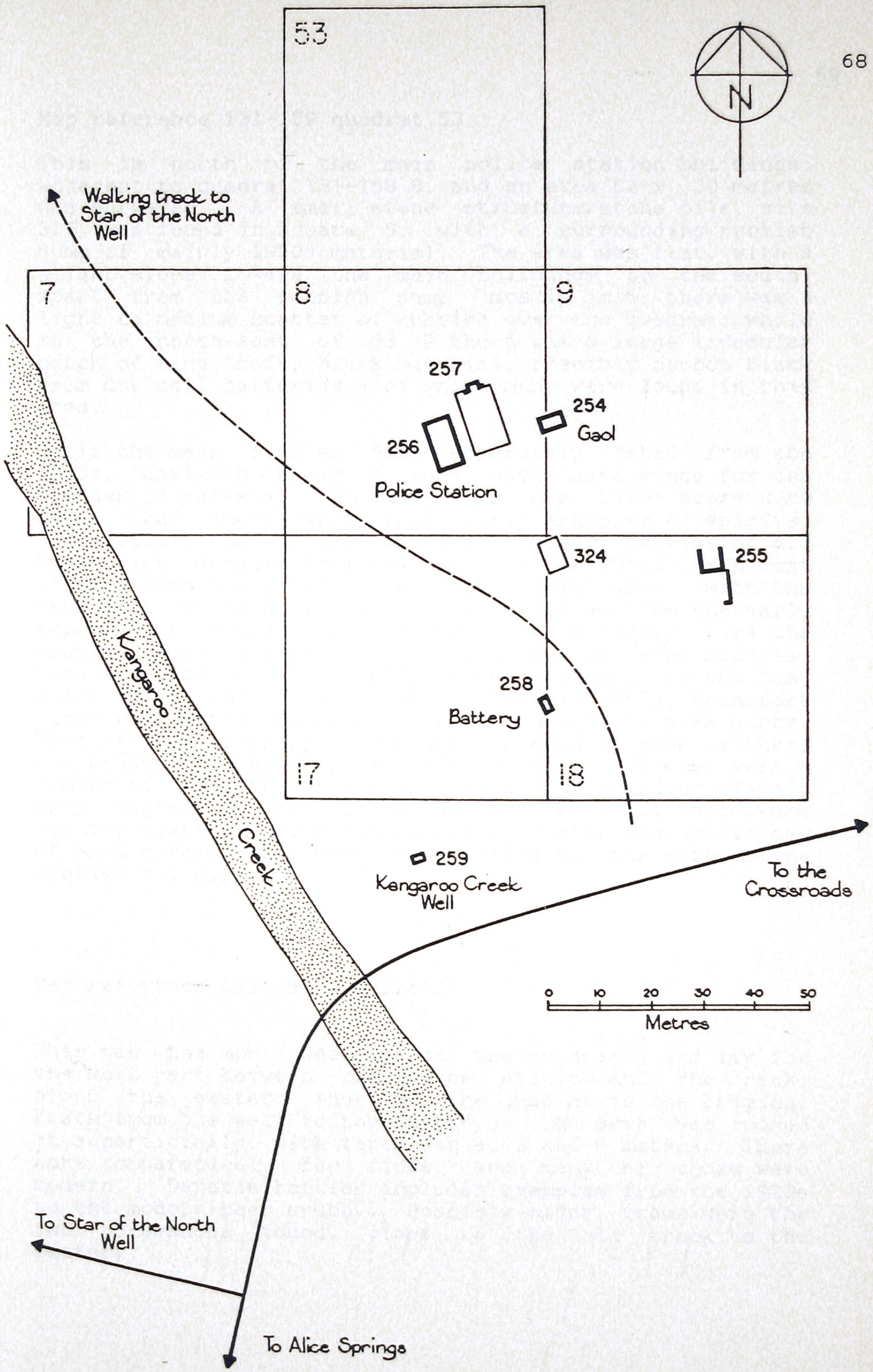


Figure 34 Plan showing the Police station buildings, north of Kangaroo Creek Well

Map reference 131-159 quadrat 53

This is north of the main police station buildings, adjacent to quadrat 131-158 8, and an area 50 x 30 metres was surveyed. A small stone structure/stone pile, site 317, was found in square S, with a surrounding rubbish dump of mainly 1950s material. The area was flat, with a slight slope toward the main buildings to the south. Apart from the rubbish dump, mostly in S, there was a light to medium scatter of rubbish over the quadrat, while in the north-east of 53 P there was a large irregular patch of fine, soft, black material, possibly carbon black from dry cell batteries - of which many were found in this area.

While the main rubbish dump apparently dated from the 1950s, analysis shows a much wider date range for the scatter of material. No early (i.e. pre 1920) beers were noted, but there were some early examples of spirits, sauce/pickle and pharmacy bottles. Other bottles of all types were datable from the 1920s to the 1950s, with most fitting into the later date range. Similarly, with the cans that can be dated, a very few examples from the early types were found here, though the majority were the double-seamed modern cans. A number of large slip lid cans were found with Use By dates embossed on the base which fell into the range of the mid 1950s. Transport items ranged from horseshoes and harness, to bike parts. Most of the clothing items were pieces of shoe leather, and presumed to be comparatively recent. There were a number of "modern" artefacts - plastics including plastic wrap, cigarette butts, aluminium cans, etc, but these were lightly scattered over the square. Greater concentrations of such modern items were found close to the main police station buildings.

Map reference 131-158, quadrat 7

This was the most westerly of the quadrats, and lay for the most part between the police station and the creek; along the eastern edge of the quadrat is the original track from the well to the battery. The area was looked at superficially, with tapes set at 3 and 4 metres. There were comparatively few finds, and many of those were modern. Datable bottles included examples from the 1920s to the modern beer stubby. Possibly older items were the two horseshoes found, close to the old track to the battery.

Map reference 131-158, quadrat 8, sites 256, 257

It is within this quadrat that the two largest of the police station buildings lie, site 256 being a two-roomed stone structure, and site 257 a chimney and extended floor area. Part of the small stone gaol comes into this quadrat, and the original track to the battery crosses the south-western quarter, as well as several smaller paths made by the more recent tourists. The quadrat has a gentle slope to the south-west, and in 1983 had an unusually luxuriant grass cover, due to heavy rains earlier in the year. (Figure 35) This made the collection of surface artefacts particularly difficult, and at the beginning, each square was weeded, to make sure that all the artefacts were recovered. This had the advantage of showing the exact lines of the concrete floor put down over the original flooring of site 257, but had a major disadvantage in that the soil was disturbed, and with tourist activity, underlying deposits may have been at risk. This method was soon abandoned in preference for a simple cropping of the grass to just above ground level.

A more detailed description of the limited excavation at site 256 follows.

The surface finds tended to cluster around the buildings, particular the modern material, with some spillover from the rubbish dump in quadrat 53 to the north. The bottles included examples from early turn-of-the-century onwards, with the greatest concentration from the 1950s. The same pattern seems to have occurred with the cans, although these are harder to date. However, there are some "early" types, but most are double-seamed and probably post World War I examples. Most of the building material also concentrated around the building remains, though an interesting collection of nails in the north-east corner of the quadrat (in E square) is interesting. While the nails are difficult to date accurately, there were 67 rosehead types, which are more likely to be "early" rather than later in date. To balance this, most of the bullet head and roofing nails came from this quadrat. Artefacts related to transport also ranged from the horsedrawn to the car.

Map reference 131-158 quadrat 9, site 254

In this quadrat the ground sloped down to a narrow gully running through the eastern squares; site 254 the gaol stands at the western edge, and partly in the adjacent quadrat 8. The western 20 metre section was checked using the fine 1 metre grid, the next 20 metre block was walked over, using tapes at 2 metre intervals; little of the easternmost 10 metres, across the gully, was surveyed. Two small stone "foundations" were noted during fieldwork which had been missed in previous surveys. One was a very

loose pile of stones in 9 H 91-3 and 9 N 1-4, 11-14, and the other was a long U shaped structure across 9 N and 9 S, which may be related to the main structure, site 255, in quadrat 18 to the south.

The artefacts concentrated along the western side, and down in the south-east. The latter concentration appeared to be related to site 255 in the adjacent quadrat 18, just as one of the small "structures" may be also associated. The bottles, as the most easily datable artefacts, included early types and a range from then to the present, with a slight concentration in the 1950s. Modern tourist material such as cigarette butts, plastic wrap, etc were few, suggesting that visitors do concentrate around the most obvious buildings. The separate concentration of items possibly related to site 255, in squares Y, and partly in T, included an unusual concentration of car battery fragments, as well as artefacts suggesting an earlier date of use, such as a horseshoe nail.

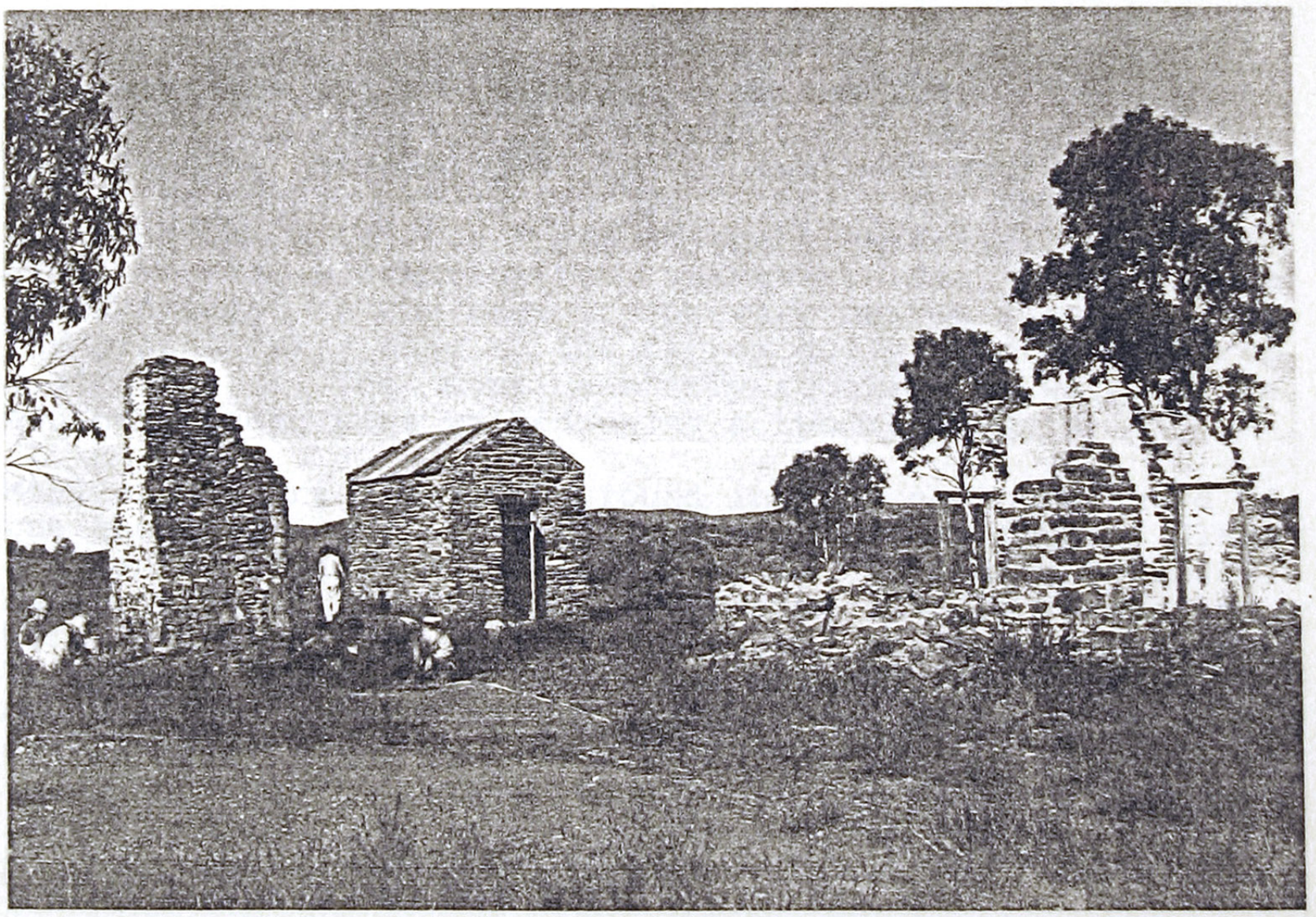


Figure 35 Weeding around site 257, in the early days of the surface scatter collection. Compare the greater deterioration in site 256, the two-roomed stone building on the right, in this 1983 photo, with the building in 1977, figure 5 p.12. Photograph taken from the north-west.

Map reference 131-158 quadrat 17, site 258, part 324

Only the eastern 30 x 50 metres was investigated, and because of the general lack of structures, was walked using a two metre grid. Site 324 is a small rectangular foundation, at the intersection of quadrats 8, 9, 17 and 18, mostly in the latter. The two head stamper,site 258 was the subject of an earlier surface scatter collection, done before the grid was established to enable conservation work on the stamper. The original track to the battery crosses the eastern and northern squares of this quadrat.

There was only a light scatter of artefacts, with most of the obviously more modern material at the northern side, close to quadrat 8. The datable glass included some early examples, one possibly from the 1950s and otherwise mostly recent stubby glass. The few cans or fragments appeared to be double-seamed types rather than earlier hole-and-cap types.

Map reference 131-158 quadrat 18, sites 324, 255

This quadrat also slopes to the east and south, with the small foundation, site 324, at the north-western intersection with the three adjacent quadrats. Site 255, known as the Blacktrackers' quarters, lies close to the eastern edge, on the edge of the very gentle slope, before the ground falls away to the narrow gully continuing from quadrat 9. The most easterly squares, as well as the southern ones, were walked using a two metre grid.

Most of the artefacts were found in the northern third of the quadrat, and little tourist material was found. Glass fragments dated from the early types to modern stubbies, but relatively few of the fragments could be identified. Wire and nails were scattered between the two structures. Transport items were well represented, with possible wagon parts, horseshoes and nails being found, along with car parts.

Partial excavation, site 256 quadrat 8

By the 1980s the main police station building, site 256, was in very poor condition, with only the east wall of the south room and the adjacent internal wall, standing to the original height. The remainder had collapsed to varying degrees, fallen in and around the building. (Figure 35). A major conservation/restoration programme had been approved, and it was necessary to find the original verandah postholes - which meant finding the edges of the western verandah under the wall rubble. It was decided to remove all the collapsed wall material using the grid first established for the surface scatter collection. While the excavation was limited, several interesting features were discovered, and are discussed briefly below. (See Figure 38, page 78 for the excavation plan).

The wall rubble was designated Feature 1, and was the largest feature. It contained mostly modern artefacts, with those on the surface being generally of the tourist type while others within or below the main deposit dated to the 1950s. The most obvious exception to this was the building hardware group where some of the nails, for example, appeared to be early types. This feature contained most of the glass fragments found during the excavation, as well as several complete bottles probably dating from the 1950s. In contrast, the remainder of the excavation produced comparatively few artefacts, and little diagnostic or datable material. Once the rubble of feature 1 had been removed, the edge of the western verandah was quite clear, marked by the edging or foundation stone. Some of the original flagstones had survived close to the entrance to the building. Apart from some excavation of the verandah floor, which had to be built up in all but the northernmost section, most of the work concentrated along the edge of the western verandah.

The verandah postholes were comparatively easy to find, as they were roughly 3 metres apart, and partially set into the verandah edge. However, having opened up squares in the areas most likely to produce postholes, some other unexpected features were discovered. The first of these was designated feature 2, and is presumed to have run the length of the verandah, apart from the area around the front step (Figure 36). It was a trench, dug into bedrock, betwen 30 and 50 cm wide, and 50 to 75 cm deep and a smooth oval shape. Below the surface disturbed layer, there was a mortary deposit, particularly in the southern squares, very shallow, and beneath that the main fill - a fine brown soil some 20cm deep. Below this was a thick layer of manure, 10-15cm, and at the very bottom of the trench was a shallow, very woody deposit. At first it was thought to be part of the foundation trench for the verandah, but was soon seen to be too large.



Figure 36 Feature 2 showing the trench ending at 8S 46, replaced by shallower foundation trenches for the verandah and its postholes, plus the stone steps or entranceway. The postholes are features 8 and 9. Squares 46, 56, 57, 66 and 67, photograph taken from the south.

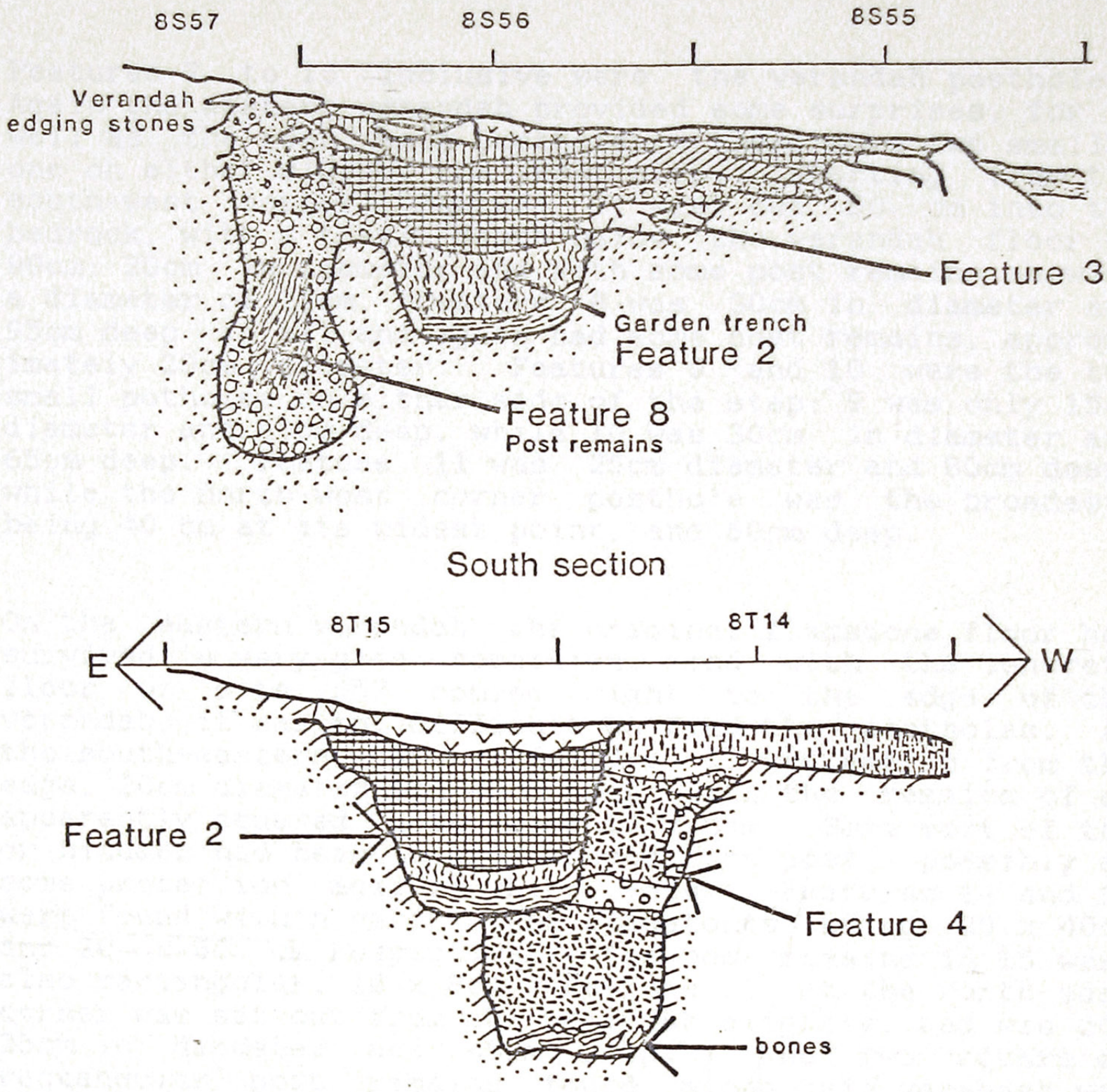
Other architectural functions were considered, without any satisfaction. Once it was realised that the trench marked the exact limit of the verandah, and that such efforts had been made to improve the naturally occurring soils, feature 2 was identified as a garden bed. In the northern part of the verandah, in squares 8 S 14 and 15, the trench of feature 2 had cut into an earlier pit, feature 4. This was 80 cm deep, and 50cm in diamter, and may have been the first attempt at gardening. The main fill was gravelly, while at the bottom of the pit was found a deposit of animal bones, identified from the jaw as being from at least three goat carcasses. (Figure 37)

The southern half of the excavation along the verandah also provided additional features. A shallower pit or terrace was found just to the west of feature 2, and was named feature 3. In squares 8 S 55 and 66 this was only 30 cm deep, and shared some of the fine brown fill noted in feature 2, over more gravelly deposits. It is possible that feature 3 was also an earlier attempt at gardening, but the similarity of deposits make it more difficult to establish the chronology. Further south, in 8 S 66, 87 and 97, feature 3 became deeper, and separated from feature 2 by a very narrow ridge of bedrock. It continued south, and also east, at the verandah corner, but there was no time to pursue it any further. The main fill was an unusual red-brown deposit at the base of the feature.

The south-west corner of the excavation contained several depressions, trenches and pits. Apart from features 2 and 3, and the corner posthole, feature 7, the remains of the original foundation trench, feature 6, were found, as well as a small trench or elongated pit, feature 5. In the latter case, feature 2 had again cut through the upper layers of part of feature 5, which was 70 cm deep. The main fill appears to have been a reddish brown sandy to gravelly deposit, while some of the dark red-brown found in feature 3 also appeared in 5's upper deposits, along with a patchy grey to red-brown layer.

Feature 6, the foundation trench, survived along the southern edge of the verandah because it had not been disturbed by the gardening activity. It was shallow, cut only 15 cm into the bedrock, but 25cm below the floor of the verandah. The fill was generally an orangey brown sandy deposit giving way to a more reddish gravelly layer, fairly typical of the natural soils, such as they are, in the area.

South section



South section

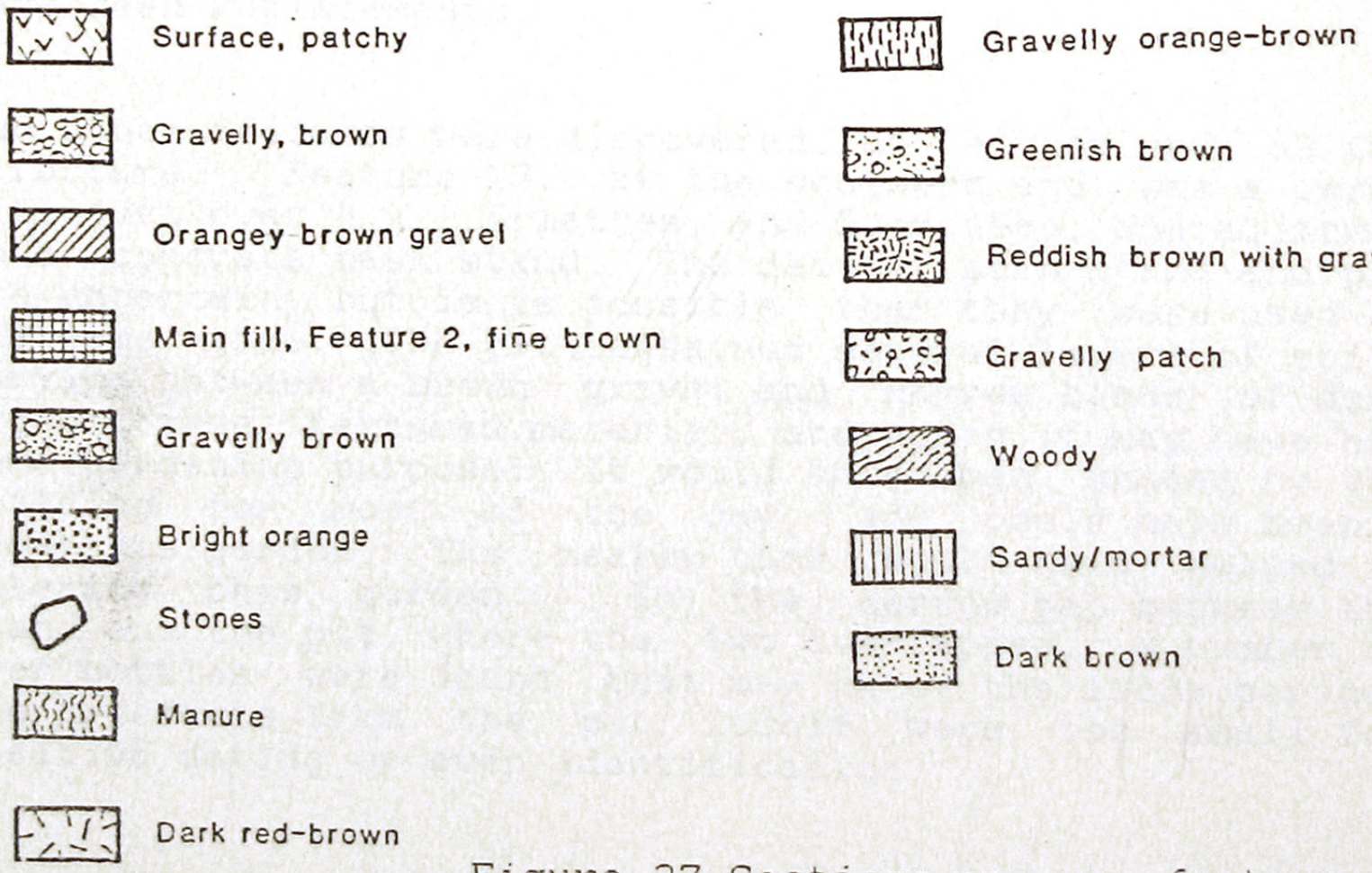


Figure 37 Sections across features 2, 3 and 4

Features 7 to 16 inclusive were the verandah postholes. Again the western verandah provided some surprises, for as well as the four main postholes, there were two smaller one on either side of the front step. Starting from the south-west corner, feature 7 was cut 50 cm into the bedrock, with a total depth below the verandah floor of 90cm; 20cm in diameter and with some post remains showing a diameter of 15cm. Feature 8 was 30cm in diameter and 95cm deep in all and again had some post remains, approximately 20cm diameter. Features 9 and 10 were the two small potholes on either side of the step; 9 was only 15cm diameter and 40cm deep, while 10 was 30cm in diameter and 65cm deep. Feature 11 was 25cm diameter and 80cm deep, while the north-west corner posthole was the broadest, being 40 cm at its widest point, and 60cm deep.

On the eastern verandah the original flagstone floor has survived in very good condition, and with the concrete floor of site 257 coming right to the edge of the verandah, it was not difficult to find the postholes. At the south-eastern corner, feature 13 was set in from the edge, 20cm diameter and 40cm deep with the remains of an apparently squared post, some 12 x 8cm. Some sort of tar or bitumen had been poured around the post, possibly as some protection against white ants. Features 14 and 15 were found within gaps in the flagstones, being 20 x 40cm and 20 x 60 cm respectively; the post remains in 15 were also rectangular, 10 x 8cm. Feature 16 at the north-east corner was set out from the verandah slightly, and was 20-25cm in diameter and 45cm deep. The two square or rectangular post remains found along this verandah may have been replacements.

Two other features were discovered, at either end of the structure. Feature 17, at the southern end, was a large pit, just over 2 x 1.5 metres, and 50cm deep, and adjacent to a concrete tank stand. The date of both stand and pit are uncertain, but is is possible that they were used at the same time. The pit contained several layers of soil, varying between a brown gravel and narrow bands of dark brown coarse textured material, and again it may have had some gardening purpose. It would have been shaded by the building for most of the day, and could have been a vegetable garden. The nearby tank would have helped in watering this garden. In the narrow gap between the stand and the pit, where the two overlapped, a number of beer bottles were found that may be of the 1950s period. The artefacts from the pit itself were too small for positive dating or even identification.

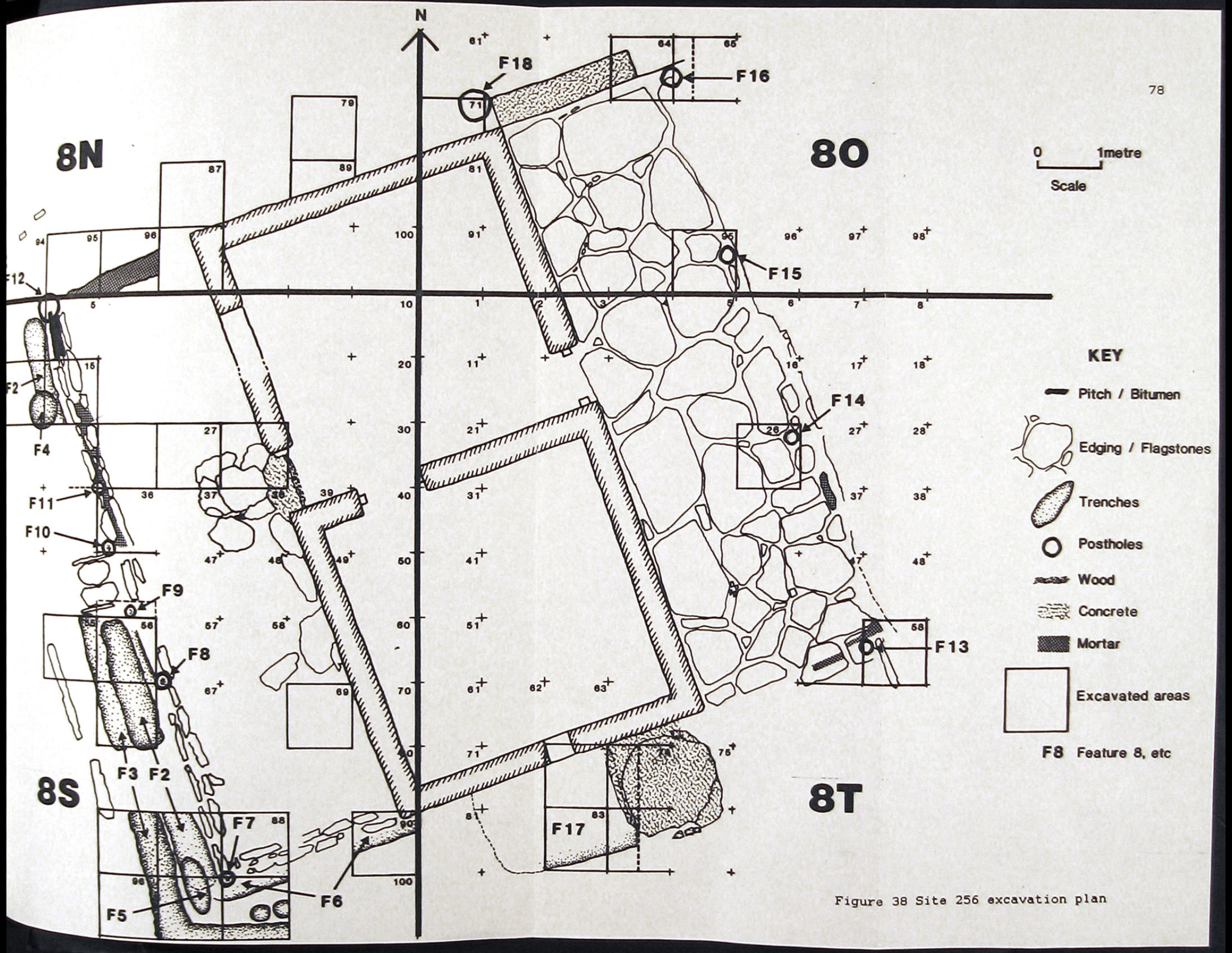


Figure 38 Site 256 excavation plan

At the north-east corner of the building, next to a concrete ramp leading from the north end of the east verandah, feature 7 a large posthole, was discovered. It was unusual in that there were no signs of the wood staining from the post, the deposits being generally gravelly; it was 40cm in diameter and 70 cm deep. Just 10cm to the south, between the posthole and the north wall of the building, a small pipe had been securely set into the bedrock.

Most of the artefacts, and all the identifiable material, came from feature 1, and generally date from the 1950s or later. Apart from the c. 1950s bottles found within feature 1, very little glass was identifiable or datable, though fragments of green glass in features 2 to 6, and 17, may be from early beer bottles. The other artefacts tended to follow the same pattern. Most of the cartridges came from feature 1, some were of post 1920s date and some could be quite recent, while others could be of any date. Feature 3 had one .22 with a U headstamp indicating manufacture before 1913. Most of the cans came from feature 1, and were 1950s or later; the other features only produced the odd can fragment and key. Pieces of bone were found throughout features 2, 3, 4, 5 and 17, which would fit in with a gardening purpose. Pottery is rare at Arltunga, though more was found in the surface scatter collection in this precinct than was expected. During the excavation some fragments were found in features 1, and 5, while 16 had a surprising amount- although it was close to the original kitchen. Lamp glass was found in features 1, 2, 3 and 5, but kerosine or gas lamps would have been used right up to the recent tourist times.

Nails were numerous, 275 in all plus fragments, though quite a number were too rusty for positive identification. Examples of the early rhomboid and rose head nails came from features 1, 2 and 17 and in this case it is not surprising to find some early artefacts within feature 1 because it was made up of original wall material. Other building hardware, such as bolts and spikes, corrugated iron offcuts, etc, also came mostly from feature 1.

The more industrial items, such as metal plates, pipes and machine parts either came from within feature 1, or between it and the original surface. Most seem to have had some connection with the small two head stamper battery, and may date from the 1950s.

The artefacts from both the limited excavation and the wider surface scatter collection suggest a very much longer occupation of this precinct than in the White Range area. In fact, the familiar White Range artefacts were largely unseen here, although it is possible that a rubbish dump well north-east of the surveyed area may contain "early" artefacts. Artefacts were found that could be dated to the 1920s and later, with a concentration in the 1950s. This 1950 occupation may be connected with the small two head stamper battery set up between the police station buildings and the well.

The discovery of the garden bed along the edge of the western verandah of site 256 was unexpected, but most interesting. It shows the considerable effort that could be put into an attempt to cope with the long, hot summers. The west facing verandah would have become very hot during summer, and it is thought that the garden bed was an attempt to provide a screen of vines or shrubs to keep the sun out of the building. This gardening attempt is also a sign of a perceived long occupation of the police station buildings, as no such passive cooling system has been found elsewhere, so far, at Arltunga. The wind tunnel at White Range site 98, although an equally effective passive cooling system did not require major upkeep, as this garden would have required. It also suggests that there was a plentiful supply of water in the nearby well, and sufficient labour available to keep the garden watered.

2.4.3 Battery & cyanide works, Star of the North well.

The surviving buildings and plant from the battery stand on relatively flat ground, circled by hills. The plant, and more official buildings associated with the works are found on the eastern side of the precinct, close to the well. The more apparently domestic structures, varying from formal to bush types, are dotted around to the north, south and west with one isolated chimney to the south-east (Figure 39). Of the gold that encouraged miners to settle in this area, only one of the mines, on a hill to the south-west, is visible from this precinct, though other mines were worked to the north and east.

There are six conventional, stone structures surviving within the precinct, usually of random rubble with lime or earth mortar, the type 1 structures. Those that are still in good condition have been protected by internal renders and the use of an external lime mortar. At least two of these, sites 193 and 194, and possibly a third, site 195, appear to be related to the treatment plant. Site 195 is one of the three walled structures that may be connected with blacksmithing, wagons and/or horses, and appears to have a large forge fireplace (site 196) close by. Such a forge may have been necessary for on site maintenance of the plant, as well as for more general repairs associated with living in an isolated area. One, site 191, also close to the machinery area, is marked only by a chimney and partial stone walls. Two others, sites 180 and 184, appear to be more domestic in function, and are well away from the works area.

Of the more usual "bush" structures, as found at the White Range, there are two obvious houses - sites 197 and 198 (type 2). Site 197 is in poor condition, with its main walls largely collapsed, while site 198 is in better condition. Three other structures in the precinct covered by the surface scatter collection work are partial stone remains. Site 186 has a chimney and associated floor area; site 187 is a rectangular stone foundation with additional floor area, and site 188 is a small chimney (types 3a and 3b).

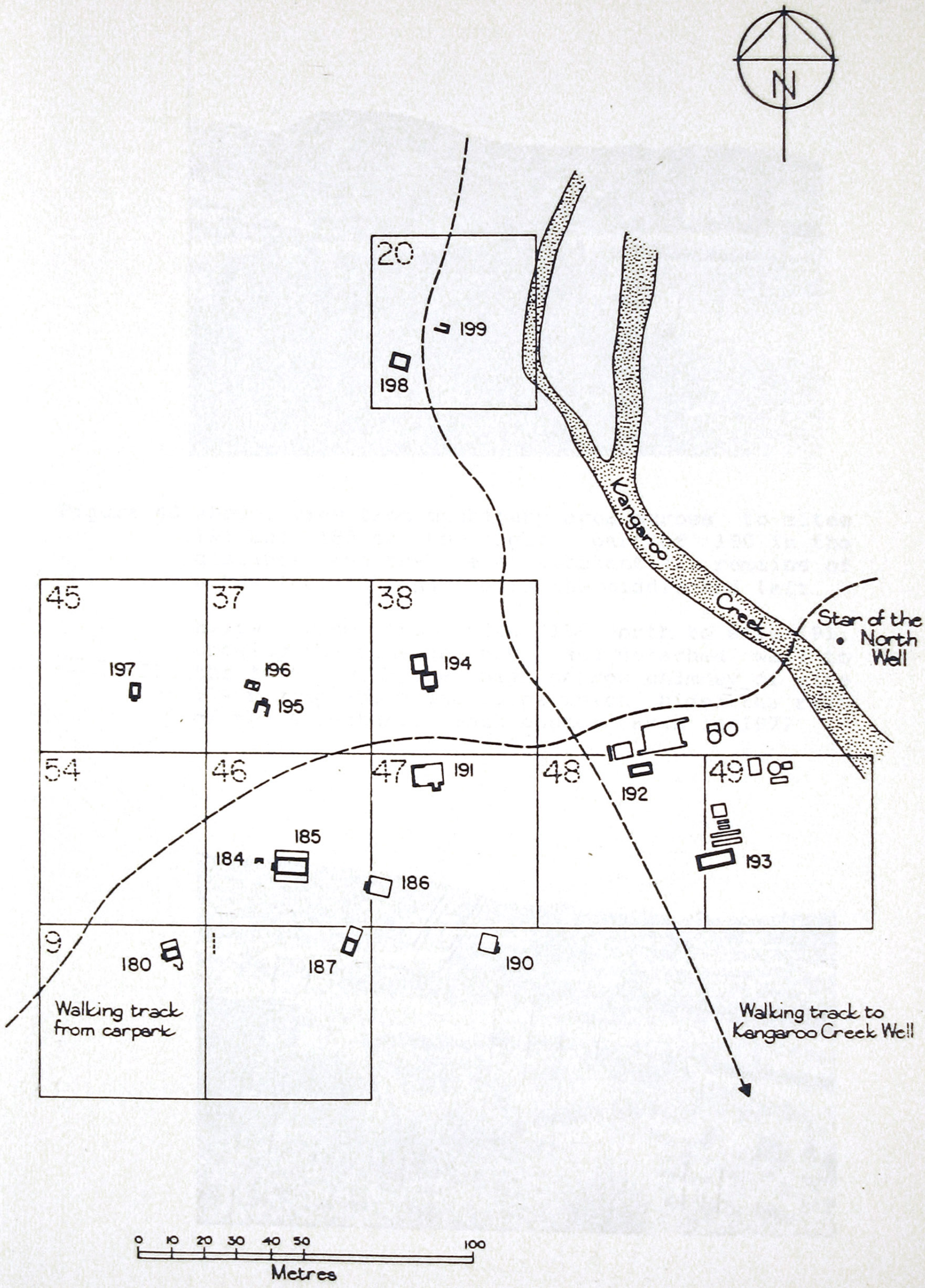


Figure 39 Plan showing the major buildings and relics of the Battery & Cyanide Works, at the Star of the North well.

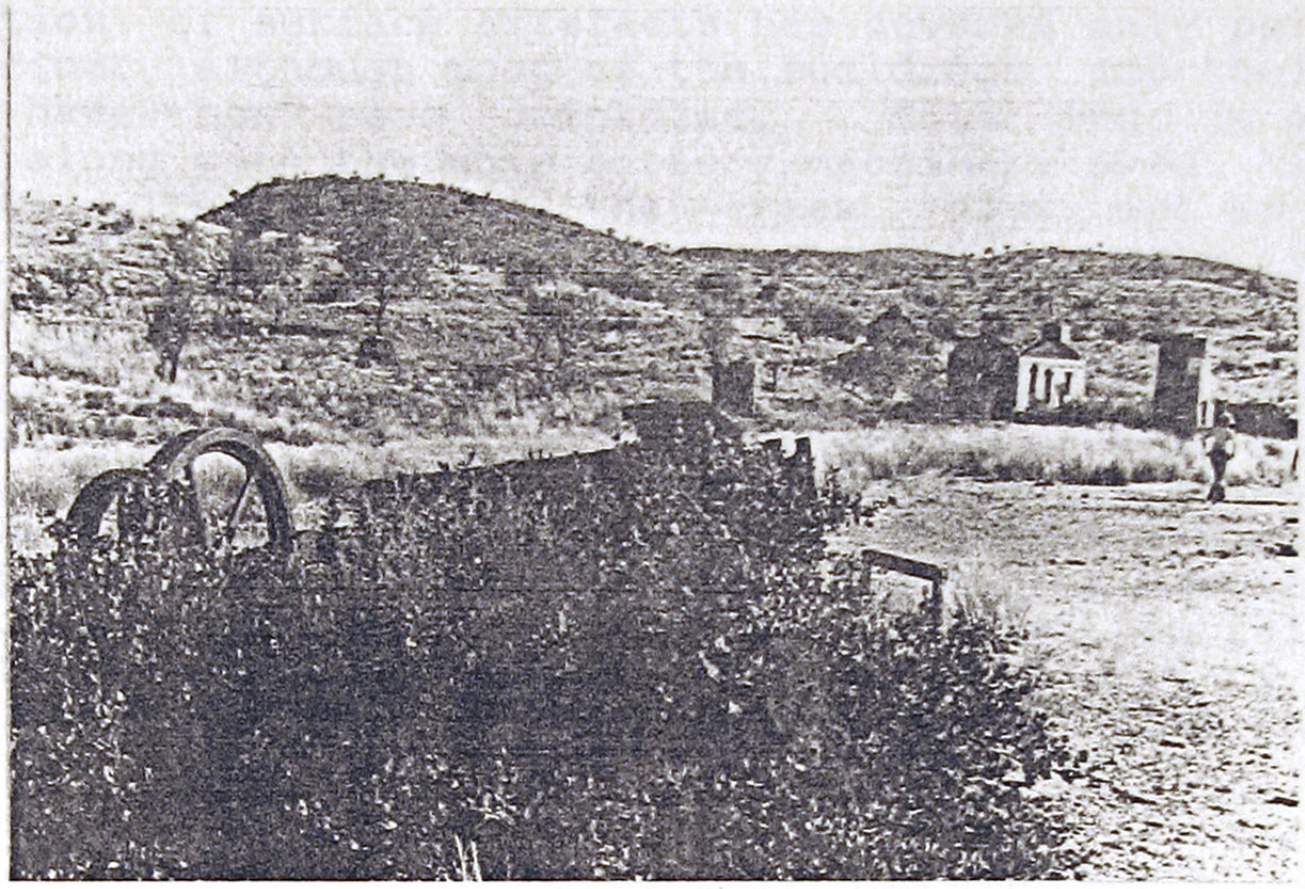


Figure 40 Above, view from machinery area across to sites 191 and 185 on the right, part of 180 in the distance, and the less substantial remains of sites 186, 187 and 188 in the middle and left.

Below, view from site 186 north to site 191, showing the fine chimney, and detached wall to the left, with the high narrow chimney of site 194 rising above the slope which hides the rest of the structure. Both photos taken in 1977



The collection of surface artefacts has covered only part of the precinct, although most of the buildings and their surrounds have now been completed. Site 190 is an exception, along with the main battery/machinery area; the more remote sites east of the creek, have not been included. One of the isolated larger structures, site 198 wasn't included in the grid, but some work has been done there as the interior had to be cleared before conservation work was carried out in 1983. When the 1984 field season began, covering the major part of the precinct to the east of sites 180 and 197, a slight change in approach had been decided upon. During the first season, any fallen stone had been left in situ, but as the conservation programme was in full swing, it was now felt that any fallen stone that was not obviously part of a structure, should be removed to some distance from the building.

Artefact analysis has been completed on the glass and begun on the nails only, as staffing for this project was cut back before a complete analysis was possible. So far the remaining artefacts have only been sorted on paper, so some information is available as to their presence or absence, and there is some idea of a date.

The first season of field work began at the western end of the precinct, and covered the area from site 197 in the north, down to site 180 in the south; and 110 by 30 to 40 metres was surveyed, the most complete for this precinct. Limitations of time, money and labour restricted further work to the building surrounds.

The quadrats, or 50 metre squares which formed the basis of the grid used in the surface scatter collection, are also used as the basis for discussing the different structures/uses of the precinct. Parts of four different map sheets coincided at this precinct, and quadrats are described within their map sheet groupings, starting from the north-west corner and moving to the east and/or south. Three of the structures were the subject of some limited archaeological work, largely to uncover postholes or prepare for conservation works.

Map reference 130-162, quadrat 45, site 197

An area of 40 x 30 metres was collected, letters M to Z, with the structure sitting within square S. The western squares of M, R and W were looked at, as there was a small scatter of rubbish, centred in R, "behind" the building. The more rocky and hilly country further west contained turn-of-the-century rubbish, but seemed to be fairly safe from the depredations of the casual visitor, being a reasonable distance from the structure. As with the fieldwork at the police station precinct, the modern artefacts clustered around the obvious buildings.

The structure, site 197 is rectangular, one room approx. 5 by 3.5 metres, with a chimney at the southern end adding another 1.7 metres. The use of mud mortar, only partly protected by internal and external lime render which is now in poor condition, has meant considerable collapse of the walls - especially the east wall. The entrance appears to be at the north-east corner, with a possible window or door in the west wall. A protective roof has now been placed over the building; it has been suggested that the site could be excavated, and left open for interpretive purposes. A major difficulty is that the site is unlikely to produce more than a posthole or two, while another is the preservation of the site. On the other hand, previous experience indicates that visitors to Arltunga would be interested in the archaeological side of the conservation programme.

The surface artefacts were relatively sparse, apart from the small rubbish area just west of the structure, and a hollow in U 91 and 92, Z 1 and 2, to the south-east. Some quite large pieces of glass were found in this area, before the field assistant was persuaded to give up the minor excavation, but further work in that area may be as helpful as excavating the building. The identifiable glass all belonged to the pre-World War I period, apart from some modern stubby glass. There were examples of beer, spirits, sauce/pickle and pharmacy bottle types. Nails were surprisingly scarce, with flat and rose heads the dominant types. Initial sorting of other artefact types suggest that a number of hole-and-cap cans came from this quadrat, as well as domestic pottery, tobacco tabs and matchboxes, wire, various metal objects and four buttons.

Map reference 130-162 quadrat 54

This quadrat is the only one surveyed so far which has no surviving building, and was included in the 1983 field season because it covers the gap between sites 197 and 180. An area of 50 x 30 metres was covered, leaving the western, rocky slope untouched. It was anticipated that the collection would be relatively easy, because of the apparent lack of building. Comparatively little was found in the southernmost squares, while the track meandering through the south-eastern third meant that P, T, U, X, Y and Z were all fairly sparse. The remaining squares, particularly those on the western side, produced an amazing amount of material, with the glass being unusually fragmentary; this may be the result of higher vehicle use, due to the lack of above ground remains. Comparatively little is identifiable, though most fits with the pre World War I types, i.e. beer bottles of the champagne type, in green or olive. Some preliminary plotting of the nails from this quadrat has been done, which has shown a concentration in squares J and O; most of the glass was found in J and the squares to the west - C, H and N, in the north-west part of the quadrat.

Of the glass that can be identified, almost all dates from the early period, apart from some possibly 1930s material in square Y (not far from site 180, see below) and some stubby glass around the track. Unfortunately the 10 metre square J, containing the most glass by weight, still has to have the diagnostic fragments identified or typed. So far 6 beers, 19 spirits, 5 pharmacy, 9 sauce/pickles and 8 unknowns from pre-World War I have been identified, plus 2 spirits from the 1930s and 1 pharmacy from the 1920s. The usual range of metal objects was found; although complete cans were few, many fragments showed signs of the early hole-and-cap construction. Such a wide range of domestic/ recreational material reinforces the probability of below ground building remains; major archaeological work within this quadrat could prove to be very interesting.

Map reference 130-161 quadrat 9, site 180.

A 30 x 30 metre area was looked at, covering the substantial structure known as the assayer's residence, and a small semi-circular stone arrangement to the south-west. A low stone wall crossed the south-eastern corner of this area, and continued around the slight hill behind the nearby manager's residence, site 185; the purpose of this wall is not yet understood.



Figure 41 The well built site 180, before conservation work began in 1983. Taken from the north-west.

Site 180 is a well made one roomed structure, with chimney, and signs of a gable roof, almost 5 by 4 metres in size. The interior shows signs of a bitumen floor, fairly worn at the entrances on the north and south walls, and through the middle of the room. A lean-to addition, possibly a kitchen seems to have been added to the south-east corner, 2 by 1.5 metres plus oven alcove 1.75 by 1.2 metres. The walls of this addition were in very poor condition, and largely collapsed; the floor appears to have been dirt. The verandah on the north side is 2.25 metres deep, with stone steps at each end. Outside, on the east wall of the main room is a small solid stone foundation, 1.2 metres square, possibly a forge fireplace. The main part of the building appears to have been put up by a professional, and the gable ends suggest a corrugated iron roof.

The glass fragemnts were scattered quite lightly over most of the quadrat, with the major concentration in the south-east, around the small semi-circular stone arrangement, and on either side of the low stone wall, in O and P. While the latter squares mark the southern boundary of the area surveyed, this slight concentration is some 10-20 metres from the back door of the main room, and the kitchen. The beginning of a moderately steep rise to the south and east may have discouraged the occupants of this structure from disposing of this rubbish at some further

distance. What is of interest is the fairly wide date range, from the early pre-War occupation, then most of the 1920s material found at the precinct, plus some from the 1930s and possibly later, as well as the ubiquitous modern stubby glass; there is little identifiable 1950s glass. As in quadrat 47 there were comparatively few nails and those were mostly flat or rose headed types. Quite a few cans have been noted, particularly in square O, which seem to be a mixture of old and more modern types. The concentration of cans coincides with the semi-circular stone arrangement suggesting that it was used as a rubbish pit.

A minor excavation was carried out to find the exact position of the verandah postholes, some months after the original fieldwork, and it was pleasing to find that the grid could be re-established quickly. The postholes were quite simple to find, as there were gaps in the verandah edging stones, and the squares D 30, D 38 and D 46 more than covered the necessary excavation. (Figure 42). In all three squares the postholes contained a soft dark brown soil, easily distinguishable from the surrounding reddish-brown soil; they were between 30 and 35 cm deep (from ground level) and 15 to 25cm in diameter (the central one being the smallest). The finds were few, and and so fragmentary as to be unidentifiable with any particular types, though appearing to be from the pre World War I period.

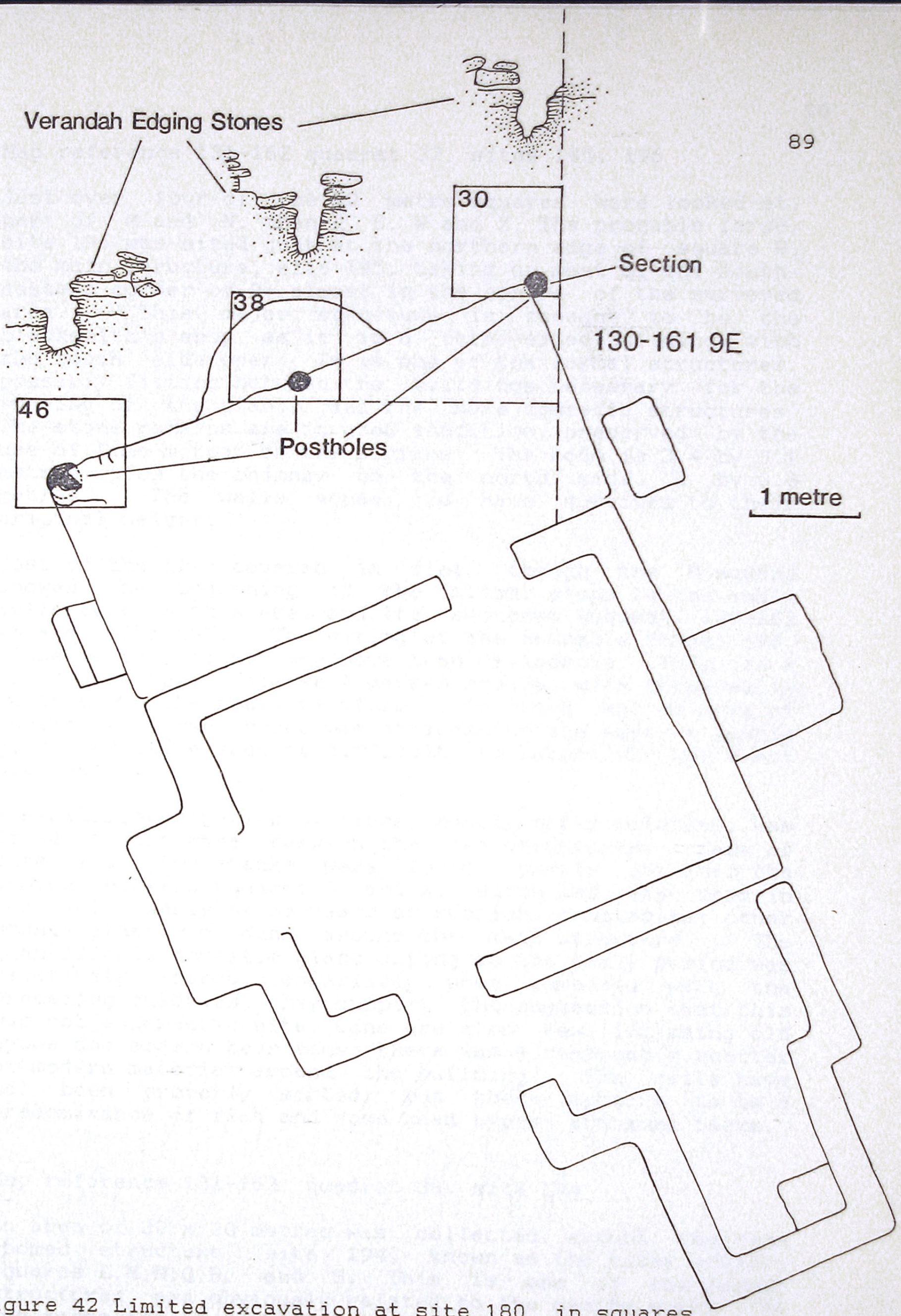


Figure 42 Limited excavation at site 180, in squares 9 D 30, 38, and 46.

Map reference 131-162 quadrat 37, sites 195, 196

Just over four of the 10 metre squares were looked at, part of M and N, then R, S, W and X. The probable forge, site 196 was sited just at the northern edge of square R, the main structure, site 195, taking up most of the south-eastern corner of R, almost in the centre of the surveyed area. This major structure is thought to be the blacksmith's shop, as it is a three-sided building, with the south side open. It is one of the formal structures, possibly fitting between the buildings necessary for the running of the plant, and the more domestic structures. The stone remains are in good condition, preserved by the use of lime mortar on the surface. The room is 3.4 by 3.1 metres, plus the chimney on the north side, 2 by 0.8 metres. The walls appear to have survived to their original height.

Most of the area covered is flat, though the M square showed the beginning of the slight slope to the small gully between this area and the adjacent quadrat, 130-162 45 and site 197. The siting of the probable forge, 196, close to this slope, may have been deliberate. This is a solid structure, almost 2 metres square, with three walls built above the base platform. An extra walled area of another 2 metres square was attached to the west; a jumble of fallen stone made it difficult to establish the exact outline.

A small concentration of glass, mostly early material, was found in the area between the two structures. East of site 195, two tanks were found, partly set into the ground, between squares S and X, which had been used in the last twenty or so years as rubbish receptacles; other stubby glass was found around the main structure. The identifiable domestic glass dating to the early period was relatively scarce, especially when compared with the preceding quadrats, may support the suggestion that this was not a domestic site. Cans are also few, including old types and modern beer cans; there was a reasonable scatter of modern material around the building. The nails have not been properly sorted, but there appears to be a predominance of flat and rose head types, and some tacks.

Map reference 131-162, quadrat 38, site 194

An area of 30 x 20 metres was collected, around the two-roomed structure, site 194, known as the assay office; squares L,M,N,Q,R, and S. This is one of the formal structures, and obviously related to the nearby works. The two rooms appear to have been built separately. There was a considerable slope down from the southern edge to the northern part of this quadrat, and the south room of the structure has been partly set into the ground. This room, of some 4.2 by 3 metres has a fine chimney in the south

wall, 1.5 by 0.8 metres; the entrance was at the eastern corner of the north wall. The west and part of the south wall needed major restoration work, as they had collapsed, due to the retention of water in the ground behind the walls. The northern room, 4.5 by 3.4 metres, is in good condition, with the internal render and external lime mortar protecting the stone and earth mortar of the walls. The entrance is in the east wall, with a probable window in the north wall.

The artefact scatter was light in the western area, at the back of the building, but increased in the east, particularly in square S. Of the identifiable bottles, the early types include one probable industrial, as well as the usual beers, spirits, and only one sauce/pickle base. The only pharmacy bottle is of 1920s manufacture, while two beers of the same date, and one probably from the 1950s were also found. While the number, or variety of spirits bottles found around the buildings is less than in the more domestic quadrats such as 45 and 54, it is still quite high for an office site. Pottery has been found in all quadrats, but more was found here. Most common was a coarse earthenware which appears to have been from crucibles used in the assaying process. The unusual metal objects included several pen nibs and other stationery items as well as heavier metal possibly connected with assaying. The nails, while few, were mostly flat or rose heads, and some tacks were noted.

Map reference 131-162 quadrat 46, site 185, 186

Here an area 50 x 20 metres has been covered, though due to pressure at the time, square L has not yet been recorded. The major structure is site 185, a formal type and the largest of the domestic buildings. (Figure 40). It has two rooms, together 10 by 5 metres with verandahs 2.5 metres deep on the north and south sides. The eastern room has a chimney, 2.2 by 1 metres, and the gable ends indicate the pitch of the original roof line. The roof was probably corrugated iron. The internal render, and external lime mortar had protected the walls, but removal of the timber lintels over time had lead to cracking, and loss of stone, which has now been repaired.

A small spur juts close to the southern side of the structure, and provided a natural limit to the surface scatter collection; the low stone wall noted in quadrat 9, continues around this spur.

The artefact scatter around the building was relatively sparse, except for a concentration in square T, close to the doorway in the eastern end. In fact, very few diagnostic fragments were found in this quadrat, and the square T material has yet to be analysed. More modern

artefacts were obvious around the building, but many others were too fragmentary for possible dating. The nails, so far only noted, appear to be mostly flat heads, with more bullet head, possibly more modern types, than found in other quadrats.

Site 186, quadrat 46 and 47

This is one of the smaller bush structures, a chimney with floor area which lies close to the eastern end of site 185, and across the two quadrats. The chimney at the western end is in quite good condition, 1.5 by 1.2 metres. The floor area was not well defined along the southern edge, but appeared to be some 6 metres square. Squares 46 U and Z, and 47 Q and part of V, were investigated around the building. The artefacts were few, the small concentrations in U and Z resulting from more recent visitors, being of the soft drink variety of bottles. The nails have only been noted, but roseheads seem to dominate.

Map reference 131-162 quadrat 47, site 191

Apart from the small area around site 186, an area of 30 x 15 metres was checked around the remains of site 191. This building is placed on a flat area, not far from the main plant, and is one of the more unusual of the apparently formal buildings. It is very close to the machinery area of the old works, but only some of the walls were of stone. The fine stone chimney, at the south-east corner has been well made, but a detached low stone wall to the west was more roughly constructed and is now partly collapsed. The floor area is indicated partly by paving and partly by bitumen.

The surface artefacts were surprisingly light, with little diagnostic material. Domestic items included glass and pottery, but very few cans, some possibly dating from the early period. While not a major structure, it is still quite a visible one, and so had its share of modern material - foil, plastic, cigarette butts, etc.

Along the line of the south wall, between the chimney in the east and the stone west wall, a low jumble of stones was noted, mostly in B 95 and 96. When these were cleared away, it was realised that there was quite a difference between the floor level inside 191, and the ground level to the south - some 25cm. A stone foundation was uncovered, including one very large stone in B 95 which could be a door step; while a posthole was found in B 96. This suggest a very wide door in the south-west corner, almost two metres from the post to the short section of stone wall extending from the main western wall. (Figure 43).

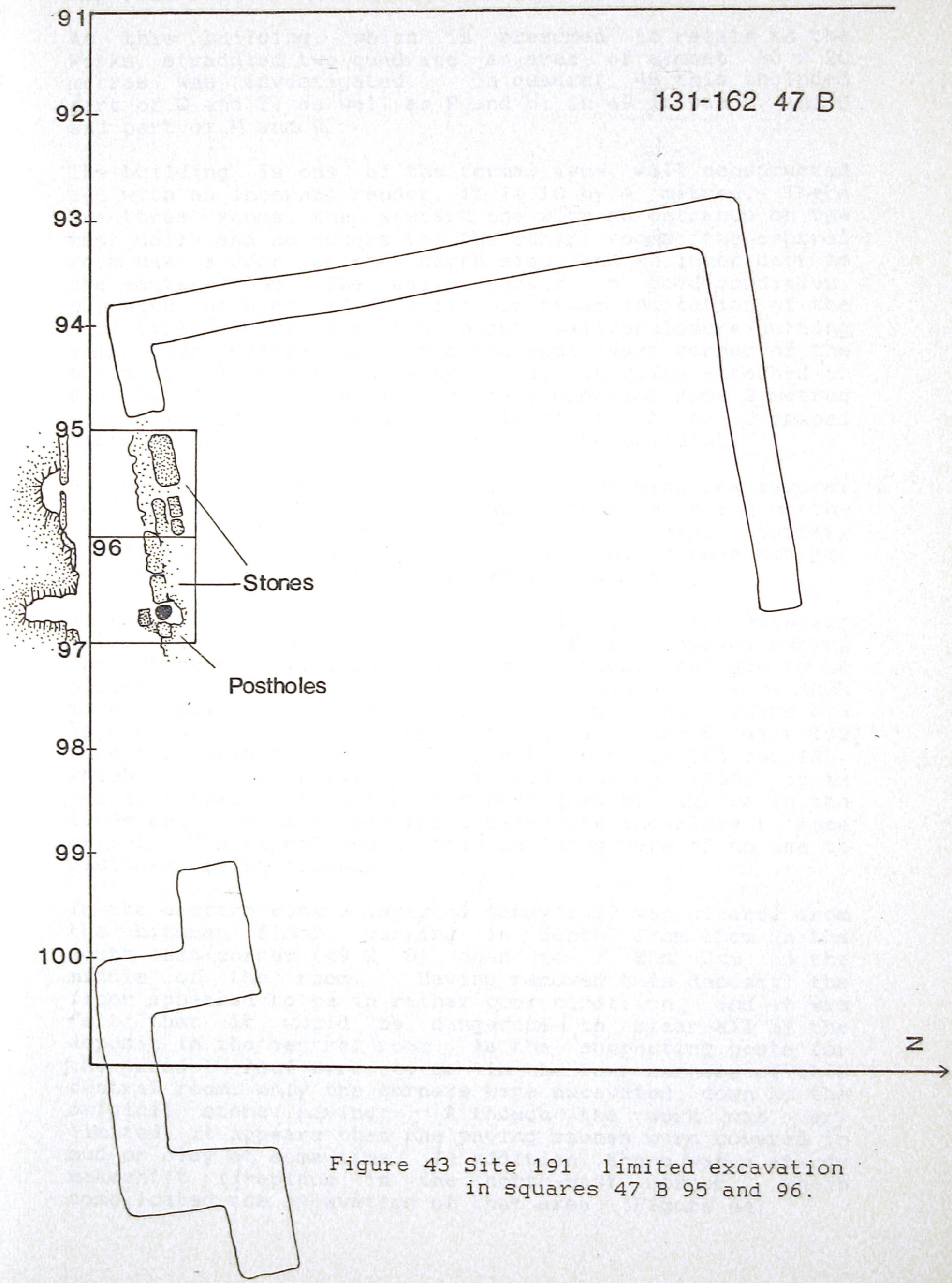


Figure 43 Site 191 limited excavation in squares 47 B 95 and 96.

Map reference 131-162 quadrat 48 and 49, site 193

As this building, which is presumed to relate to the Works, straddled two quadrats, an area of almost 30 x 20 metres was investigated. In quadrat 48 this included part of O and T, as well as P and U; in 49 it was L and Q and part of M and R.

The building is one of the formal type, well constructed and with an internal render, it is 10 by 4 metres. There are three rooms, the western one with an entrance on the west wall, and no access to the other rooms; the central room has a door on the north side, and an inner door to the eastern room. The walls remain in good condition, but with no sign of a gable, or other indication of the roof line. There is a low "bush" wall/enclosure jutting some four metres out from the south-east corner of the building. At the south-western end, not quite attached to the building, is a low stone foundation some 2 metres square - possibly once a forge fireplace. A low U shaped stone "structure" was found south of the building.

At the north side, or front of the building are several long rectangular foundations, and further north and north-east are the remains of boilers, engine, battery foundations, cyanide and other tanks, which have not yet been covered by a surface scatter collection.

As the first site of the 1984 field season, the exterior fallen stone found along the south wall was removed during the artefact collection. And as a parasol roof was to be placed over the building, it was necessary to look much more closely at the interior of the building. There did appear to be a greater depth of deposit inside site 193 than had been obvious at other sites such as 185 and 180, which also had parasol roofs fitted during 1984; it is probable that the latter had been used by campers in the 1960s and 1970, and they had cleared the interiors to some extent. The fireplaces at this building were of no use to visitors, being closed.

In the eastern room a layer of sandy soil was cleared from the bitumen floor, varying in depth from 10cm in the south-east corner (49 Q 8) down to 1 and 2cm in the middle of the room. Having removed this deposit, the floor appeared to be in rather poor condition, and it was felt that it would be dangerous to clear all of the deposit in the central room. As the supporting posts for the parasol roof were to go in the four corners of this central room, only the corners were excavated, down to the original stone paving. Although the work was very limited, it appears that the paving stones were covered in mud or clay at some time. In addition, there was a sturdy makeshift fireplace in the north-east corner which complicated the excavation of that area. (Figure 44)

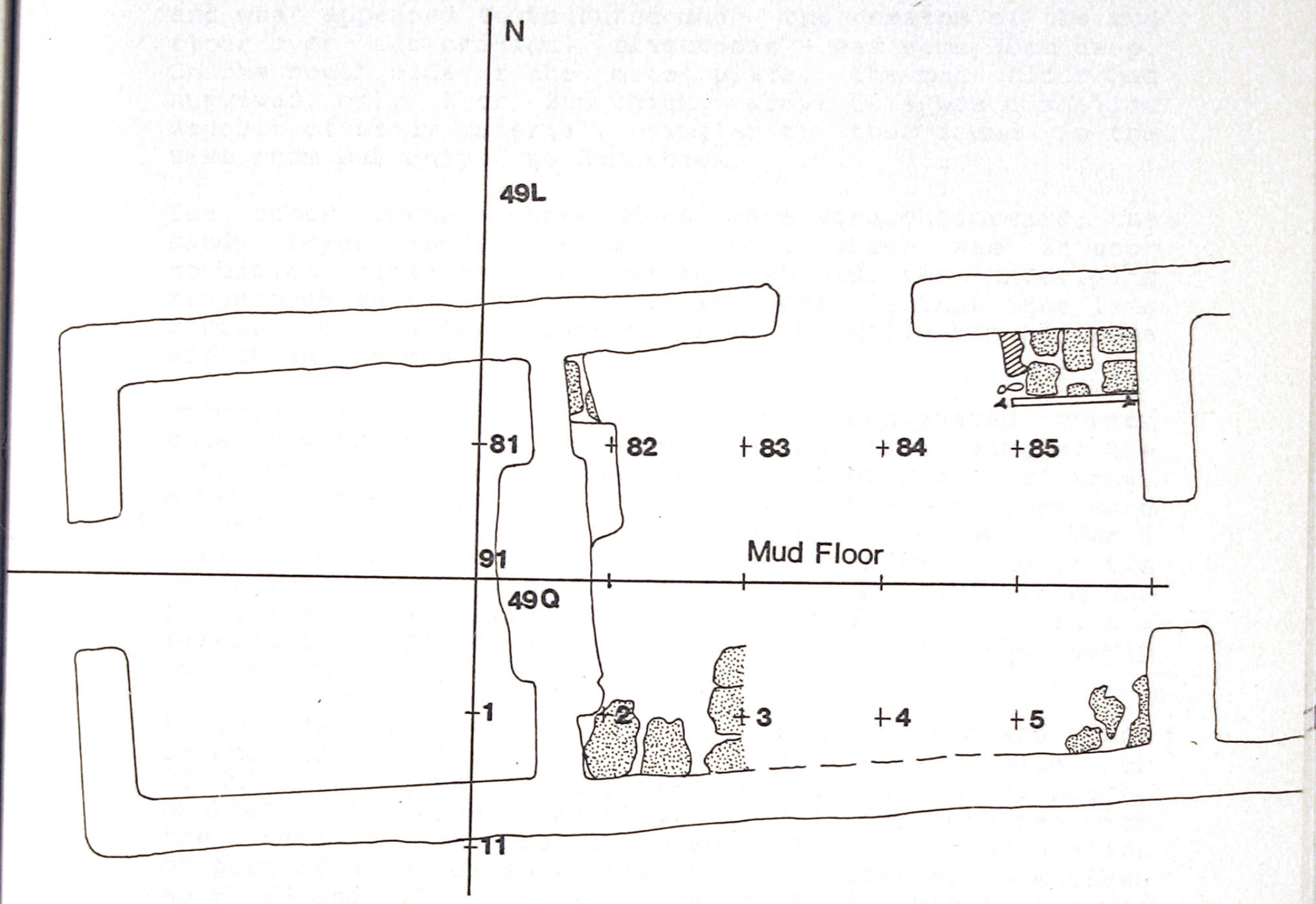


Figure 44 Site 193 limited excavation in 49 L and Q

The fireplace had been made by driving star pickets into the ground, and wedging a heavy metal plate between the two pickets at either end - this formed the front of the fireplace. The narrow side was built up with some large stones, while the walls of the building provided the other two sides. The fireplace covered squares 49 L 84, part of 83 and 73. Inside the metal plate the build up of ash, and what appeared to be burnt mud - the remains of the mud floor over the original flagstones - was some 30cm deep. On the south side of the metal plate, the mud floor had survived, only 1 or 2cm thick; above this was a shallow deposit of sandy material, similar to that found in the east room but only 2 to 3cm thick.

The other corners were much more straightforward; the sandy layer above the mud floor, which was in poor condition close to the walls, showed the underlying flagstones quite clearly. It is possible that the lime mortar, or fallen plaster from the walls has had some effect on the mud floor.

Unfortunately, when comparing the designated corner squares with the real grid over the building, some of the interior squares were found to be slightly out of true. However, the artefacts from inside the structure were relatively few, though apparently of the pre World War I period, apart from one post-War beer neck found in the north-west corner. One early beer neck came from the fireplace area, although it seems unlikely that such a fireplace would have been necessary in the early occupation.

A considerable scatter of surface artefacts was found around the building, both on the northern side, or "front", facing the battery shed, as well as to the south, or back. An unusual concentration of glass, combined with the underlying softness of the soil, led to the excavation of part of a hollow south-east of the office, in squares 49 R 74 and 75. The southern part of this hollow was excavated, to a depth of 20cm, containing a multitude of artefacts. Three complete or almost complete bottles suggest an industrial use. Other early bottle types included beers, spirits, sauce/pickle and pharmacy types, plus some dating to the 1920s and 1930s. More pottery fragments were found than usual, and the notes suggest that at least some were from crucibles. Nails were well represented, but have not yet been sorted out. Some modern artefacts were noted, as well as domestic items possibly from earlier times, such as tobacco tabs, some cans, etc. Of particular interest, because of the unusual concentration, was the number of horseshoe nails, or fragments, found in 48 P. Square P 2 had 235 nail shafts, P 11 and 12 had 62 each, as well as a number of heads and nails found in the adjacent squares. Such a concentration is not so surprising, as the original access to the works was via the track leading south from quite

close to site 193. The reasonably flat area on either side of this track, between site 193 and the battery area would have been important for carters bringing in stone for treatment.

Site 198, quadrat 20

The stone "house" is the finest, most complete, "bush" structure at this precinct, and a little isolated from the other structures. It is rectangular, almost 5 by almost 4 metres, with an entry on the east wall and possible window spaces on the other walls. There was a considerable amount of fallen stone and mortar within the building, which largely covered the stone flagged floor. When the fallen stone was removed, quite a thick layer of lime mortar was found, apparently fallen from the walls over time, and now packed into a little ledge around the base of the walls.

The interior was cleared in preparation for conservation work. It was not surveyed into the grid plan for the rest of the precinct, and there has been little analyis of the artefacts. One extremely important artefact was found, the complete example of the possibly transitional beer bottle - retaining the "champagne" shape of high pushup and finish, but showing heavy seams on the body, base, and even offset on the finish itself. While such bottles may have been made from the 1880s, the comparative rarity of such items at Arltunga may suggest they arrived only in about the 1910 decade.

Map reference 131-161 1, sites 187 and 188

This quadrat lies south of site 185, the manager's residence, and part of site 186, the nearby chimney with floor. Only a small area was looked at, the end squares of D, all of E and half of K, to cover the two buildings. The structures are minor, bush types, site 187 being a rectangular, walled room, plus paved area and site 188 is a small chimney. Site 187 is a low stone walled structure, the main room being 3.8 by 2.8 metres, and the paved extension to the fron, or north-east, being some 4.5 by 3 metres. Site 188 could be the chimney for the nearby site 187 "rooms", and is notable for its steel lintel, possibly purloined from the works area. It is a small chimney, only 1.5 by 1 metre, with a short extension or wall of 50 cm. on the western side.

The artefact scatter was light, but included some modern material - 2 burnt aluminium cans were noted, one inside site 187 and one near site 188. The nails were the usual

flat and rosehead types, and 35 tacks were noted, mostly clustered around the walled room of site 187. Very few cans were found, but some at least were of the hole-and-cap type. Only one identifiable bottle fragment was found, an early pharmacy neck.

The precinct is of interest because of its mix of building types, from the formal structures to the bush types. Its importance as apparently the only major treatment plant site within the Reserve, is obvious, and this major use of the site may explain the variety of building types found here. Sites 193 and 194 appear to be related to the works, and presumably have been built for particular purposes. They, along with site 191, are the surviving buildings closest to the machinery area, the remainder being scattered some distance from the sound of the treatment plant.

While the precinct has not been completely collected, and the major rubbish dump for the early occupation has yet to be located, the bottle fragments do provide some pointers to the differences between the domestic and more industrial structures, as well as the apparent use of buildings in the 1920s and later. The incomplete analysis of the remaining artefacts is frustrating, but the notes show the usual scatter of items such as packing case tin, cartridge cases, cans, nails, unidentified metal possibly from the early years, up to recent tourist rubbish. Some areas would benefit from more detailed archaeological work, such as quadrat 54, and site 191 in quadrat 47. One other domestic building, site 190, still needs to be checked, as do the various structures in the northern part of the precinct, as well as the main battery area itself.

2.4.4 MacDonnell Range Reef precinct

This area was chosen for survey, conservation and presentation to the public as the most accessible, but hitherto apparently unvisited mining site close to the main precincts discussed above. Access is from a track leading north from the road between the police station area and the Crossroads, and quite close to the latter. (Figure 45) There is no known well within close distance of either the MacDonnell Range Reef mines, or other mines and buildings in the vicinity. The nearest wells were at the Crossroads, Works or police station precincts.

The area covered at the MacDonnell Range Reef was comparatively small, less than 200 by 100 metres, divided into two smaller areas. One was close to the mine workings, and included two small structures, while the second, separated by some 80 metres, and containing the remains of four small structures, is to the east. The access track winds through the eastern section, ending at the mine workings in the western section. Since the area was opened to the public, the track close to the mines and buildings has been closed, and visitors walk the five hundred metres from the carpark.

Western Section

Few artefacts were found amongst the mine workings, and the surface scatter collection was superficial. Just to the east of the workings was an area containing two small structures and a medium rubbish scatter down a slope. Parts of two quadrats were investigated in this section. All but five of the obviously modern artefacts were found here.

Map reference 135-161, quadrat 52

Eight of the 10 metre squares were looked at, in the south-western quarter of the quadrat, M, N, Q, R, S, V, W and X. The southernmost squares were on a small flat, and part of the original access track crossed the area. North of the track, there was a quite steep slope down to a narrow gully. Although there was no structure within this quadrat, site 169 was at the edge of the adjacent southern quadrat, 135-160 7, and it is believed that the rubbish scatter in 52 originated from that small foundation.

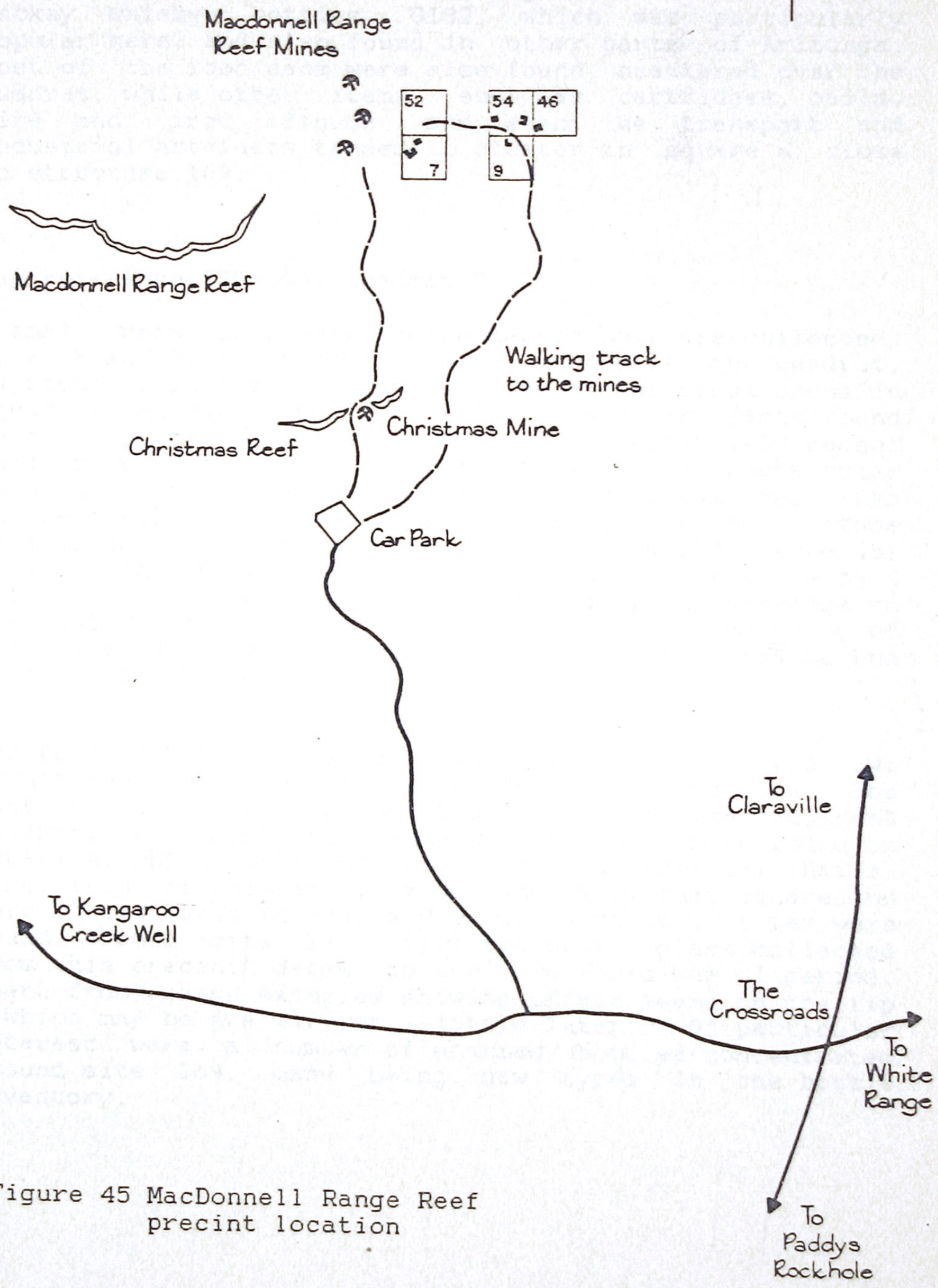


Figure 45 MacDonnell Range Reef precint location

Most of the glass was found in 52; one advantage of the comparative scarcity of artefacts at this precinct as a whole was the possibility of matching bases and necks of fragmented bottles. The most obvious example of this was the piecing together of the fragments of the Whyte & Mackay whisky bottles, G132, which was particularly popular here, and also found in other parts of Arltunga. Most of the food cans were also found, scattered over the quadrat, while other items, such as cartridges, nails, wire and iron offcuts and even the transport and industrial artefacts tended to cluster in square W, close to structure 169.

Map reference 135-160, quadrat 7

A small area, of twenty square metres only was collected, A, B, F and G, in the north-west corner of the quadrat, adjacent to part of quadrat 52. The access track ended in square A, and while there were few modern artefacts found in this precinct, there were signs of relatively recent camp fires in this quadrat. A small rectangular foundation, site 169, (type 4a) some 3 by 2.5 metres, lies at the northern edge of square B. A semi-circular stone arrangement with medium height walls, site 170, (type 4b) lies within square F. It covers an area of almost 4 by 4 metres. The area looked at was bound by the workings to the west, a small hill to the east, and the beginning of the slope down to the Christmas Reef, and the road to the battery, on the south.

Generally the artefacts clustered around the two structures, particularly site 169, the foundation. The scatter was much lighter than that in the adjacent quadrat, 52. Most of the modern artefacts were found in square A, while most of the building material (nails, wire, iron offcuts etc.) also came from that square, or were concentrated in square B around site 169; a few were found around site 170. All the bottle glass collected from this precinct dates to the pre-World War I period, apart from those examples showing offset seams on the lip - which may be pre war, or a little later. Of particular interest were a number of pharmacy bottles concentrated around site 169, many being new types in the bottle inventory.

Eastern section

This was a fairly flat, open area, with comparatively little vegetation, and four small, low stone structures. There was less difficulty with vegetation growth, compared with the western section, but the naturally stony surface provided excellent camouflage for the predominantly metal artefacts. The surface finds were more widely and sparsely scattered than in the western area, as were the structures. Parts of three quadrats were looked at.

Map reference 135-161, quadrat 54, sites 172, 173

This was the most extensively covered quadrat, with 50 x 30 metres being investigated, covering squares L to Z. The access track wandered through the area, though the two small structures were sited at the northern edge of the surveyed area. A natural boundary was formed along the north by the gully also noted in quadrat 52. Of the two sites, 172 was a small solid stone structure, 1 metre square and thought to be a forge fireplace (type 4c). Site 173, some 20 metres east, was a low semi-circular stone arrangement - much less substantial than site 170 in quadrat 7. It covered an area of almost 4 by 2 metres but was only three or four stones high (type 4b).

The artefacts were scattered over the whole quadrat, with a very slight concentration in the middle section, and less to the east and west. All of the artefact function groups (domestic, building, industrial and recreational) and most of the categories were represented in 54, but it was here that a feature of the precinct became obvious. This was the number of tin matchboxes, or fragments thereof, that were found. Such matchboxes have been found at other sites, and precincts, but in comparatively few numbers considering the need for such an item. Most common at Arltunga is the Bell & Black No 4 matchbox, and here were found 8 complete examples, plus 10 without their bases, and 43 lids. For example, at the White Range sites, only 3 incomplete Bell & Blacks were found at site 59, and 7 plus one lid from site 100. It would seem that the small, light and identifiable matchboxes have fallen victim to the casual collector in other areas, and were either too fragmentary, or too well camouflaged, to attract attention at this precinct, which anyway appears to have avoided the fate of heavy visitation that other precincts have suffered.

Map reference 135-160 quadrat 9, site 174

A small area, 40 x 10 metres was collected, squares A to D, largely because of the presence of site 174, another small semi-circular stone arrangement, (type 4b) in square B. This was only about 2 by 1 metres, and more L shaped than U shaped. The two metre grid was used, as the artefact scatter was extremely light, though most function groups were represented. There was a small concentration of glass south-east of the small structure.

Map reference 136-161 quadrat 46

An area 30 x 20 metres was collected, squares L, M, Q, R, V and W, using the two metre grid, as an extension of the major quadrat, 54, and because of the discovery of another small structure. This was a shallow U shape, with the back wall being made of a natural stone outcrop, just over 2 by 1.8 metres (type 4b). Again, the artefact scatter was very light, apart from the number of matchboxes/ fragments and a small concentration of glass in square W, east of the small structure. There were very few other artefacts, and none that could be called industrial.

Generally the domestic artefacts, as represented by bottle glass and cans, were less frequent in this eastern section. There were few identifiable cans, as most had been flattened before being thrown away, and many had lost their ends. This may suggest that part cans were of the old soldered type, where ends could be loosened quite easily, but it is also possible that cans had been cut up for various purposes, and measurements are useless.
The high concentration of matchbox fragments has already been commented on. The only very accurately dated object is the pharmacy bottle, G232, made in Adelaide by F.B. Hughes for Mr. A.K. Newbery between 1905 and 1911.

As this small precinct had no obvious domestic structures apart from the foundation, site 169, it is believed that it could be considered purely as a working site, with the structures serving some industrial purpose. All the surviving buildings fall into the type 4 group, the most insubstantial, which reinforces the working, rather than domestic, function of the site. Excavation around site 169 would be valuable in establishing the original building form and structure. The other sites would also benefit from further work, as little is known about their functions. There is a possibility of timber elements

being associated with these stone remains which may make their particular function much clearer. The forge fireplace, site 172, was obviously necessary for the re-forging and sharpening of tools, and many such forges have been found at Arltunga. The small sem-circular or U shaped structures are of uncertain function though it is possible that site 170, closest to the mines, would have been used for storage of tools, or possibly as a day shelter for the miners. Naturally enough, any working area would contain domestic and personal items - and there are quite a few buttons from the precinct - though these do seem to be concentrated in quadrat 52, close to structure 169. The comparatively light artefact scatter agrees with a daily rather than permanent domestic usage, with the inhabitants living closer to available water.

Precinct	White Range			MacD. R. Reef					Police station						Battery & Cyanide Works									
Site	59	98	100												45	54	9	37	38	46	47	48	49	1
Quadrat				52	7	54	46	9	53	7	8	9	17	18										
DOMESTIC																								
Household:																								
Cooking																								
stove part									1		3													
pot/billy/lid		6		1		1			1	1	7	3	2	1	/	/	/	/			/	/	/	
utensils	3	1	1	1						1	3						/							
unusual	2		1						1															
wire mesh		1	17						31		8	1		4	/	/	/	/	/	/		/	/	/
packing case																								
tin fr.	52	12	56	31	6	5		1	43	5	21	22	6	30	/	/	/	/	/	/	/	/	/	/
hoop iron						2			4		3	1		4					/			/	/	
Furnishings																								
lamp fr.			14	1		2												/						
door fittings	1	2	4															/						
locks/keys		1	4								1													
unusual	20		8						2		3	3												
clock fr.	1	1	1	1		1	1									/								
Food & drink																								
Bottles																								
Hand finished:																								
beers	10	2	50	9	2		1				1			1	5	7	2		1			2		
spirits	4	1	32	18	4	2	2		3	1	1			1	9	18	3		2			2	1	1
sauce/pickle	4		14	1	1	2	1		2		1				2	5	1	4						
pharmacy	3	1	16	5	6	2	1				1				4	8	3	3				1		1
misc.	7	1	17	3			1	1	3					1	10	2	5	1	6			4	4	
Auto.Machine made:																								
beers									178	5	50	12	1	9	8	4	15	17	3		1	9	5	
spirits									48	1	2	3		5		2	10		1				1	
sauce/pickle									16		5	2	1				5					1	4	
pharmacy									4		4			1		1	2		1				1	
misc.									11		7	7		2			8					1	1	
Food cans															/	/	/	/	/		/	/	/	/
Hole-&-cap									2		3	1		2										
milk ?	1		273	3					17		1			1										
fish	5	1	64	16		1			25		3	1	1	2										
meat	10		68	6			1	1																
vegetable			36																					
unident.	6	4	222												/		/	/	/	/		/	/	/
Double-seamed									242															
milk ?			28						69		2	1	1	3										
cream									19		8													
fish									69		10		1	1										
meat				2																				
vegetable	1		27																					
unident.			7																					
Pottery			/						1		/	/	/	/	/	/	/	/	/	/	/	/	/	/

Figure 46 Simplified artefact table. Note that bottle numbers based on base minimum numbers only.
* indicates some items are fragmentary
/ indicates presence, but uncounted.

Precinct	White Range			MacD. R. Reef					Police station						Battery & Cyanide Works								
Site	59	98	100																				
Quadrat				52	7	54	46	9	53	7	8	9	17	18	45	54	9	37	38	46	47	48	49	1
Clothing																								
buckles			2	1		2			3		4				/	/	/			/			/	
buttons	13*	9	11		3	10		3	2	1	3	2	1	1	4	6	3		1	1	1	/		2
studs			5																					
boot protectors	4	1	7	1	1	3				7	1	1				/	/	/						
shoe fr.									19	23	4	2	2											
cloth fr.										13	1		3		/		/			/			/	
Toiletries		1										1					/							
RECREATIONAL																								
Smoking																								
clay pipe fr.	14	8	12		1	10				2					/	/	/					/	/	/
pipe fr.	1	1														/								
tobacco tabs	18	10	18		1	19	2	1	9	5	4	1	4		/	/	/	/	/	/	/	/	/	/
" tins/lids	6	2	6	9	2	9	4	1	43	32	11	2	17		/	/	/	/	/	/	/	/	/	
cig. butts				4	5				1	93	6	7	3		/	/	/	/	/	/	/	/	/	/
other	1		85+						4	4	1													
modern				25	14	2	1	1	93	7 460	80	90	92		/	/	/	/	/	/	/	/	/	/
MISCELLANEOUS																								
Matchboxes	8	1	9			6	3		6						/								/	
" fr.				2	3	126	22	5	10	5			6		/	/		/	/	/	/			
Cartridges	59	4	3	35	3	35	2	2	15	86	20	7	8		/	/	/	/	/	/	/	/	/	/
bullets	6								2	1														
Stationery																								
pen nibs	1	7													/				16		2			2
other		2														/		/	/		/			
BUILDING																								
nails	247	725	1377	44	81	46	1	1	91	525	97	13	59		127	468	169	/	/	/	/	/	/	/
corroded fr.	585			2	8	9				133					/	/	/	/	/	/	/	/	/	/
tacks	69	38	283			3			3	37	2		1		/	/	/	/	/	/	/	/	/	/
screws	16	17	45			3			8	88	12	2	8			/	/	/	/	/	/	/	/	/
nuts/bolts		7	9	3	1	4									/	/	/	/		/	/	/	/	
wire	45	28	87	36	33	26	2	2							/	/	/	/	/	/	/	/	/	/
canv. eyelet	3		6	2	2	5			2				1			/			/	/		/	/	
cgi offcuts	27		3	24	6	2			61	83	42	5	68		/	/	/	/		/	/	/	/	
other			/						/	/	/	/	/		/	/	/	/	/	/	/	/	/	/
tent peg						1			3	3														
wire rope		1	2			1			4	4			1											

Precinct	White Range			MacD. R. Reef					Police station						Battery & Cyanide Works									
Site																								
Quadrat	59	98	100	52	7	54	46	9	53	7	8	9	17	18	45	54	9	37	38	46	47	48	49	1
TRANSPORT																								
chains/hooks		3	2																					
wagon parts	1	2	3	1		4		1	1		3			4		/	/					/	/	
horsehoes	2		7		1				1		3	9		5			/							
" nails	13	11	25			5*			3	2		1		4*	/	/	/	/	/	/		/	/	
buckles	5*	2	1		2	31*	2*		2		10*	11*		12*							/	/		
harness									3		2				/*		/							
leather	50	7	14																					
h. parts				1	1	1																		
h.rivets	36	27	6	4	8	17										/	/							
car parts															/	/	/		/	/				
bike part							3		4			1	4	6	/?					/			/	
									1							/								
INDUSTRIAL																								
Tools																								
large			1		3*	1										/	/			/		/	/	/
small	2		14	1		1					2													
electrical									2		4			1										
Larger items																								
machine parts						2		1	3		11				/									
pipe fittings											1	1	1	1									/	
rods									6		7	3		1										
heavy unid.	5		3						2	1	27	2	2	3	/	/	/	/	/			/	/	
crucible fr.																/			/		/	/	/	
glass																	/		/					

The function categories of artefacts have been developed over the years of fieldwork, on commonsense lines, and seem to follow a reasonably acceptable grouping.[1] The difficulties in dealing with a very shallow site, with most of the artefacts on or near the surface have resulted in the loss of surface material. Some of the losses have occurred through serious bottle hunting in the past twenty or thirty years. Even the White Range area fell to the collectors, and the only complete bottles found there were either hidden in the rubbish dump or found during excavation. Tin matchboxes seem to have been a popular item too - very few have been found at the Police Station or Works precincts, and surprisingly few at the White Range. However, at the MacDonnell Range Reef precinct, particularly in the eastern area where there were few signs of modern visitors, were found a good number of complete matchboxes, and a surprising number of matchbox fragments.

The Domestic Group

As most of the analysis and research has concentrated on the bottle glass and food cans, these items are dealt with first.

Food and drink

The bottle glass is the one artefact category that has been researched to some depth, and completed in all precincts. In the table, the numbers have been simplified to show general distributions, and divided into two groups. The first is the "hand finished" group, though it includes some with a machine made finish, but dating between 1880 and 1920, and those made completely by automatic machines, from about 1920 onwards.

All the bottles found so far were at least partly machine made, in that they were formed in a mould - though some were hand blown, others were machine blown[2]. From the 1880s the two piece body mould, with a separate base plate, became the most common container mould, and remained in use until about 1920. Another popular bottle form from about the 1880s until 1910 or so was the "seamless" or turn, or paste mould type, in which the side seams were removed by the bottle being twisted in the mould. Most of the plain green champagne beer bottles found at Arltunga are of this type. A three piece mould continued in use until the 1920s, which produced a bottle with a horizontal seam below the shoulder, and side seams above that, to some point below the finish; embossing was only possible in the shoulder area, and the body was tapered to allow removal from the bottom, dip mould.

Semi-automatic machinery for making bottles were available in America and England in the 1880s, although it took some time before they were accepted by the unions. It is the

American Michael Owens who is considered to have produced the first fully automatic bottle making machine in 1903. As with the earlier machines, there was considerable reaction against this latest idea, and it took over a decade for the Owens machine to be accepted. The Owens machine bottles have the seams on the finish, and often the "ghost" or parison side seams, and base or heel seams, that were found on semi-automatic machine made bottles.[3] The Owens machine continued to produce bottles until the early 1950s, but saw increasing competition from the 1920s. The Hartford single feeder, patented in 1922 and the individual section, or I.S. machine, invented by Henry Inge in 1925 were two major developments. The latter is now the most commonly used machine for bottle production.

The 1920s also saw the final triumph of the crown seal finish for beers, etc, invented by William Painter in 1892.[4] With the acceptance of machinery, the bottles could be formed accurately to take the crown. About the same time the external thread on narrow mouthed bottles was introduced, although threaded necks for widemouthed bottles, as well as some internal threads, had been introduced in the 19th century.[5]

Further research into the size, shape and weight of bottles in the 1930s saw the use of the M curve near the heel of the bottle, named after its discoverer, J.B. Murgatroyd[6]. The weight of bottles was reduced, and from the 1940s there was greater standardisation of bottle and jar sizes. Since that war, bottles have had increasing competition from aluminium cans, introduced in the late 1950s, and subsequently, the plastic bottle. Attempts to regain markets affected by these newcomers have included the introduction of the stubby by the 1960s, and the non-returnability of bottles.

The Australian glass making industry was slow to develop, but Sydney had successful works by the 1860s, and Melbourne by the 1870s. A glassworks was established in Adelaide in 1875, which struggled but survived.[7] In Melbourne the pre-eminent name is that of the Melbourne Glass Bottle Works Company, established in 1872 by Felton, Grimwade & Co. to provide bottles for their pharmaceutical company. In 1890 the factory moved from South Melbourne to Spottiswoode (later Spotswood) and provided a wide range of bottles for wine, beer, pickles, sauces, jam, and condiments apart from the pharmaceutical needs. The company established a factory in Sydney in 1903. In 1907 they took over the Adelaide Glass Bottle Works, and the S.A. Glass Bottle Works in 1913; then in 1915 amalgamated with the Waterloo Glass Bottle Works Co. Ltd., Sydney, to form the Australian Glass Manufacturers Co. Ltd. in December, 1915. A.G.M., or Australian Consolidated Industries as it has been known since 1939, has dominated

the industry ever since.[8] Some of the early bottles types, with an M embossed on the base, have been found at Arltunga and most of the post 1920 material was made by A.G.M.

In Adelaide, the S.A. Glass Bottle Factory Ltd was established in February 1874. The factory was built in Chief Street, Brompton, and the first bottles were blown in January, 1875. After a slow start, the factory began producing plain, clear bottles in fairly small numbers. In 1887 Gustav Hinrichson, a glassmaker from Hamburg became the manager; in 1888 the Harrold Brothers bought the factory and F.B. Hughes became the secretary. Hughes introduced the base mark on bottles and jars: from 1890 bottles were being embossed with a double O to prove the high standard of the local product. Despite the success of the venture, the recession of 1893 hit the Harrold Brothers, and the factory suffered. Hinrichson left to set up his own Adelaide Glass Bottle Works at Croydon in 1894, and in December 1896 F. B. Hughes decided to take over the factory, with a slight name change to the S.A. Glass Bottle Co. He continued marking his bottles, with his own F.B.H. initials - and Hinrichson also continued the idea at his factory, using H within a circle.[9] Both glassworks were eventually taken over by the Melbourne Glass Bottle Works Company.

Another factor in the glass industry in Australia was the growth of bottle co-operatives in the different states. In South Australia the Adelaide Bottle Co-operative Society was formed in 1897 with members from the brewery, cordial, wine & spirit and preserve & sauce industries.[10] In 1907 it was suggested that the society have its own brand, and the Pickaxe trademark was registered in 1908. The pickaxe brand was first sandblasted on beer bottles in 1910[11] and the first embossed markings came in the following year. The trademark is very helpful in the dating of bottles, because of name and design changes. In 1912 the society changed its name to the Adelaide Bottle Co-operative Company Ltd. and for a year or so bottles were embossed with both company and society; about the same time the crown seal was introduced, although the old champagne style beer continued for some years. The large body trademark was used on all sorts of bottles, including wines and spirits, but the concerned members eventually decided that they would prefer to have either a plain body, or their own mark, for the latter. From the late 1920s, only beer bottles were to be embossed with the pickaxe brand, and in 1928 the brand was reduced to a small circle, and placed just above the heel of the bottle. Other useful dating changes include the use of amber glass for beers from the early 1920s, - but during the Depression some older green crowns were brought back into use.

Changes in the base markings used by the Australian Glass

Manufacturers are also useful in dating manufacture. At first, from 1916, the AGM letters were entwined, but about 1923 this changed to smaller letters, either straight or curved on the base; from 1930 or 1934 the trademark has been used - a large A with the G in the top section, and the M in the bottom half of the A[12] Other changes allow for quite accurate dating of the Pickaxe beers during the 1950s, as explained in the discussion below. Meanwhile, the pickaxe wine was reintroduced in 1937, and due to a wartime shortage of corks, in 1942 the screw top wine bottle was used. Other war time shortages lead to a decrease in the amount of glass used for beer bottles from 1947; in 1953 a shorter beer bottle was introduced, and with a rounded base.

The Arltunga bottles have been divided into five main groups - Beers, Spirits/wines, Sauce/pickles, Pharmacy and a Miscellaneous group which includes the few industrial bottles, some food types, cosmetic jars and those bottles with the contents as yet unknown.

In the following discussion I have followed the nomenclature suggested in the Parks Canada Glass Glossary, although these vary considerably from terms used by collectors and writers. In particular, I have used the term finish for the lip and string rim, and have found the word heel particularly helpful when describing the base. Most of the discussion concentrates on complete bottles, or bases, which I have found easier to fit into the different use categories, and usually with more information as to date and source of manufacture.

BEERS

Brewing was established in the early days of European settlement in Australia, with the first brewer being John Boston, a free settler who arrived in 1794.[13] Beer bottles had to withstand considerable pressure, so corks had to be wired into place, and kept firmly anchored by the lip of the bottle; the heavy base and high pushup also gave extra strength. During the 19th century the bottle evolved into the typical "champagne" style, which was gradually replaced during the early years of the 20th century by the crown seal finish, and almost flat bottomed bottle.

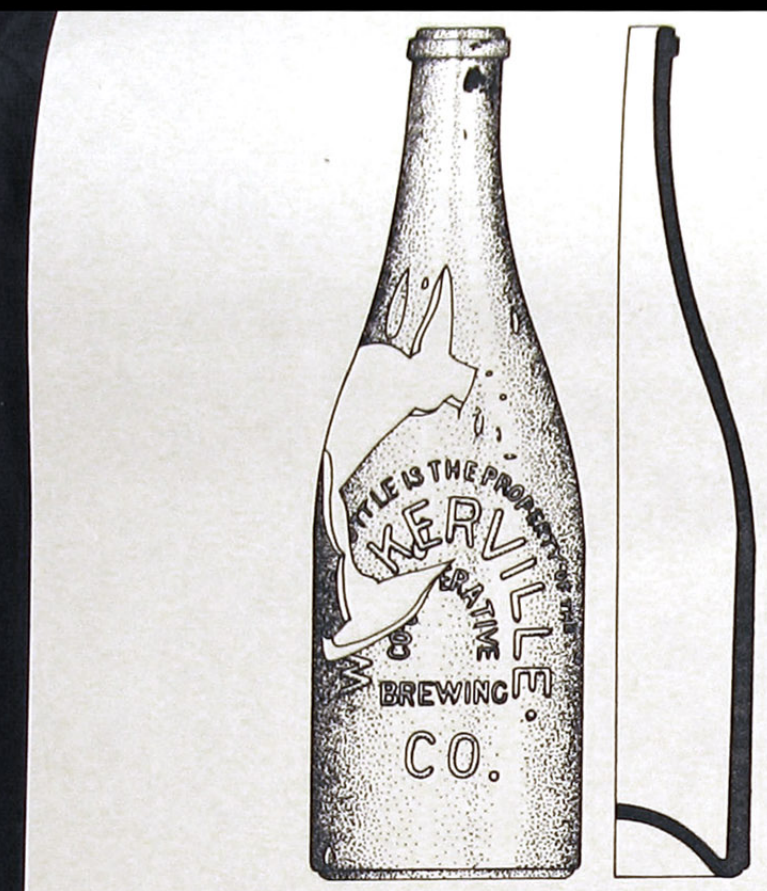
At Arltunga the beer bottles follow this pattern, of usually green "champagne" types, and the amber machine made beers from the 1920s onwards. All the identified champagne type bottles have been placed into this beer category, apart from the two clear brandy types, (see Spirits section, G070 and 84); it is possible that some of the bottles contained liquids other than beer. While the early beers are not easily datable within their range of 1880 to c. 1920, the later beers with the combinations of

Pickaxe and AGM embossings can be more closely dated. Such dates of course refer to manufacture and not necessarily date of deposition.

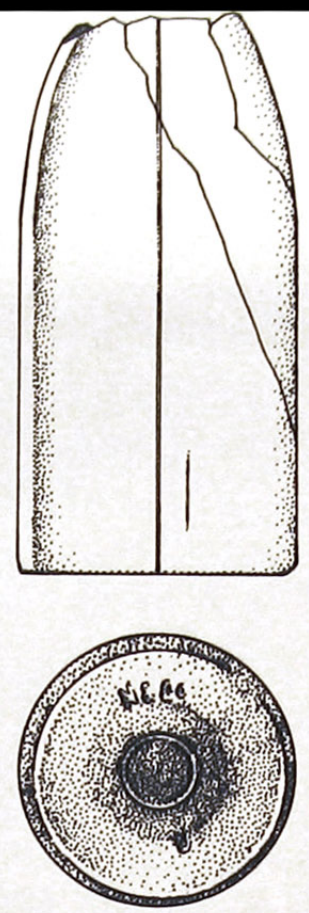
All the champagne beers fit into a date range of 1880 to 1920. Of the 11 varieties the most common is G037, a heavy and seamless type, with 36 bases identified. (Figure 47) The one complete example weighs over 1160g, is 30.8cm tall with a base diameter of 8.8cm. These bottles, or parts of bottles, have been found at all precincts, with 23 from the White Range sites, and a very small base fragment from the police station area. Of the five other plain beers, most were found at all four precincts, but in fewer numbers than G037. One was found only at site 100, and as is shown in the artefact tables, this site had more beer bottles than the others, both in total numbers and in different types.

There are two bases showing embossing, indicating manufacture in England. G058 (8.6cm d) is embossed N & Co while G020 (8.2cm d.) is embossed C S & Co, and bothwere very similar in profile (figure 47). The former were found at all precincts but the police station, and mostly in fairly small pieces, while two G020 types were found only at site 100. The two companies, Nuttall & Co, and Cannington, Shaw & Co. were making glass in Lancashire, at St. Helens, from the 1870s until 1913 when they amalgamated with other companies to form United Glass Bottle Manufacturers Ltd.[14] Both made a wide variety of bottles, as will be seen in later groups.

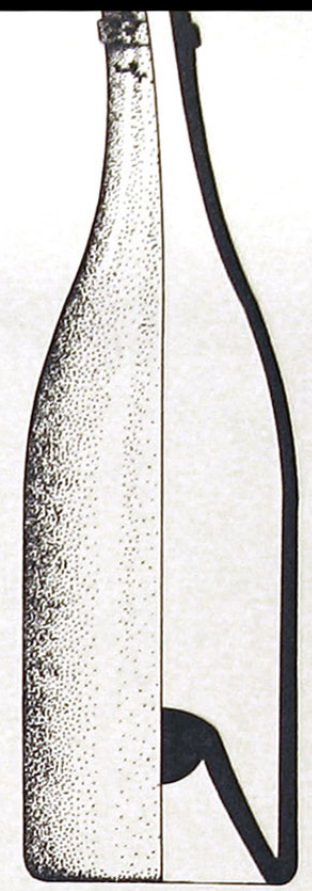
Finally, there are two types which may indicate the transition from the champagne style to the modern crown seal beer, though both appear to be relatively early in this transition period, being made of green glass, and with the champagne finish (Figure 47). One, G140 is unique at Arltunga, has a much lower pushup and is heavily embossed with a body trademark for the Walkerville Brewing Co. The Arltunga example was found at White Range site 59; interestingly enough one tiny base fragment of possibly the same type, was found at the police station precinct during the excavation of site 256. The Walkerville Co-operative Brewing Co. was formed in 1889, incorporated in 1898, and became part of the S.A. Brewing Co. in 1938.[15] Reed's booklet on the Bottle Co-operative mentions having some problems with the brewers using, or not using the pickaxe brand, and that the champagne finish was being made up until 1918, but it has not been possible to pinpoint the date of the Walkerville embossing. The second transitional type, G220, is similar to the champagne beer, but the finish shows the mouth, side and below finish seams of the semi- or automatic bottle, though in this case the finish seams are offset. Arnold mentions early crown seals being made in this fashion.[16] This, and all other identified fragments, were found at the Works precinct.



G140



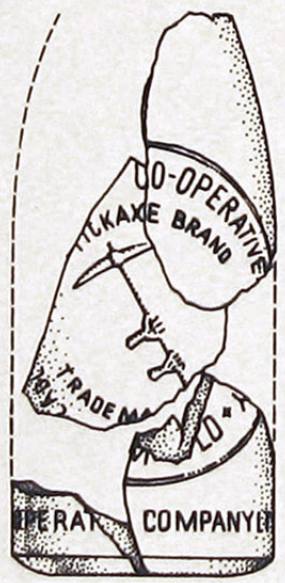
G058



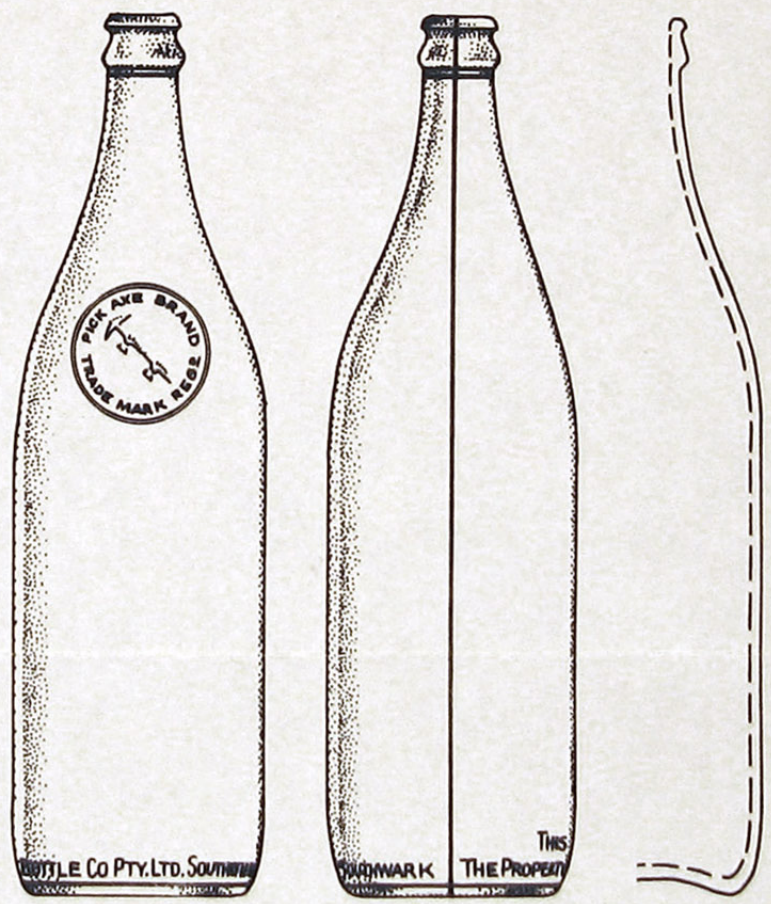
G037



G642







G544

Figure 47 Beer bottles. Top right, G037 the most common champagne type; middle G058 and left, G140. Bottom left, G542 from the 1920s, and right, the 1960s beer bottle.

All the post World War I beers date from the 1920s or later, and are of amber glass, with the pickaxe brand, used by the South Australian Bottle Co-operative, dominating. All the bottles show the many seams made by automatic machinery, the crown seal finish and the bases being almost flat. The date of manufacture of many of these bottles can be more precisely fixed, because of variations in the embossings. All were found at the police station and works precincts.

Only one amber beer (G542) has been found with the large pickaxe brand on the body, which combined with the plain AGM letters on the base suggests manufacture between 1923 and 1928. (Figure 47) The two examples came from near site 180 at the Works. Two types were dated to between 1928 and 1930 or slightly later: G543 and G621. Five bases were found at the Works, and 16 from the police station. Bases from the 1930s and 1940s are less easily to date more accurately, but are marked by the use of the AGM trademark. All the bases with the AGM trademark show body lettering with extra capitals for most words; there seems to be a tendency towards making the body lettering smaller, but this is not quite clear as yet. None of these bottles show signs of the M curve. There are two base types in this date range: G624 (1 example from Works, three from police stations) and G623 (10 bases from police station). In addition, there are four plain bases, or without the AGM trademark, but with body lettering showing the larger capitals, and no sign of the M curve, and so placed in this group. All were found only at the police station precinct, the majority represented by only one or two examples, except for one, G620 with 40 definite examples, and 15 possibles.

Many bottles could be dated to the 1950s because they have had the year of manufacture embossed on the base; also PX was embossed for two or so years in the mid 1950s, and the M curve was finally introduced. Later developments include the change to a textured heel, and the apparent introduction of IS letters on the base. All of the types were found only at the police station precinct. The most popular was G617 with PX embossed on the base which dates it to between 1956 and 1958: 114 different bases were found, plus many more fragments. It was during the mid 1950s that the small pickaxe trademark was moved from the heel of the bottle to the shoulder, and this change is shown on these bases.

Two beers and two stubbies have been identified from the 1960s. One beer, the complete G544, was found en route to the MacDonnell Range Reef precinct, and collected for comparisons with other bottles (Figure 47). Apart from the obvious differences in size and shape, it weighs only 635g, almost half that of G037. It is dated to the 1960s

by the heel embossing, which in 1963 changed from the Co-operative Co. to the Adelaide Bottle Co. Pty. Ltd. The other beer, G679, is of a similar date, with 6 examples being found at the police station. The stubby was introduced about 1961 into Australia, and the fact that it is found at the Works and police station precincts close to the building remains, gives some indication that the stubby is related to tourists, and not miners.

SPIRITS

So far, the identifiable bottles indicate whisky, brandy, gin, schnapps and bitters were available to the thirsty miners at the turn of the century; port and sherry may have been more popular in the 1930s to 1950s.

Early bottles show a wide variety of colours, while later examples were in clear or brown glass. The brandy bottles have a different finish, being similar to, but smaller than, the champagne beers. The usual spirit finish is a two part, with a lip and down-tooled string rim, though there is considerable variation, with one part finishes, or rounded string rims; the neck can be straight, slightly flared or bulgy. In all cases so far identified the bottles were made in moulds, and with hand applied lips. Apart from the introduction of the threaded neck from the 1920s, some of the later bottles have the two part "finish" of the 19th century bottles, and although the old terminology should not be used in the context of completely machine made bottles, it has been continued for convenience.

From the early types there is only one definitely Australian product, represented by a brandy bottle; all the whiskies are imported, but there was a move towards bulk importation by the end of the 19th century, for local bottling; there is one example of this, late in the major, early occupation period. Despite the difficulty in identifying the contents of bottles in the post World War I period, several amber and clear bottles have enough embossing to indicate fortified wines of South Australian origin, and others suggest local bottling at the very least. The pattern shown in the beers, of increasing use of locally made products, continues in this section. In both periods, there are a considerable number of presumed bottle remnants, which may have contained beer or other liquids.

The identifiable whiskies make up a large part of the spirit types, as base embossing was popular for identifying brands during this period. Four different brands have been found so far, with some base variations within each brand type, which may be datable. The bottles come in both clear and green/olive colours.

In the clear glass, G132 Whyte & Mackay is the most common type, and found at all but the police station precinct. (Figure 48) An almost complete example was found at one of the White Range mine sites, 491, and apart from 11 bases from MacDonnell Range Reef, the other finds were fragmentary. Sites 59 and 100 had only one each and the Works precinct only 5 base fragments. There are two types of Walker's whisky, G100 and G099, both limited in numbers, found only at White Range sites 98 and 100, and the Works, in quadrats 45 and 54. This limited distribution may indicate that this whisky was more expensive, or less available to the Arltunga residents. Some House of Lords whisky bottle fragments were found at the same two precincts as the Walker's.

There are four variations in the Peter Dawson whisky bases, with few clues as to chronology of each. (Figure 48 shows three of them). The whisky has been found at all four precincts, though the fragments are so small at the police station that they could be either of two types. The White Range sites have examples of all four types, with G165, of particular interest. Only one of these bases has been found, near site 131, and includes the very faint but entwined AGM letters, which must date manufacture to 1916 or later. The base is green, and as spirits seem to have changed to amber glass during the 1920s, it is the one very closely datable bottle from White Range. It is also the only one found at Arltunga so far that has the entwined AGM letters.

The brandy types have been identified by one complete bottle having Chateau Tanunda sandblasted on the body, and are the only "champagne" types to fit into this spirits section. The bottles have a much finer finish, a shorter neck and are slightly smaller than the similar beers. Two types have been identified, largely because of a difference in colour, and the labelled Chateau Tandunda bottle. Brandy does not seem to have been popular, with only some 16 examples found scattered over all precincts. One other brandy neck, G225 shows the offset seams on the lip, similar to the beer G220, and also found at MacDonnell Range Reef and the Works precincts.

Gin, schnapps and bitters are rare, only four types and 8 examples having been found. The square, green base, G103, is the most popular, with four bases from site 100, and a slight variation but very fragmentary, from the Works. (Figure 48) G094, the Siegert & Hijos bitters bottle, is represented by one example only, from White Range. There are in addition a number of bases thought to have contained spirits, but not definitely identified. These include very red amber types, dark brown and clear bases found in limited numbers at the White Range, MacDonnell Range Reef or Works precincts, and one dark green type found at the police station.



Figure 48 Spirits: top right, G132, middle G100 and left G038; bottom left G103, middle three of the Dawson bases; right the 1950s G596 bottle.

The post World War I bottles are less clear as to contents, but slightly easier to date. Amber bottles dominate the early years, with more clear bottles from about the 1950s. While not yet certain of many of the contents, amber glass may suggest fortified wines rather than spirits. The amber glass is presumed to belong to this section rather than to the Beers, because of the lack of body embossing, apart from those few types which do indicate South Australian origin and contents. As with the beers, the bottles show the marks of machine manufacture.

There were few bottles datable to the 1920s but as with the beers most came from the Works precinct, and more particularly from close to site 180 in quadrat 9. There were only two types, G536 and G539 and three examples in all. A clear, apparently footed base which may not have contained spirits, G588, was found at the police station. The 1930s and 1940s material is also limited, despite the wide variety of types. Four types but only 11 bases were found at the Works, from quadrats 54 and 9. There was an even greater variety at the police station with 13 types, and 30 bases or part bases. Almost all came from the rubbish dump in quadrat 53.

Some of the 1950s material has been dated by base embossing, others by their provenance; the M curve does not seem to have been used for these liquor bottles as it was for the beer types. All types came from the police station, with only one example of G638 being found at the Works as well - this has an F number on the base, which may be an indication of a late 1950s or 1960s date. G596 is an almost completely reconstructed clear rectangular Yalumba bottle which may have contained brandy (1 bottle, 1 base, figure 48). Of the other 22 bases, 13 may have contained gin, the remainder unknown.

SAUCE/PICKLES

The preserving of imported fruits to the colonies, and particularly Tasmania, was well established by the 1830s, with jam manufacturers established by the 1860s. The first South Australian jam factory was established by George McEwin in 1862, and was soon making pickles and sauces.[17] Other companies moved into this field, and although it became more usual to can the jams, glass was preferred for the sauces and pickles.

Of particular interest within this category are those showing that the bottle, or its contents were made in Australia. Three bases indicate manufacture in Adelaide, with the G030 base (only one example, from site 100), apparently being made before 1896. This base was embossed O O, the mark used by the S.A. Glass Bottle Factory in the early 1890s. G035 is embossed with an H within a circle,

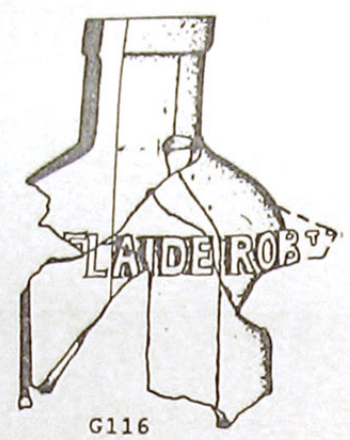
the mark of the Adelaide Glass Works from 1893 to 1907. Three bases were found at site 100, and at quadrat 54 at the Works. G011 is embossed FBH, suggesting manufacture between 1896 and 1913 and found at all four precincts, but in very limited numbers. G071 was made by the Melbourne Glass Bottle Works Co., before 1915, and 4 bases were found at site 100. (Figure 49) G052 is the Lea & Perrins Worcester sauce bottle, fragments of which, have been found at all four precincts; the matching glass stopper, G055, has been found at all but the police station precinct.

The pickles and chutneys are presumed to have had wider-mouthed bottles, but only three bases have been identified. G163 is a small but heavy base from White Range site 131, embossed Rosella Chutney and Melbourne, on the body, and made by the Melbourne Glass Bottle Works. Then from the Works, G215 is an incomplete base of uncertain date, with some body embossing suggesting the contents were pickles. It was found near site 195. Several necks have been found, one of the most common is G116, with shoulder embossing naming Robert McEwin, Adelaide. It has been found at site 100; at MacDonnell Range Reef and several, slightly different, fragments from the Works precinct, from quadrats 54 and 37. Robert McEwin may have taken over the long established family business in 1900, when the name was changed to Robert McEwin & Co. Ltd.[18]

There are two bases from the 1920s, dated by the use of the AGM letters. G569 is another McEwin type, possibly a sauce, though the lack of possible matching necks makes identification more difficult; it was found at the both the Works and the police station precincts (Figure 49). G548 has body embossing identifying it as coming from G. Wood & Sons, in two different sizes, and found only at the Works. Three other types are impossible to date, including a Holbrooks sauce bottle, again found at both precincts.

All of the 1950 types seem to have been sauce bottles, and came mostly from the police station, with only fragments of two of the neck types appearing at the Works area. G668 has been identified as containing vinegar, though its large, flagon shape could have been used for other liquids; the horizontally ridged body fragments, and the body embossing, make it relatively easy to identify fragments, and at least two types were noted. (Figure 49) Three other sauce bottles were found, including a Rosella tomato sauce.

While there are relatively few identified sauce/pickle bottles, it is interesting to see that the same products and companies appear over quite a long time span - i.e. the McEwins, and the Rosella examples. More research into company history is needed to see if additional dating and/or identifying of the Arltunga material is possible.



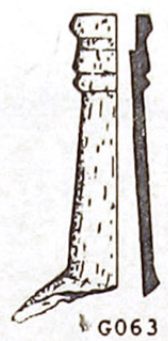
G116



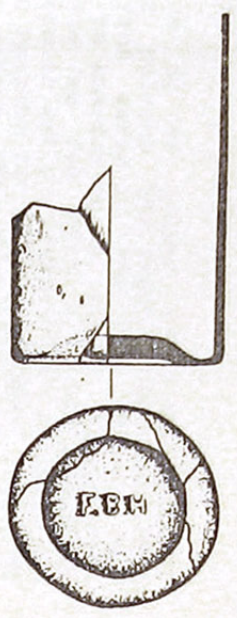
G055



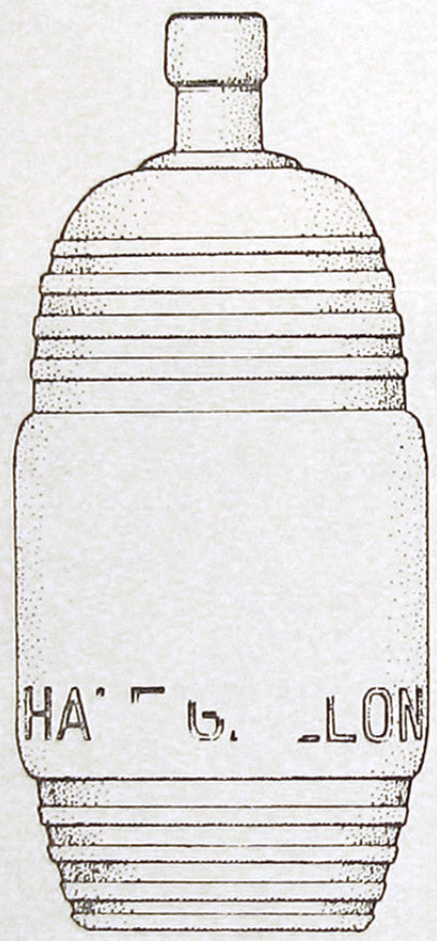
G035



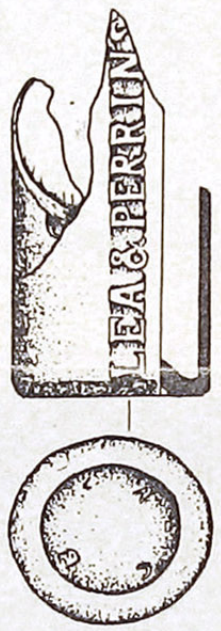
G063



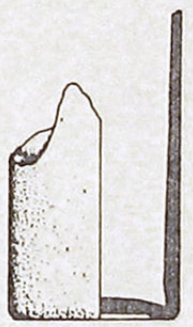
G011



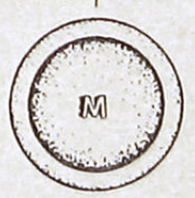
G668



G052



G071



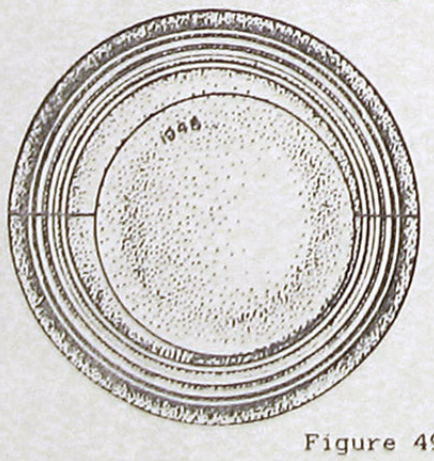


Figure 49 Sauce/pickle bottles: Right, the three Australian made examples, G035, G011, G071; middle, the Lea & Perrins botle fragments, and G116, the Robert McEwin bottle. Left, the 1920s McEwin base, and the 1950s vinegar flagon.

PHARMACEUTICAL BOTTLES

This category is made up of patent medicines, general remedies, drugs and poisons. The first patent medicines were produced in England early in the 18th century, and were being exported to America by the 1750s. The patent, or proprietory medicine (as few were actually patented) became enormously popular early in the 19th century, as did opium; one of the reasons for this may have been the increasing publicity about the properties of the new medicines through the growth of newspapers, especially in America. It was soon realised that the shape of the bottle could be used for product identification, as could body embossing; bottles could be cylindrical, oval, flat (rectangular) and often panelled.[19] In 1905 an American, Samuel Adams showed what a fraud the patent medicine industry was, and they became less popular.

In Australia, the Report of the Royal Commission on Secret Drugs, Cures and Foods, by Octavius C. Beale, was published in August 1907 and quoted many of Adams' articles, plus analyses done locally. The Report noted that Ayers Sarsparilla "is probably the most widely advertised in Australia of all the alcoholic, excepting Wolfe's Schnapps". One bottle bought in Melbourne had been found to be only half full, and that was half alcohol. Clarke's Blood Mixture when analysed was mostly water coloured with burnt sugar, plusiodide of potassium (which could kill), chlorine ether and potash liquor; an expensive product containing cheap ingredients. Surprisingly, both these tonics were still available in the 1950s, though most patent medicines had disappeared soon after the scandal.

Poisons were also readily available to the general public, and it was obvious that the bottles needed to be distinguished in some way from others, to prevent accidental poisoning. The use of colour, particularly dark blue, with vertical ribbing and/or raised projections became popular safeguards by the end of the 19th century[20].

The Arltunga pharmacy bottles group shows an even greater individuality than other bottle groups, with a wide range of types being found, but limited numbers. Most of the small bottles or bases that may have contained drugs, are represented by a single bottle only. The earliest datable bottle, or base, G009 is embossed O O, suggesting a date of manufacture before 1896; the one example came from site 100 (Figure 50). Another possibly 19th century base is G237, embossed W T Co, A and USA, which may have been used by South Australian chemists between 1875 and 1900.[21] The only base, and base fragment, came from the MacDonnell Range Reef. Three different but small plain bottles were found, from site 98, 100 and MacDonnell Range Reef (Figure 50). Two probable poison bottle fragments were found,

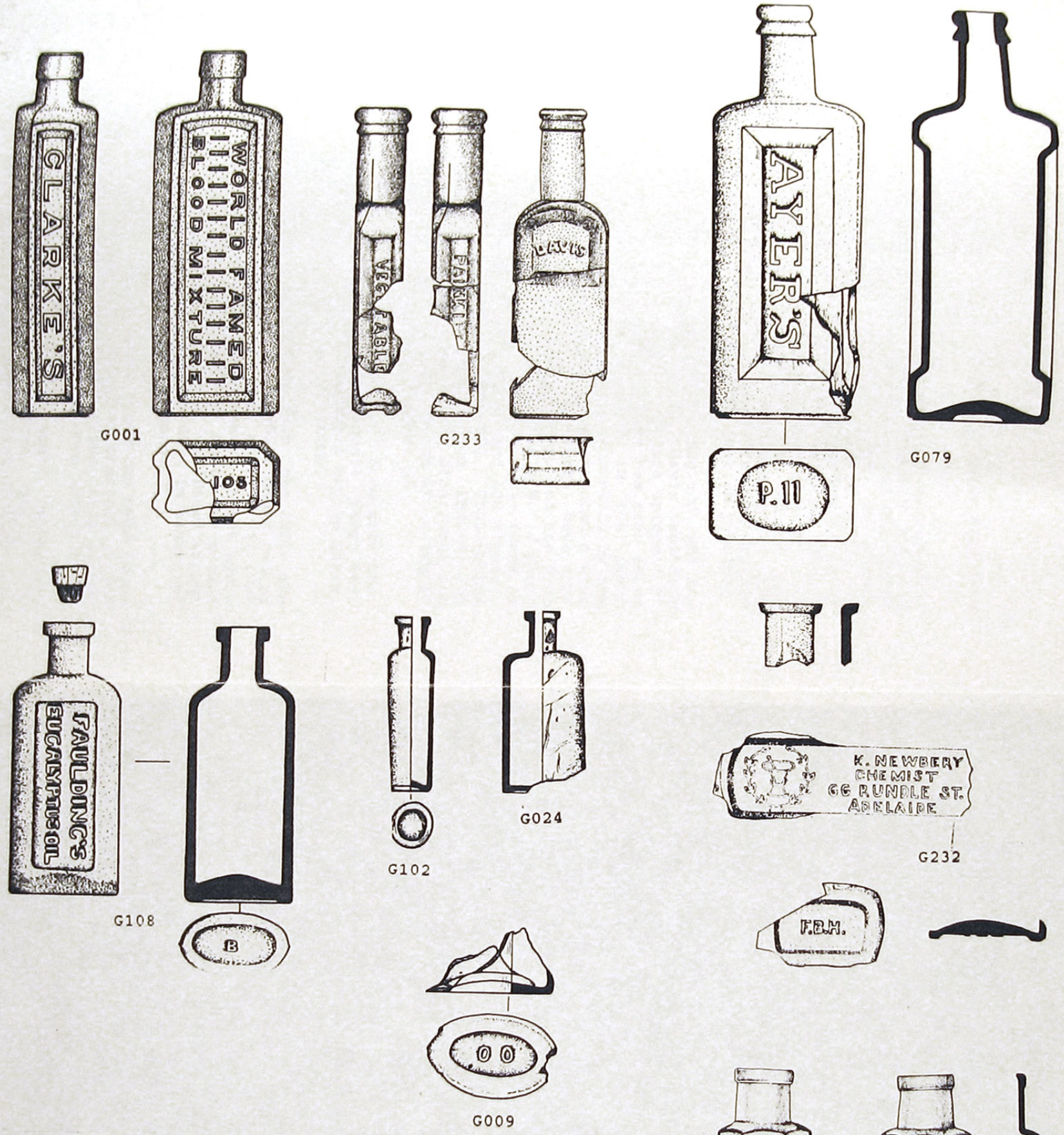


Figure 50 Pharmacy: Top, the patent medicines, and middle the plain, or Australian made bottles from the early period, bottom right, the 1950s poison.

G077, dark blue from site 100, and G234 a paler blue from MacDonnell Range Reef.

Most of the household remedies were of local manufacture. Faulding's Eucalyptus Oil, (Figure 50) and Milk Emulsion have been found at the White Range sites, and the former at the Works area in 54 and 9 quadrats. Of unknown contents, but from an Adelaide chemist are two different though similar bottle fragments from the MacDonnell Range Reef. (Figure 50) These are quite closely datable, as the body embossing shows them to have been made for a Mr. A.K. Newbery, chemist, of 66 Rundle Street; he was at this address between 1905 and 1911, according to the contemporary street directories. Eno's Salts, an English import, were noted at all but the police station precinct.

The patent medicines came from America, England, and one was produced in Sydney. G233 the Perry Davis Vegetable Painkilller became famous after a cholera epidemic in America in 1849; one almost complete bottle has been found at the Macdonnell Range Reef. G079 is the Ayers Sarsparilla bottle, a popular tonic in Australia by the turn of the century, though the company produced a wide range of remedies. Three bottles, or parts have come from the White Range site 100 rubbish dump, and one from the Works area. G001 is the English Clarke's World Famed Blood Mixture, which was popular at Arltunga - found at the White Range sites 59 (one) 98 (one) and 100 (three), plus one from the Works area. (Figure 50) G090 is the Australian Clement's Tonic, available from 1890[zz]; its amber bottle is quite a change from the clear/aqua and pale blue of the others, and has been found at sites 97 and 100 (1 each) and the Works area, quadrat 45.

Three castor oil bottles were found, all from site 100, though one type was also noted at MacDonnell Range Reef which also had a number of other small bottle bases, which may have contained pharmaceutical items.

Most of the so far identified bottles from the 1920s are poison bottles, and from the size of G523, could belong in the household section, if there was one. All four types are amber, and have been found only at the Works precinct, and mostly in the western section, around quadrats 54 and 9, although one, G529, was found around the office building, site 193 in quadrat 49. In each case only one example of each type has been found.

A greater variety of pharmaceutical types has been found from the 1950s, at the police station precinct. The pattern of only one example for most types, seen in the earlier occupations, continues into this more modern time.

The first type is a Faulding's bottle, small, amber and rectangular in shape; contents unknown, but it is interesting to see the same names continuing through from

the early to the late occupation at Arltunga. The second, G673 is a small clear bottle, with much of the label intact, identifying it as Murine, a treatment for eyes. A more typical poison bottle was found, hexagonal in shape, and a larger amber bottle which may have contained a tonic.

The whole pharmaceutical group has shown an unusually high number of single items, or concentrations at one precinct and in some cases at one site. The patent medicines and some of the pharmaceutical items have been a little more widespread, but the general pattern is the opposite of most other groups. This may be the result of individual preference, as it appears that a wide variety of medicines were available at Arltunga, or brought by the miners, and may provide some clues as to the people occupying the different precincts. This requires considerably more research into the contents of bottles, and their perceived effects, as well as the completion of the analysis of the bottles from the Star of the North or battery precinct, which may add to the pharmaceutical assemblage. The appearance of locally made bottles, from Adelaide and Melbourne continues the pattern as seen in other groups, as does the continuation of brand names from the earlier occupation to the later. While on the subject of Fauldings, there was a small body fragment found at the Kangaroo Creek well precinct which probably came from a modern Faulding's Eucalyptus Oil bottle - the lettering is in italics, rather than the upright letters of the early type. The fragment is too small for useful cataloguing, but it is possible that more of such a bottle will be found in future which may date the fragment more accurately - at the moment it could be any date from the 1910s onwards.

The prize of this groups must be the Newbery bottle, (G232) which can be quite closely dated as far as its manufacture is concerned, to between 1905 and 1911. This may well be the most closely dated bottle from the whole Arltunga assemblage, and gives a firm date for the rubbish dump at MacDonnell Range Reef.

MISCELLANEOUS

A very limited number of large glass jars, presumably containing chemicals, were found around site 193 and 194 at the Works precinct, with one other example from near site 180 and from the police station near site 255. These are listed on the artefact table as in the major industrial category.

A possible Food or Pharmacy item is the small Bovril bottle. Although fragments of a Bovril bottle were found at White Range site 59, it was not identified until the more complete (and slightly different) bottle was found at

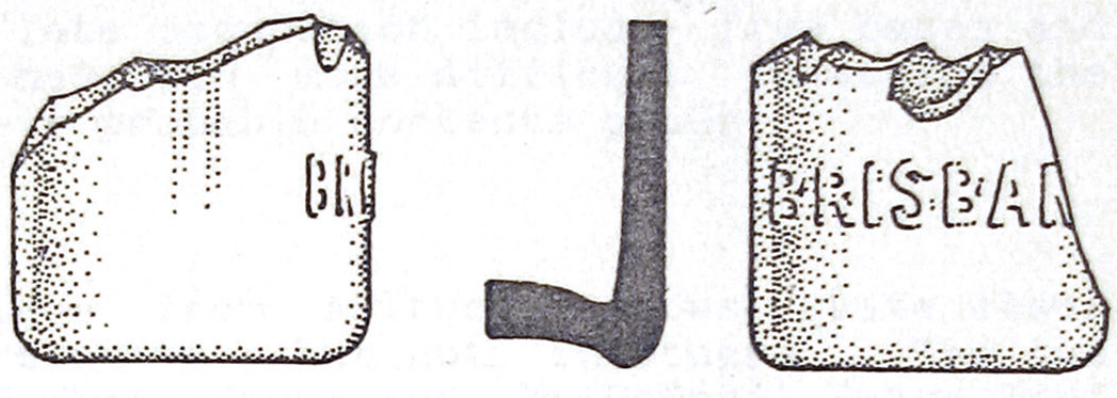
the Works precinct, near site 180 in quadrat 9.

There are a number of bases from bottles with so far unidentified contents. The shape, and particularly the low pushups and base embossing, where it exists, suggest either spirits or pickles and sauces. This is one are in which the complete bottles would be more useful, as the necks are more helpful in identifying contents. Efforts have been made to suggest categories from the provenance of the bottle, e.g. some sauce/pickle types have been identified because they were found in the kitchen area of site 100. In most cases, only one example of the type has been found. With the early bases, none have been found at the police station, and only two at MacDonnell Range Reef; those from the Works have concentrated on the most westerly quadrats, 45, 54 and 9, and at the White Range, site 100 has the greatest number.

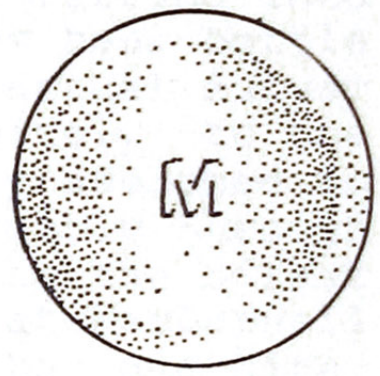
There are 7 small green to amber type, which may be half-sized spirits, but with no base embossing to suggest brand names. The embossing that does exist shows that the bottles were made in Australia and England. The aqua bases are more numerous, 20 with some sort of embossing, and 5 plain. Of these 12 were found only at the White Range (9 from site 100, 2 from site 59 and 1 from site 98); otherwise Kangaroo Creek well is the only precinct not represented in this section. Again the base embossings identify two Australian made bottles and six from England. (Figure 51) The English glassmakers include the two represented in other groups, Nutall & Co, and Cannington, Shaw and Co. A number of the bases have letters and numbers which may eventually be useful for identifying the maker, the contents or the date of manufacture.

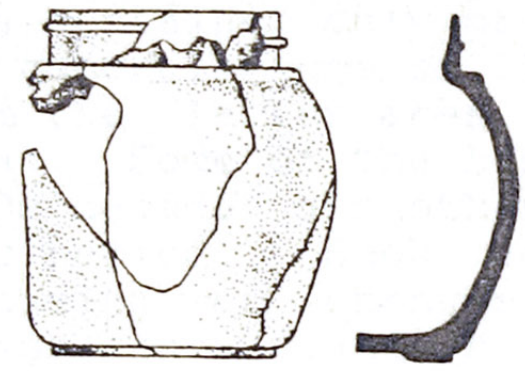
One base G664, was made after 1913; it is green, almost flat, and embossed UG? suggesting manufacture by the English company, United Glass Bottlers formed in 1913. Of the four independent glassmakers who joined together, two were Nutall & Co. and Cannington, Shaw & Co[23]. Given the dominance of our own Australian Glass Manufacturers Co. in the post World War I years, this bottle may have reached Arltunga by 1918 or even earlier. It was found in the rubbish area, quadrat 53, at the police station.

Only four bases with unknown contents have been found from the 1920s, two each from the western precincts. Two possibly 1930s-1940s bases have been noted, including one Food? jar, G546 found near site 193 at the Works. This has a wide mouth and separate lid, with it and the body embossed Agee Victory. The other is a clear base from the Kangaroo Creek Well precinct.



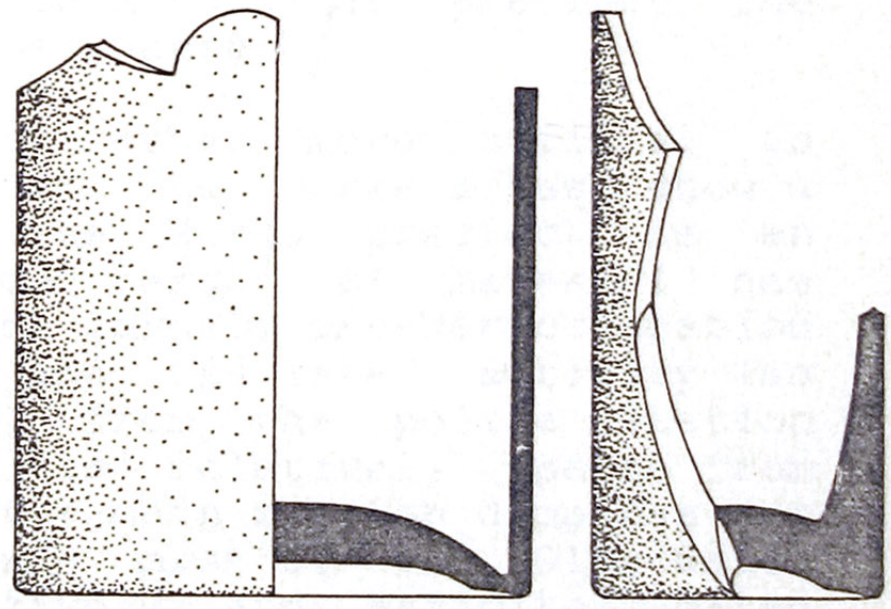
G154

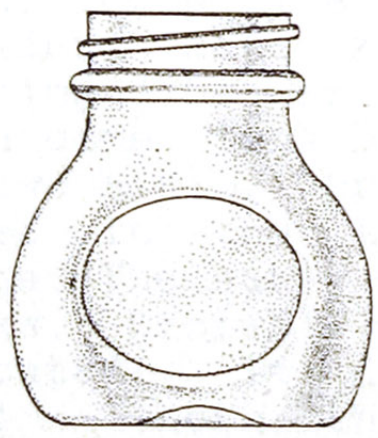


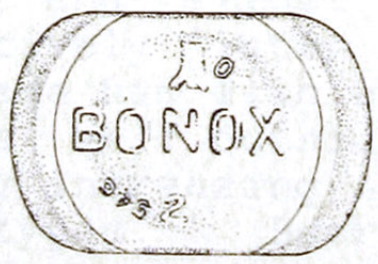




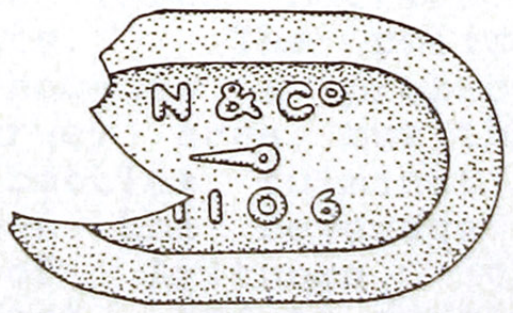
G656







G641



G143

Figure 51 Some of the Miscellaneous bottles. G154 and 143 of unidentified contents but possibly sauce or pickles.

The 1950s material shows some range of types - cosmetics, food and those of unknown contents; all but one came from the police station. The cosmetic group has several Ponds jars, while a similar opaque white glass jar may have contained food, or something like vaseline. The three Bonox types could be food or pharmacy items. The unknown contents from this late occupation include five bases and three necks - it has been more difficult to assign the modern necks to their probable contents group.

The bottle assemblage from Arltunga shows quite clear patterns in some respects, but not in others. The two mining precincts of White Range and MacDonnell Range Reef have contained only pre-1920 types, with most fitting into the general range of 1880 to 1920. (The 1960s beer bottle from the latter area was not close to the actual survey area). Some of the bases can be dated definitely to the 1910s decade, and others have been tentatively assigned to this period. Such datings have been possible through embossing, or changes in manufacture, such as the offset finish seams found in a very few examples at MacDonnell Range Reef and the Works. It is interesting that one site, 131, at the White Range, contained a spirits base dating to 1916 or later, but that so far none of the offset finish seam types have been found at that precinct. The dating of this type may thus be suspect.

The two precincts seen as rather more official in function, the police station and the works areas show a much wider date range. The Works precinct is an interesting one as the wide range of material has provided some link between the largely pre-War occupation of the two mining precincts, and the later activity (as expressed in the artefacts) from the police station buildings. The early material is relatively sparse from the works, probably because the main rubbish dump has not been located. It does include most of the 1910s dated material - both the tentatively and definitely dated bottles, and almost half the 1920s bottles, and then comparatively later artefacts. The police station assemblage has also suffered because a probable rubbish dump was well outside the survey area, but then shows a steadily increasing number of bottles, culminating in the 1950s types. Beer has been the beverage of choice throughout the occupation of Arltunga, though the MacDonnell Range Reef precinct, and to some extent the Works precinct, have a predominance of spirits bottles.

The food related bottles, the sauces and pickles etc., and the pharmacy bottles seem fairly evenly spread. The variety of types and comparatively limited numbers within types suggest that these items had a longer use life than the alcohol bottles, which would be expected. Some of the pharmacy bottles in particular suggest 1890s dates of

manufacture, which in the case of White Range, are very early. Perhaps more importantly, they suggest that a wide range of consumer goods were available at Arltunga - or that people came prepared with all their favourits condiments and drugs.

The bottles are not always so helpful in identifying the differing functions of different sites, or even functions within sites. Site 100 at the White Range certainly has a greater number and variety of bottles than the other White Range sites, but this could be as much a result of the presence of the billiard table as the personal preference of the inhabitants. Apart from the natural concentration of bottles in the rubbish dump, more bottles or part bottles were found around the living and kitchen areas at the site, with slightly fewer numbers in the billiard room area. It may be that the latter room was tidied up for the visitors, and empties thrown into the rubbish area, while a mess around the living quarters was more private. There is certainly a much lighter scatter of bottles around the work area of the forge, shelter/shed and ash pit. Site 98 had comparatively few bottles, as would be expected from a store site which would be aiming to sell its stocks, rather than eat or drink them. Site 59 has fewer bottles and generally less variety, but some new catalogue types were found here. The bottles at this site were found mainly in the small rubbish dump, with the other lesser concentration being within the major structure and around the area of the additional north room. Site 131, not represented on the artefact table, showed again that individual taste and/or economic status allowed for a reasonable consumer choice. Several new types were noted in the small rubbish scatter around this site, including one that dates to 1916 at the earliest.

At the MacDonell Range Reef, the bottles are definitely concentrated in the western section, in the rubbish scatter associated with the only probable domestic structure, site 169. The material from the eastern, and probable work area, is much more reduced in numbers,though all function groups were represented. While most of the bottles fit into the broad date range of 1880 to 1920, there are some necks showing the machine made offset seams which may suggest some occupation at the later stages of that date range. The most definitely datable bottle from the site is the Newbery pharmacy bottle, made between 1905 and 1911; as pharmacy bottles can be in use for several years, this suggests a later, rather than an early 20th century date.

While the assemblage from the Works shows a much greater date range, including most of the 1920s material so far found at Arltunga (see figure 52), the distribution is also of interest. The scatter immediately adjacent to the two major domestic structures, sites 180 and 185, was comparatively light, though site 180 had a minor dump to

the south-west. The greatest concentration, particularly of early types, was found in qadrat 54, with no obvious building remains, and quadrat 45 to the north. Other minor concentrations were found in association with the more apparently "work" buildings, such as site 195, 194 and 193 suggesting that the lunchtime beer was part of the job. Some of these concentrations are the result of recent use of the area, including stubby glass which does not appear on the artefact table.

The police station precinct is certainly dominated by the 1950s rubbish dump and similar material found especially close to site 256, in quadrat 8. This precinct has almost all the 1950s bottles, and most of those tentatively dated to the 1930s and 1940s. (Figure 52) The lack of earlier material is partly a result of this long occupation of the site, and partly because a major rubbish dump was outside the survey area. A superficial check at the three small isolated sites to the south-east of the police station buildings suggests that the artefacts there are generally of the early types. Recording of this smaller area would provide an interesting contrast to the assemblage from the police station area, even without the major police rubbish dump.

Both these precincts indicate a pattern referred to by Hardesty as the horizontal stratigraphy characteristic of mining sites. This is the reluctance of later occupants to re-use earlier rubbish dumps, and in some cases, earlier buildings. The latter reluctance is not indicated at Arltunga, but there is certainly a difference in the artefact scatter. As the later occupation of the Works precinct seems to have been relatively minor, it may have been more acceptable to dump rubbish close to habitation sites. The pattern is much clearer at the police station, with the quite obvious 1950s rubbish dump within fifty metres of the buildings, while the early rubbish dump is a much greater distance away. The 1950s dump partly covers the same area as a very light scatter of much earlier material, but it does indicate an occupation of three or four years, in which case the proximity of the rubbish dump seems a little unusual.

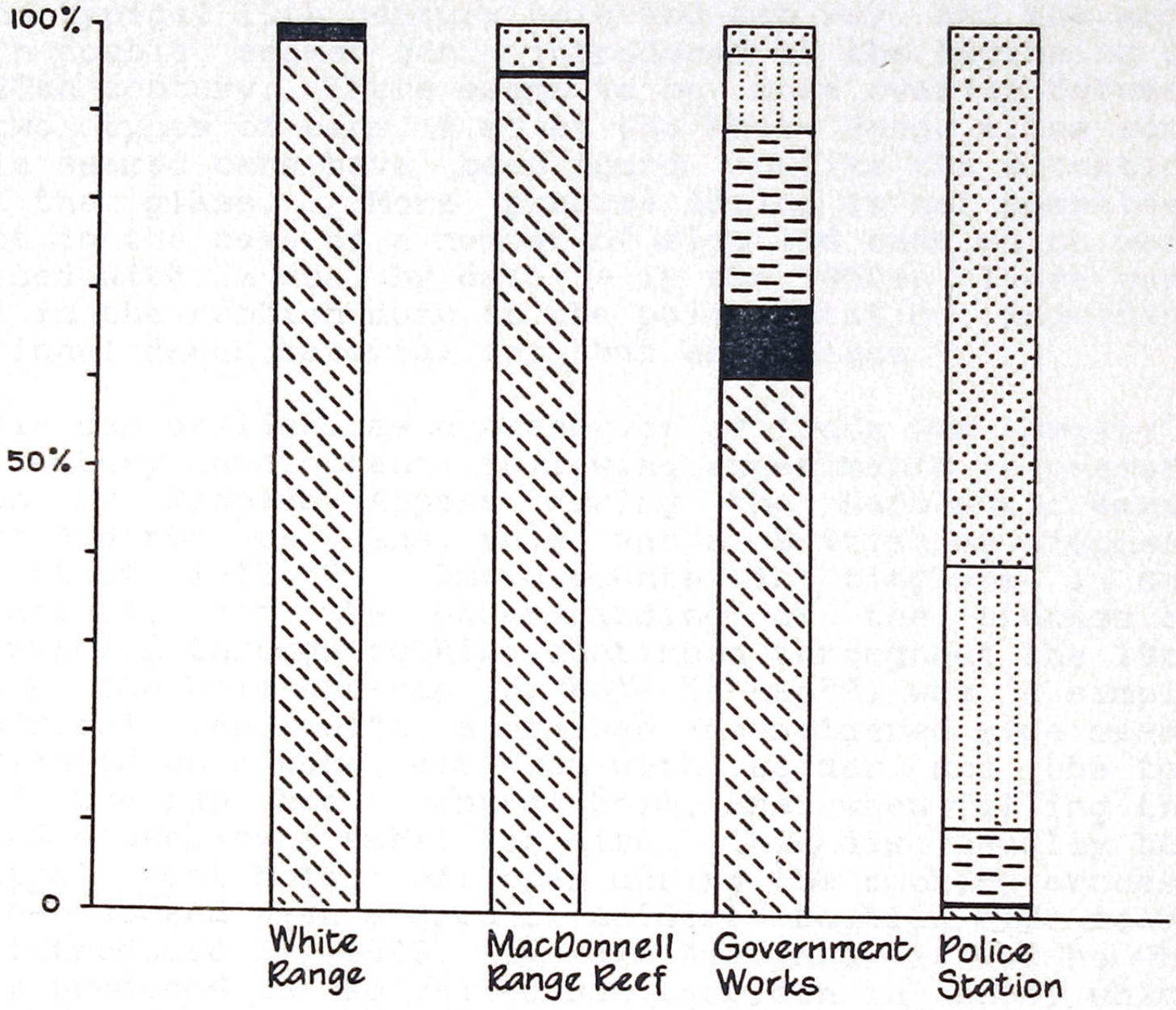


Figure 52 Graph showing the distribution of bottle glass by date in the four precincts. The percentages have been worked out from the total weight of glass in each type and category, rather than by the minimum numbers count as shown in Figure 46.

The food cans also make up a large group within this domestic/kitchenware category. They have not been as completely analysed as the glass bottles, and the Works precinct cans have yet to be catalogued. As with the glass bottles, the cans fall into two groups - those made in the typical 19th century hole-and-cap way, and the more modern double seamed can, introduced at the beginning of the 20th century. There seems to be more overlap between the two types of cans, i.e. at the White Range sites some double seamed cans have been found, unlike the situation with the glass. More precise dating is not possible, except in the case of a number of slip lid cans which were embossed with a use by date - in the 1950s. These were found in the rubbish dump at the police station, providing additional dated material for that assemblage.

The tin can utilised as a preserver of foods was largely a 19th century development, following experiments in preservation by Nicolas Appert during the Napoleonic Wars. Appert did not use cans, this was a British development from about 1813.[24] Improvements in tinplate, in can manufacture, and the understanding of the process of preservation through cooking continued throughout the 19th century. The hole-and-cap (or hole-in-cap[25]) was a simple cylindrical can, with a lapped and soldered side seam. The flanged ends were attached with solder, and the top end of the can had a central hole, used when filling the can and closed by a small tin disc. This disc usually had a central vent hole, left open during the cooking process and then closed with a drop of solder. Doubled side seams were introduced in 1888, by Max Ams, and it was he who finaly produced the so called sanitary can in 1904, which had the ends double-seamed to the body. While it took some years for complete acceptance of the new can, by 1920 there were very few old hole-and-cap cans being manufactured. Further research saw lighter cans being used from the 1930s, the introduction of the beer can in America in the same decade, and the aluminium can from the late 1950s. The first ring pulls were tested in America in 1962, and being used by 1965.[26] They have now been replaced by the pop top can.

By the 1890s a considerable variety of canned meat, fish, vegetables, fruit and milk were available. Canned foods were being used by householders, and were gaining acceptance as an alternative to fresh foods. Canning in Australia began in a very small way in the 1840s[27] and increased from the 1860s onwards. Meat and jam were the most important items canned, followd by soups and vegetables.

As can shapes and sizes do not appear to have changed greatly over time, it has been possible to suggest contents for some of the Arltunga cans, based on the modern cans. In other cases, such as in the rectangular sardine cans, the identification has been simple; in

others still, if the can has been punctured, it is presumed to have contained some sort of liquid. In this way it has been possible to suggest that milk, fish, meat, and vegetable cans have been found. Many cans have not been identified, which probably contained fruit, jams, meat & vegetables, soup, and vegetables. Most of the cans are cylindrical in shape, the exceptions being sardine and other fish cans, and some meat cans.

MILK CANS

These have been identified by the two holes roughly punched into one end, and at 8.3cm high and 7.5cm diameter, they are very close to modern evaporated milk cans. Condensed milk was available from the 1850s, and evaporated milk from 1885.[28] In Australia, Melbourne had the first milk condensors from 1882, and Nestle opened its first factory in Queensland in 1908[29]. The cans from the White Range that fit this size include hole-and-cap cans with lapped and with doubled side seams, and the modern double seamed cans. (Figure 53) As can be seen in the artefact table (figure 46) an enormous number of these milk cans were found at site 100 - 301 in all, including 28 double-seamed types. This compares with only one at site 59, and three at MacDonnell Range Reef, and suggests the presence of children at this site. The police station area had some of the hole-and-cap milk cans, and the rubbish dump in quadrat 53 also contained a large number, 242, of double seamed possible milk cans. These varied a little more in size and shape, suggesting that both evaporated and condensed milk was used here. These figures may be incorrect, as one of the modern types is 9cm by 8.5cm and could have contained fruit juice (155 examples of this type were found). The other can type was 8.7cm x 7.5cm. In addition, there was another medium sized can, 8.2 x 7.4cm, similar in measurement to the early milk can, but none of these had been punched; 31 were found. While on the subject of dairy foods, the police station also had 76 small cans of reduced cream- one can retained enough of its tin printed label to allow positive identification.

FISH

These are mostly sardine cans, of which quite a variety of slightly different types were found. Sardines had been canned in Europe from the 1820s, and the rectangular can was actually using a double seam to attach the top and body of the can from the 1870s. The most common type is the two piece can, the bottom and sides in one piece, with the attached top, but considerable variety of construction has been noted. Some cans were 3 piece, with the ends either inside, or outside, of the body section. One of the most common of the two piece cans was that embossed Norvege on the base (21 from site 100, 3 from site 59 and 1 from MacDonnell Range Reef). Similar cans were found at

the police station, especially in the rubbish area, but embossed Norway and Norvege.(Figure 53) Two of the White Range cans still retained signs of their original tin printing, showing a Norwegian origin, and possibly produced between 1905 and 1910.[30] Other fish cans included 2 large oval cans from site 100 (one of which had holes punched into the base to make a sieve) and the more modern kippered herring cans from the police station dump.

Some small round cans were found, which may have contained canned salmon. The hole-and-cap type was found at site 59 (1 example) and site 100 (23 examples), was 4.6cm tall and 8.9cm in diameter. The double-seamed can, embossed Canada on the base, was slightly different at 5.1 x 8.6cm, and 13 were found at the police station.

MEAT

Both round and rectangular cans may have held meat, both types being made to open around the body, as with modern canned ham. The tall, rectangular cans varied in height, with the two from MacDonnell Range Reef (one at 12.2cm and one at 9.8cm) while 4 from site 100 were 10.2cm tall, and 3 from site 97 were 6.7cm tall but much broader. (Figure 53) The tapered rectangular meat can was introduced in America in 1875, and are still in use. The police station had a number of modern equivalents, probably dating from the 1950s, with one type having the remains of a Tom Piper label.

One round can, unique to site 100 was found with base embossing, partly rusted away: A? M.E. Co. Ltd., ..Pton and Queensland. The can may have been key opened or cut open, and now stands 8.4cm tall by 7.2cm. Identifying the maker, and possible date, has been made difficult by the incomplete embossing, but meat canning had begun in Queensland in the 1870s. The Queensland Meat Export & Agency Co. was formed in 1890 but operated from Brisbane and Townsville, while the likely Rockhampton meatworks was the Central Queensland Meat Export Co. Ltd. established in the early 1880s, and continued under that name for several decades, despite changes in ownership.[31]

Other round cans possibly for meat were medium broad types, key opened around the body; the complete can was 6.2cm tall, and 10.6cm diameter. It was found at site 59 (8 examples), site 100 (41) andwith only one from MacDonnell Range Reef. There were in addition a variety of these shaped cans found in the same two precincts, most coming from site 100. Similar double-seamed types were found at the police station, the most popular being 7.7 x 10.2cm, with 46 examples, mostly from the rubbish area.

VEGETABLES

Very few cans containing vegetables have been positively identified, but the White Range sites had some most unusual double-seamed cans with small, fine lead labels. (Figure 53). These indicated European origin, and that the contents were petit pois (taller cans, 11.2 to 12cm tall, diameter 7.4cm) or haricots verts (7 x 10cm). The labels varied slightly, and the cans must date to after 1903. All examples were found at White Range, and all but one at site 100. The Lassetter's 1906 catalogue has Petit Pois at 7d or 9d per tin, and Haricot Verts at 9d per tin, which seems to compare reasonably well with other canned vegetables. One American book on canned foods, published in 1914 referred to peas as "one of the great canned food staples."[32] The author went on to say that until recently most peas were imported from France, and considered a luxury, but their beautiful green colour came from the use of salts of copper. When the pure foods laws required information about all the contents of the cans, the French pea business was ruined, and consumers turned to the local product. It may have taken a little longer for the imports to fall into disfavour in Australia.

One other vegetable has been identified from slip lids embossed Muckart's Patent Preserved Potato. No complete cans were found, but some of the slip lids were fitted to rectangular can ends, 26.5 x 22.5cm. These obviously came in large cans, and must have been dried, as it would take some time to eat the contents.

Among the numerous tall round cans with contents so far unidentified, there are several that are of similar measurements to the imported peas; 24 from site 100, and 2 from MacDonnell Range Reef. Possible modern types, 11.8 x 7.5cm, were popular at the police station, with 176 examples but in this case, 19 of them had punched holes at one end, suggesting the contents were liquid.

Other cans of uncertain contents included a variety that were made to have a slip lid, similar to modern coffee or milk powder cans. Some of the old soldered seam (hole-and-cap seems inappropriate for these) cans varied from a very small example which may have contained baking powder from site 100, to much larger types 12.7cm tall by 8.3cm. Of the 8 different varieties, all were found at site 100 (34 examples) while only 1 was found at site 59 and 2 from MacDonnell Range Reef. At least 3 and possibly 6 of the site 100 examples were double-seamed, and slightly larger at 13.4x 8.5cm. The police station area contained 11 varieties of slip lid cans, 45 cans in all, the most popular of which was 11.5 x 9cm embossed on the base Use Before and dates between 1956 and 1958. Other cans of differing sizes had similar embossing, all between 1956 and 1958. (Figure 53). The largest was 18.2 x 13.2cm and may well have contained coffee or milk powder.

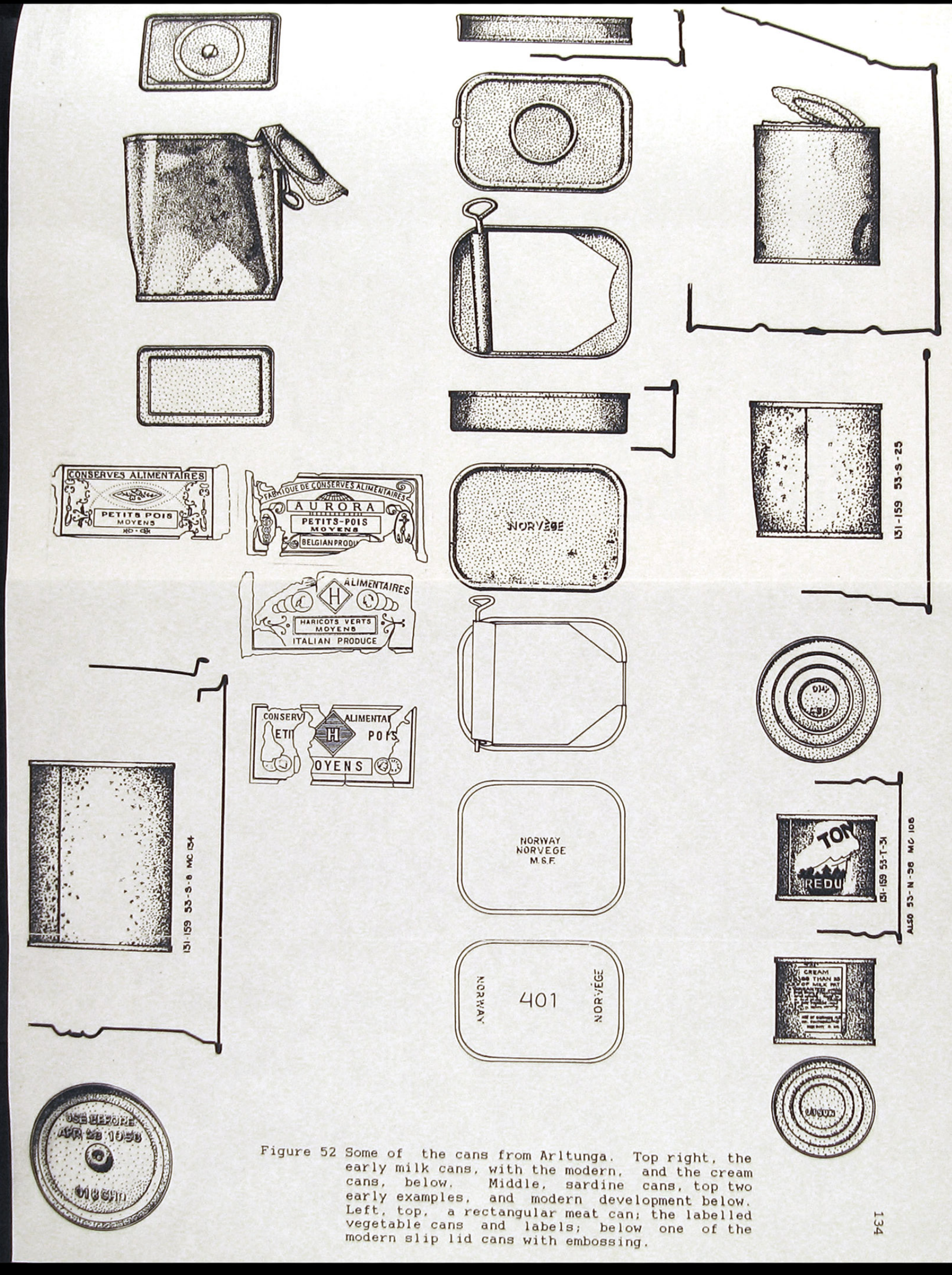


Figure 52 Some of the cans from Arltunga. Top right, the early milk cans, with the modern, and the cream cans, below. Middle, sardine cans, top two early examples, and modern development below. Left, top, a rectangular meat can; the labelled vegetable cans and labels; below one of the modern slip lid cans with embossing.

Other identified cans included Coleman's starch, in small rectangular cans with a fitted lid, found only at site 100,and Coleman's cornflour found at MacDonnell Range Reef. A Robinsons Groats can was found at site 100, and another at the police station rubbish area. Four oval Robur Tea lids were found at site 100, and some J S Fry & Sons Cocoa lids, one from site 59 and 3 from MacDonnell Range Reef.

The cans show that a reasonable variety of foods were available at Arltunga, where fresh foods would be difficult to get. Site 100 at the White Range again has the greatest number and variety of cans, with the milk cans suggesting the presence of children, and the starch cans suggesting a woman. The Robinson's Groats, which was a fine porridge, also suggests women or children at the site. The number of cans, and the presence of such exotic items as the European peas may indicate a higher economic status for the inhabitants of this site.

Comparatively few identifiable cans were found at the MacDonnell Range Reef precinct, because most of the cans had been flattened. The police station precinct included a number of hole-and-cap cans, as well as the more numerous possibly 1950s double-seamed cans. The long occupation of this site suggested by the datable bottles has not been possible to verify from the cans, as they cannot be dated so precisely.

One other food category was the bone, most of which was found in very small fragments, but in all precincts. This group needs specialist analysis, but identifiable fragments include a rabbit skeleton from the site 98 wind tunnel, and three rabbit jaws from site 59. Several large rib bones, from an ox or bullock were also found at site 98; most of the bone from site 100 was very small, and much of it had been burnt. At the police station, the surface bone appeared to be the result of recent camping occupation, while the excavation discovered the first garden "pit" with its several goat carcases.

Kitchenware

This group was not particularly large in number, and the artefacts cannot be precisely dated. The only stove parts have been found at the police station precinct, where part of a stove door was found in the rubbish dump of quadrat 53, and two pieces were found in quadrat 8. These may belong to a later occupation of the buildings, as it seems that fireplaces, and simple ovens were the more usual cooking methods in the earlier days. Fragments of heavy cast iron cooking pots were found at the police station precinct, and at White Range site 98. The latter were larger fragments, in one case stamped CLARK & C....NGLAND. It is interesting that these were found at the store site, rather than at a domestic site. Such heavy pots would have been used because they could withstand rough handling, so it seems unlikely that stock items would have been easily broken. One billy, now in poor condition, was found at the MacDonnell Range Reef precinct, and several lids came from the police station area, plus a saucepan handle. The only enamel plates, 3 in all, came from this same precinct. A knife blade and penknife were found at site 59, a fork at site 100, and a spoon at site 98, plus a knife sheath from the police station, quadrat 8. The MacDonnell Range Reef 52 rubbish scatter area contained a vegetable peeler, which could be a recent deposit. The White Range sites also produced some unexpected finds: part of a mincer was found in the kitchen, structure B at site 100. Site 59 produced a small metal attachment that looks as if it could have been a sugar shaker, a small strip of decorated silver, and an advertising thimble. A small bell was found in the police station rubbish area, quadrat 53. Wire mesh, which could have come from such items as Coolgardie safes or food cupboards, has been found at all the precincts with major domestic components.

Pottery makes up a minor part of the total artefact assemblage, with little found at the early precincts. The small amount from site 100 seems to have come from one large jar, possibly containing whisky, and a small meat-paste or ointment jar. Other fragments of pottery were found scattered over the area of structure C, the billiard room, but are very small. The fragments from the police station area appear to be ordinary kitchenware, cups, saucers and plates, with some jar types. There is a need for a proper analysis of the police station pottery, along with the widespread fragments from the works precinct.

The packing case tin and hoop iron are an expression of the bulk stores required in any outback area, though little hoop iron was found (or perhaps, was recognised). The packing case tin varied quite considerably in breadth,

from 1 to 3.8 cm. This tin is also another source of nails or tacks, which varied in size from 1.4 to 2cm for tacks and approximately 3.2 to 5.1cm for nails. While the artefact table shows the number of packing case fragments found at each site or quadrat, there is no indication of the size of those pieces - most were quite short. It is interesting that there was very little from site 98, the White Range store, and almost equal amounts from the other two sites. At MacDonnell Range Reef most was found in the rubish scatter of quadrat 52, and there was a similarly high number from the police station rubbish area, quadrat 53. In the latter case, there was also a reasonable scatter found in the three quadrats with major buildings- in fact a surprising amount from quadrat 18. The building in 18, site 255, had been identified as the blacktracker's quarters in the 1970s, but evidence is mounting for its use as a stable or shed. The packing case tin is a small part of this identification, suggesting that stores would have been unpacked in this area before being moved to the police station living quarters, sites 256 and 257 in quadrat 8.

Furnishings

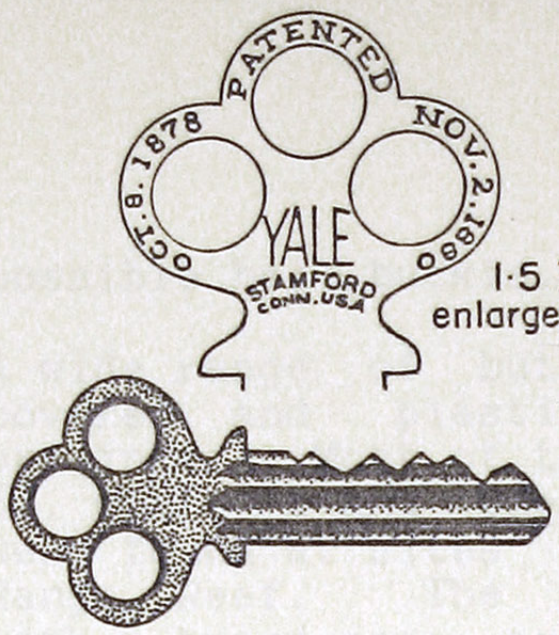
This is also a small group, not surprising in an isolated and pioneering area, where items would be repaired and reused for as long as possible. Kerosene lamp fragments are relatively rare, although they would have been the obvious source of light at Arltunga. The majority of the fragments have come from site 100, where several metal pieces were found around structure B, and one from the adjacent structure A. Surprisingly, the identifiable lamp glass was found within the ash pit, structure F and the rubbish dump - though much of the glass from structure B had been affected by heat. The artefacts show at least two different lamps at this site. The metal pieces indicate a lamp with a quite heavy and ornate embossed pattern, popular at the beginning of the 20th century.[33] The lamp glass, on the other hand, or at least some of the fragments were embossed DIE.., suggesting it came from a Dietz lamp, much simpler types, similar to hurricane lamps. Such lamps were illustrated in the 1906 Lassetter catalogue, the firm being an American one trading from 1840 until at least 1914.[34] There were even fewer fragments from the MacDonnell Range Reef precinct, just a regulator/handle, possibly part of a lamp reservoir (from the eastern section) and some lamp glass from the rubbish scatter of quadrat 52.

Hinges, lock fittings, and keys were found at the White Range sites, suggesting a need for some security. Site 98, the store, may have been holding stock items as well as items used in its own buildings. A hinge was found in square 2D, a lock plate rather strangely near the wind tunnel in 3F, and a Yale key in 4C. The latter has a very distinct trefoil design which suggests a manufacture date between 1882 and 1892,[35] an early date for most Arltunga sites. It is most likely that such keys were rarely needed, and that such stocks could be on hand for many years. Site 100 had two padlocks and a barrel key from structure B, and two small keys, possibly for a trunk or suitcase, from structure C. A hinge was found in square 20Q, associated with structure A, suggesting the position of the door or possibly a window. The concentration in the kitchen area suggests a need to lock up at least some food supplies, or perhaps some personal items. Part of a padlock or latch fitting was found in the main structure at site 59, and another part padlock from quadrat 8 at the police station. (Figure 54)

The unusual furnishing items were mostly found at site 59 and included a decorative S hook, five small tin "cups" similar to protectors placed under chair legs, and 14 upholsterer's tacks scattered over both structures. Site 100 had 8 two piece metal "fasteners" from structure C. While not all these items have been definitely identified they seem to fit with the furnishing category. Site 59 almost certainly had a comfortable chair or two, which, with other unusual items such as the hook, and strip of silver, suggests a reasonably high standard of living in this camp. A number of suitcase or trunk metal strengtheners were found at the police station, scattered over all quadrats apart from 17. Some fragments of a metal frame, perhaps for a mirror or picture, were found in the rubbish area of 53, and quadrat 9; inner springs from beds or chairs were also found in quadrats 8 and 9. The clock fragments were mostly small, fine cogs or wheels, with one of the MacDonnell Range Reef items being what could be a watch back section.

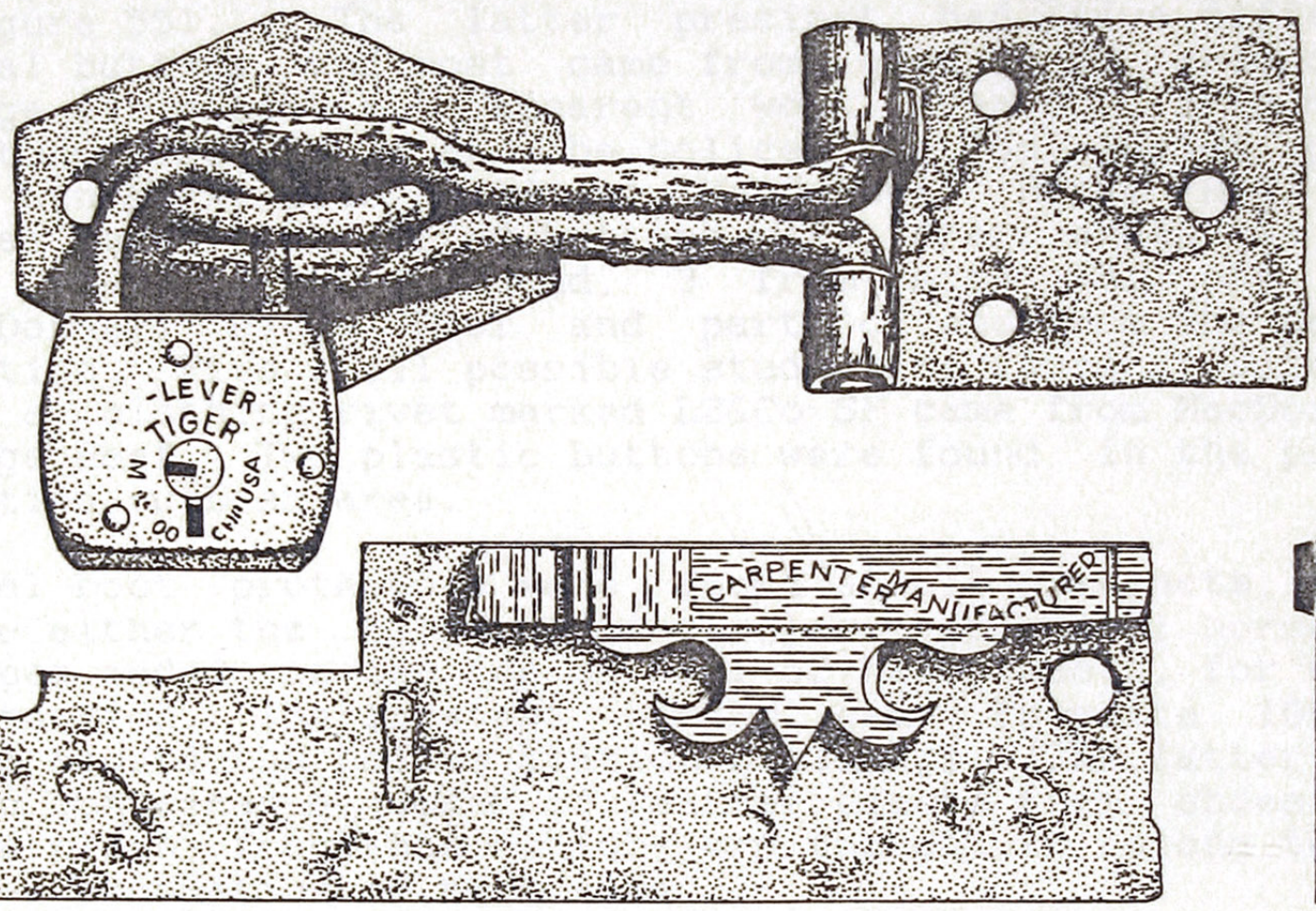
Clothing

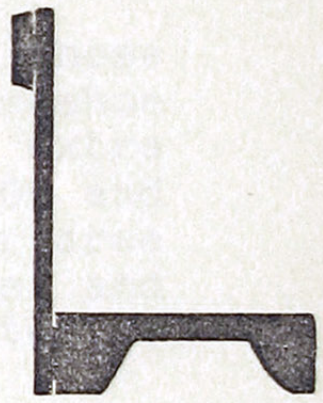
The metal artefacts are better represented than items such as clothing or shoe leather, particularly in the White Range area. The smaller buckles that fit this category include two vest buckles from site 100 (figure 55), which match an illustration in the 1906 Lassetter catalogue. The MacDonnell Range Reef buckles have not been definitely identified, but one appears to have been from a belt, and two may have been from braces. The police station precinct had 7 buckles, from the rubbish area and quadrat 8. They are the small suspender or braces type, with one



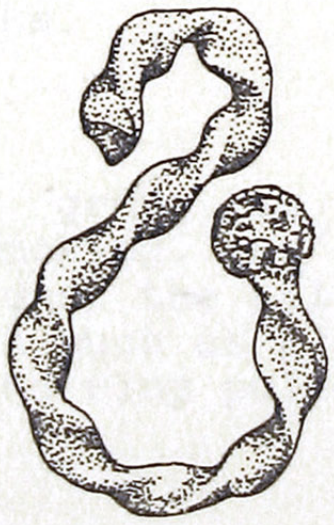
1·5 X enlargement

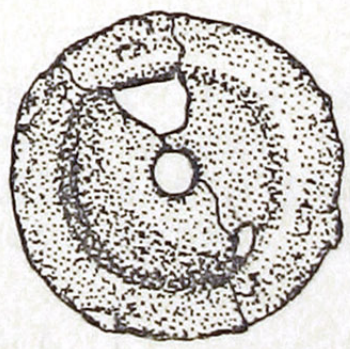












Scale – actual size.

Figure 54 Furnishings:
Top, the Yale and barrel keys
Middle, the smaller padlock from site 100, and the door fitting
Below, the small items from site 59, the upholstery tack, decorative hook, and the tin "cups".

possible belt buckle, and could be of any date.

A wide range of buttons, metal, pearl or bone, cloth covered and plastic have been found from the four precincts. Most of the pearl/bone buttons came from site 59, where 8 and one part button were found; three each were found at sites 98 and 100, and one from MacDonnell Range Reef. The metal buttons were plain, or embossed with a brand name, again with three from sites 98 and 100, four from site 59, and 13 from MacDonnell Range Reef (figure 55). The latter precinct had five different metal buttons and most came from quadrat 54, around the forge fireplace and apparent work area. Three metal buttons were found at the police station, including one Our Own Mark, also found at MacDonnell Range Reef. The bases for cloth covered buttons were rarer, except at site 100 where 4 were found, 3 from site 98, one from MacDonnell Range Reef and part of one from the police station. Five small possible studs were found at site 100 and a clothing rivet marked LS&Co SF came from MacDonnell Range Reef. Two plastic buttons were found in the police station rubbish area.

Metal boot protectors were found at all precincts, these were either the solid semi-circles, or small horseshoe shapes added to the toe or heel of heavy boots, for extra protection. The greatest number came fromsite 100 and from around the police station buildings. The latter area also contained a number of leather pieces from shoes, and some cloth fragments, which are thought to belong to the later occupation of that site.

Toiletries were few, but include part of a comb from site 98, and more modern items such as the Pond's jars, discussed in the bottle section, razor blades, collapsible tubes and lipsticks.

The recreational group is made up of the artefacts connected with smoking, the small reed boxes from mouth organs or accordions, the billiard table slate pieces, and the modern rubbish such as plastic wrap, paper, foil, dry cell batteries, and ring pulls.

Smoking

The clay pipes found were very fragmentary, being parts of stems and bowls. The most common bowl design had a basket weave pattern which may have joined a stem stamped S McLardy of Manchester, a pipe manufacturer from 1869 to 1930. These were found at sites 100 (12) and 59 (1) and at MacDonnell Range Reef (9). One stem from site 100 was stamped ..Waldie, John Waldie & Co of Glasgow, making pipes from 1870 to 1929. Site 59 had one stem stamped W White of Glasgow, who operated only between 1884 and 1899.

Two bakelite or vulcanite pipe mouthpieces were found at sites 59 and 98. The remaining fragments were too small for any identification.

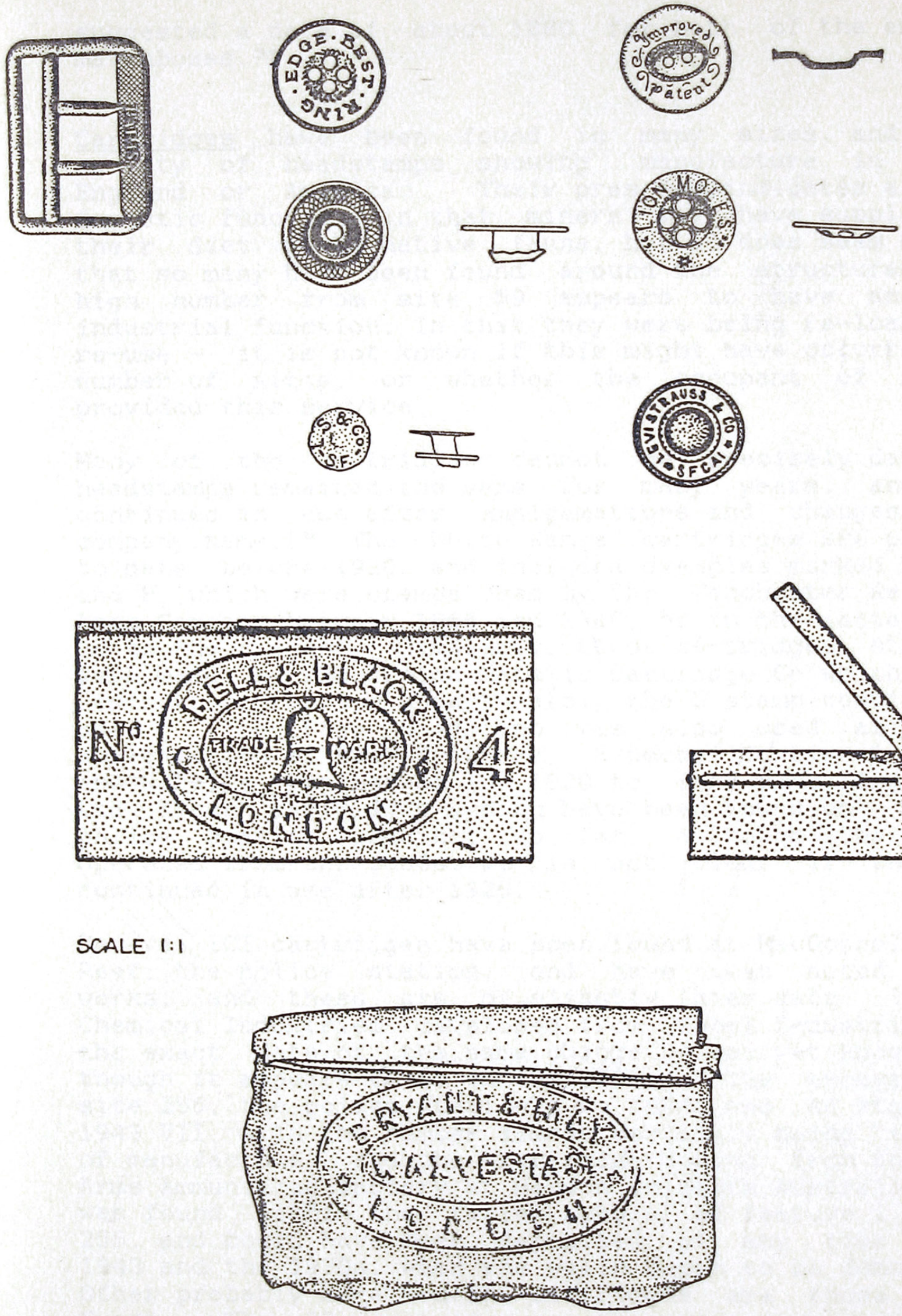
The tobacco tabs are small tin artefacts, in various shapes and used with plug tobacco. This tobacco was sold (at least in the 1970s) in rectangular blocks which had been partially cut into squares; the tabs kept the squares in place until needed. Two of the round tabs, Conqueror and IXL brands were found at three precincts at least, and these brands were last produced in 1924.[36] Other tabs were diamond shaped, rectangular or hexagonal, plain or embossed. Some of the larger rectangular types found at the police station may have had a different purpose as they were stamped Tread on your cigarette butt.

Tobacco tins are difficult to date, as they are small round, one piece cans with over-fitting lids. Some of the lids found at the police station have remnants of tin printing on them, usually depicting Log Cabin lettering and logo, which are presumed to be rather more modern. The cigarette butts are one indication of possible visitation to sites.

The other recreational items are the reed boxes, found at site 59 and the police station, though the latter are smaller. (Figure 56) More numerous, though confined to site 100, are the slate fragments, believed to have come from a billiard table. Both give some idea of the limited recreational activities, apart from alcohol, that were available to the Arltunga miners.

The Miscellaneous group was formed because at least two of the sub-categories fitted more than one function. The matchboxes were used for domestic, recreational and industrial purposes; while the bullets and cartridges could be considered as both domestic and recreational.

The matchboxes have been referred to in the fieldwork section, and the artefact table shows the extraordinary number of boxes, or fragments, found at MacDonnell Range Reef, compared with the other sites. The most common type was the Bell & Black No. 4 (figure 55), found at both the White Range and MacDonnell Range reef. 9 came from site 100, 1 from site 98, 3 lids from site 59, and 8 from MacDonnell Range Reef. MacDonnell Range Reef also had a Bryant and May Wax Vesta lid as well asa plain lid, and the police station area had two R Bell & Co Vestas lids. Richard Bell began making matches in 1832, and Bryant & May from 1861, when wax vestas were very popular. Bell established a factory in Melbourne in 1894, and amalgamated with Bryant & May, in 1909, but it is not clear if the two names continued in use.[37] The addition of Black to Bell & Black has not yet been dated in any of the research seen so far. New Zealand research has



SCALE 1:1

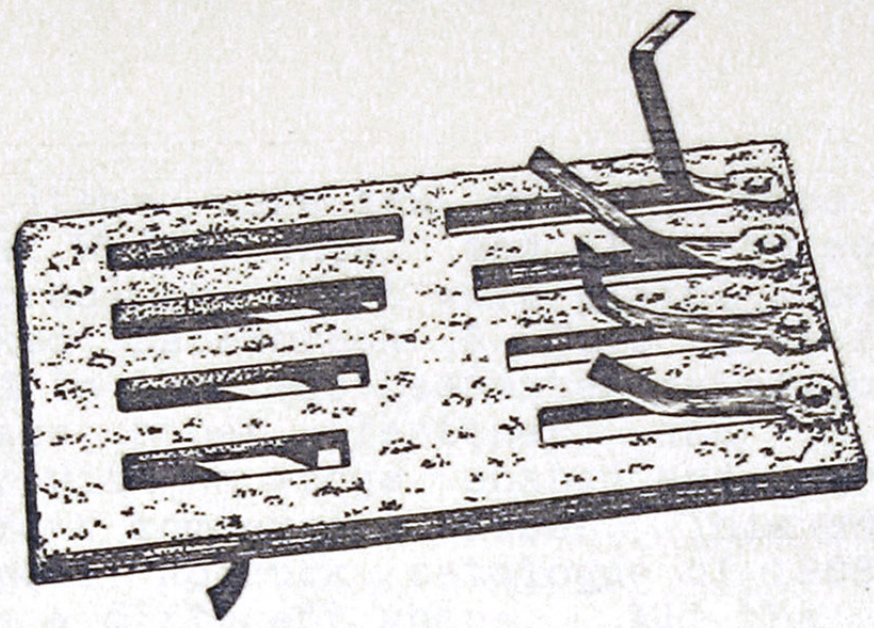
Figure 55 Clothing - the vest buckle, and some of the buttons.
Recreational - the matchboxes

suggested a date of about 1880 for both of the embossed matchboxes.[38]

Cartridges have been found in many sizes, and with a variety of headstamps showing manufacture in either England or America. Their presence indicates a mostly domestic function, in that miners may have supplemented their diet with native fauna, but it does seem strange that so many have been found around the structures. The high number from site 59 appears to have an almost industrial function, in that they were being re-loaded for re-use - it is not known if this might have occurred at a number of sites, or whether the occupant of site 59 provided this service.

Many of the cartridges cannot be precisely dated, as headstamps remained the same for many years, and often continued in use after amalgamations and changes to the company name.[39] The White Range cartridges are presumed to date before 1920, and included examples marked WRA Co, and H, which were stamps used by the Winchester Repeating Arms Company between 1866 and 1940, or in the latter case, up to the present. Similarly, those cartridges stamped U were made by the Union Metalic Cartridge Co which became Remington in 1911 - unfortunately the U stamp continued in use. The Eley headstamp was also used after the amalgamation of Eley Brothers, Kynoch, Curtis & Harvey, and Nobel's Explosives in 1920 to form Nobel Industries Ltd. Kynoch cartridges Kynoch have been found only at the police station precinct so far, although the company operated from the 1860s; it is not clear if the stamp continued in use after 1920.

Several ICI cartridges have been found at MacDonnell Range Reef, the police station, and have been noted at the works, and these are of slightly later date. Imperial Chemical Industries developed from Nobel Industries, but the exact date of the name change is not yet known to me though it appears to be in the 1930s. The excavation at site 256, the police station also found one .44 stamped MJ 1943 VII, with the number almost certainly being the date of manufacture, and the cartridge coming from the Small Arms Ammunition factory at Hendon in South Australia. It was found within the fallen rubble of feature 1 at site 256, and could have been deposited at any time between 1943 and the 1970s, when the walls began to be demolished. Other probably more modern cartridges are those stamped Super. The .22 cartridge was the most common, with some .38s and .45s, and a number of shotgun cartridges being found at all precincts. (Figure 56)



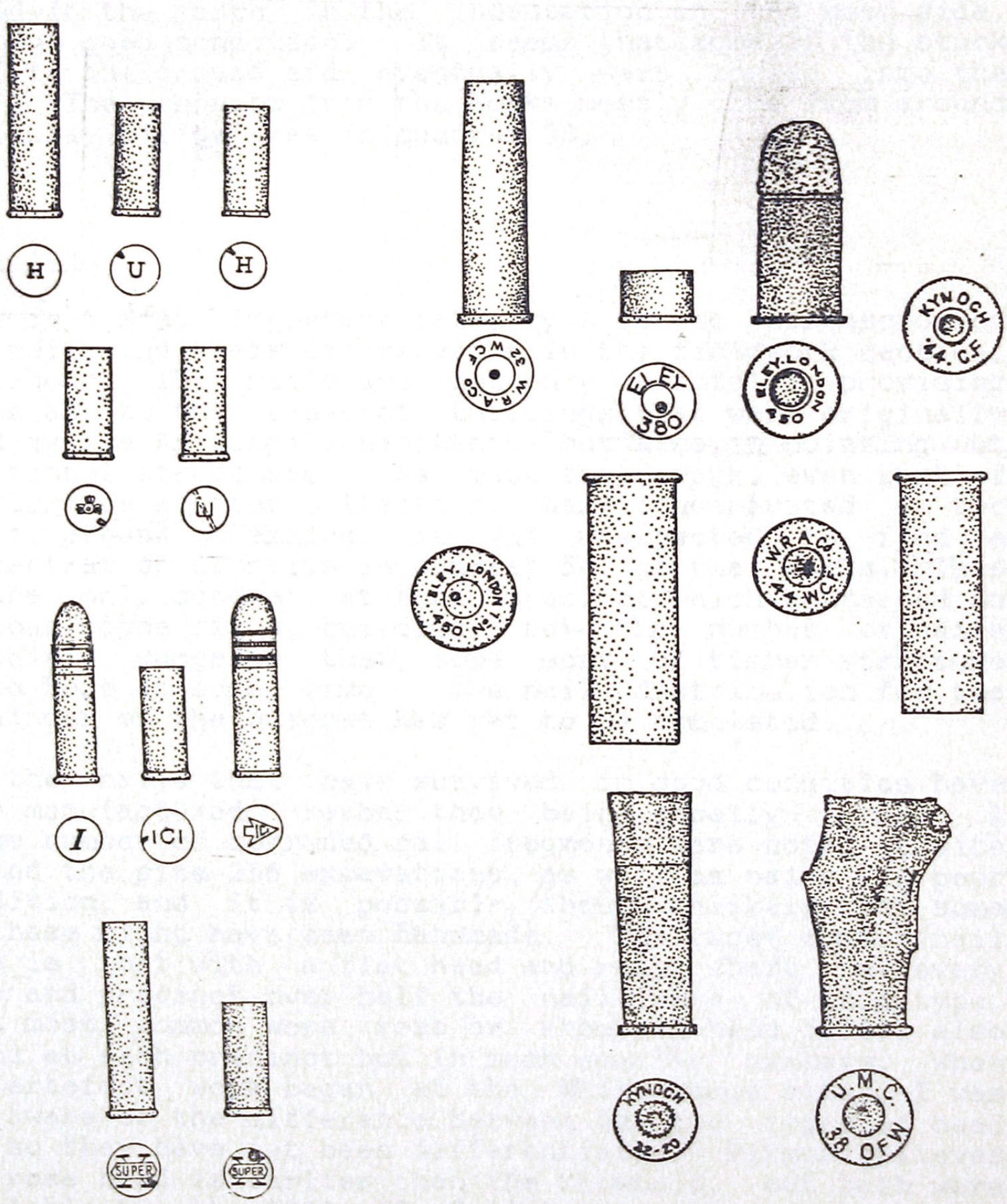


Figure 56 Recreational - the reed box from site 59

Miscellaneous - some of the cartridges.

Stationery items were few, with pen nibs coming from site 59 and 98 at White Range, and also in some numbers from the Works precinct. Most were plain, though one from site 98 is marked Esterbrook & Co's Relief nib, which is illustrated in the 1906 Lassetter catalogue. Site 98 also had a brass paper fastener, and a pencil eraser, rectangular with a wedge shaped end, marked Eagle Pencil Co.'s New York commercial eraser. This company is listed in the Sears Roebuck catalogue of 1908, but the actual erasers are a different shape. All the stationery items from site 98 came from the paved floor area, most of them found in the earth in the indentation on the west side, and in good condition. It seems that some of the stock fell to the ground and eventually were forced into the soil. The pen nibs from the Works mostly came from around the assay office area in quadrat 38.

Building

This is a most important category, as the discussion of the nails and their distribution in the fieldwork section, has shown. The nails are not only helpful in providing clues as to the types of buildings that were originally used by the Arltunga inhabitants, but also in pointing out additional structures. As most field work, even that of the surface scatter collection, has concentrated on the above ground remains, it was unexpected to find a concentration of nails in quadrat 54 at the Works. This is the only quadrat at that precinct which contained no obvious signs of a building, but the number of nails certainly suggests that some sort of timber structure stood here at some time. The nail distribution for the remainder of the quadrat has yet to be completed.

All the nails that have survived in good condition have been manufactured, rather than being locally forged. A large number of corroded nail fragments were noted at site 59 and the site 256 excavations, as well as nails in poor condition, and it is possible, though unlikely that some of these might have been handmade. The most common nail type is that with a flat head and round shaft - at every site and precinct over half the nails were of this type. Next most common were rose or rhomboid head nails, also found at each precinct but in much smaller numbers. When the artefact work began at the White Range sites, I was not aware of the difference between the two types of head and so they have not been differentiated. Varman believes the rose head is earlier than the rhomboid, but both were available by the 1880s.[40] Bullet head nails seem to have taken over from these rose or rhomboid heads in later years, at a date still to be established. Two were found at site 98 and 17 at site 100, with one from MacDonnell Range Reef, and 68 from the police station, so it seems

probable that they were available before 1910.

Roofing nails, for use with corrugated iron, etc., were available from the 1890s, and have been found at White Range and the police station precincts. It is of particular interest to note that at the White Range sites there were a number of "home-made" roofing nails made by the addition of rough squares or rectangles of cut tin to whatever nails were available. At site 59 only two roofing nails were found, one being home-made, at site 98 there were 42 home-made to 56 manufactured, and at site 100 the proportions were 89 to 41. No roofing nails of any sort were found at MacDonnell Range Reef, reinforcing the view that the structures at this site were comparatively flimsy. None of the home-made roofing nails were found at the police station, and most of the manufactured sort were found around the buildings.

Tacks were also more common at the White Range sites, and may have been used in attaching canvas to timber supports, though this is by no means certain. Site 100 had the greatest number of tacks, though their distribution does not necessarily help in identifying whether canvas was used for roofing at that site.

Square, rectangular and triangular shafted nails have been found, the former at three precincts, and the latter two only at White Range and MacDonnell Range Reef. More unexpected were 12 flooring nails found at sites 98 and 100 at the White Range, where timber floors seem non-existent. There were two floor brads, the rectangular shaft and head being cut out from a sheet of iron, from site 98, and the flooring nails had flattened round shafts grooved just below the head; 8 of these came from site 100. These could presumably be used for timbers other than in flooring.

Screws, nuts and bolts and wire, as well as some of the nails, may have been used for building purposes, but also for transport and industrial purposes, in wagons, machinery etc. Little work has been done on identifying the particular purpose of these items. The wire artefacts include round or oval shaped loops, which appear to have some building purpose, i.e. tying timbers together, and pieces shaped into hooks, as well as odd lengths of wire. Canvas eyelets have been found at all precincts, but the numbers are not high considering that canvas may have been an important part of some buildings. The offcuts of corrugated iron are just that, pieces of iron varying in size from small to large. The number of offcuts suggest corrugated iron was readily available, though it does seem contradictory for sites 59 and MacDonnell Range Reef to have so many offcuts and so few, or no, roofing nails.

The other material within the building section includes the remains of timber posts, as found at site 100, and the

masonry, lime mortar and timber lintels found at the police station. The tent pegs are thought to be more recent, but there is no definite date for them. The wire rope may not be related to building activity, and relatively little of it has been found.

Transport

These items are well represented at all precincts, with those occupied only in the early years of Arltunga having artefacts relating to horse transport. The police station area has more recent car and bike parts, though even these could date from the 1930s or so. The heavy chains and hooks appear to belong to wagons and carts, and some of the heavy lengths of flat iron may have come from the same source. The horseshoes, and nails were widespread, with one very great concentration of the latter near the office site at the Works. Harness leather, rivets and fittings were found at White Range and MacDonnell Range Reef, with a surprisingly high number of leather fragments at site 59. Their presence, along with possible wagon fittings and other features of the site suggest that the occupant was connected in some way with the transport industry.

Industrial

As the fieldwork has concentrated on domestic sites, the industrial items are relatively few from the major White Range sites; though an ore bucket and other items such as cold chisels and shovels have been collected from some of the mine sites. Part of a shovel handle was found at site 100, from structure D, and what appears to be part of a bellows from near the forge, but most of the other tools were smaller: a cold chisel, part of an awl, and a drill bit. A number of pieces of lead were found, also around the forge area, and most unusual, the metal part of a paintbrush came from the area between structures A and C. The heavy iron unidentified items may well be related to transport rather than this industrial section. A possible awl was also found at site 98, the only tool or industrial item from this site.

MacDonnell Range Reef precinct, as an area more concerned with mining than everyday living, still had only a light scatter of industrial items. One square and one broad chisel were found, a small pick head, and some small machine parts such as a possible ratchet and heavy pieces of iron. Fragments of a bucket, as well as pieces from a tank, which might have been used for domestic purposes as they were found in quadrat 7, close to site 169 and the mines. Five of the 9 industrial items were found in the eastern quadrats, but the concentration was not very

obvious. The precinct was well cleared of its usable items when it was abandoned.

The many industrial items from the police station seem to relate to the small two head stamper, and are possibly of a more recent date. Many of the heavy unidentified pieces of iron and steel from this precinct may also belong in the transport section, and were found in all quadrats. There were a number of pipe and hose fittings, rods, and clamps and brackets, again found well spread over the precinct. Heavy hinged items, either industrial or transport, were found in the rubbish dump and quadrat 8. The few electrical or associated items were foundin quardrats 53, 8 and 18, and three small tools (triangular file, and two hacksaw pieces) were found in quadrat 8.

The only obviously industrial items from the Works area which were noted because so unusual are the fragments of pottery crucibles. While most of these were found around the office and assay office area, some were also noted in quadrat 54, at the western, more domestic part of the precinct. Tools, machine parts, and many unidentified heavy metal items have also been noted from the precinct.

1. See for example the artefact tables in Hardesty's The Archaeology of Mining and Miners, op cit, Appendices B and C.

2. For earlier developments in bottle manufacture see E. Meigh, The story of the glass bottle, 1972, R W Douglas & S Frank, A History of Glassmaking, 1972, C Munsey, The Illustrated Guide to Collecting Bottles, 1970, and Parks Canada, Glass Glossary 1985.

3. Parks Canada, op cit, p 35; Miller G & C Sullivan, Machine-Made Glass Containers (etc.) p. 93.

4. J.J. Nurnberg, Crowns - the complete story, 1967, especially the first chapter.

5. N Bender, Early 20th century closures, p 104, and H H Holscher, Hollow and Specialty Glass, p.467.

6. Douglass & Franks op cit, p 191-193; J Boow, Report on Glass, n.p.

7. For an introduction to Australian glass makers see M Graham, Australian Glass etc, 1981. For developments in Adelaide, see the Adelaide Historic Bottle Club newsletters; N Jensen The Glassworks of Chief Street, 1984.

8. Graham, op cit, p 28; K Arnold Collecting Australian Found Bottles, Part 1, 1985 p 25-34, Vader J & B Murray Antique Bottle Collecting in Australia, 1979 p. 14.

9. Arnold, op cit, p 35-6 and Jensen, op cit, p. 8f.

10. F.B. Reed, The Adelaide Bottle Co. Pty. Ltd., 1977.

11. Reed, op cit p. 8, and R Irving, articles in S.A. Antique Bottle Scene, 1986.

12. Arnold, op cit, suggests 1934 but some of his dates are suspect; S Sieling in Australian Bottle Review 1976 suggests 1930.

13. Arnold, op cit, p. 110 and Vader & Murray, op cit. p. 49-51.

14. Toulouse, J.H. Bottle Makers and their Marks, 1971 p. 147-150, 380-384.

15. M.H. Ward, Some Brief Records of Brewing in South Australia, 1950? p 19-21.

16. Arnold, op cit, p. 8.

17. Farrer, K.T.H. A SettlementAmply Supplied, 1980 p. 152 ff.

18. Arnold, op cit, p. 278.

19. Fletcher, E. Bottle Collecting, p 51, 56, and Beck, D. The Book of Bottle Collecting, p 63.

20. J Stockton, Victorian Bottles, 1981 p. 71-74.

21. Rick Irving made this suggestion in an article in the S.A. Antique Bottle Scene, vol. 10 no. 7, May 1982.

22. Frederick M Clements is listed in the 1890 Sands Directory as being a manufacturing chemist and dentist in Newtown, and he wrote offering his Tonic to Henry Parkes on February 3rd, 1890 (Parkes Correspondence, volume 9). A Clements Tonic Cookery Book has a testimonial from Alice Springs, dated April 1916.

23. Toulouse, op cit p. 510 ff.

24. For developments in the canning industry see A.J. Howard, Canning Technology, E.S. Hedges Tin in Social and Economic History, Tin International articles on the A-Z of the Tinplate Can, May 1974, and E.F. Eaten's articles on the History of Canning in Lockwoods Group news, 1977 and 1978.

25. J. Rock discusses the slight difference in terminology in his Cans in the country side, Historical Archaeology 18, no 2, 1984

26. See,for example, Jane Busch, An Introduction to the Tin Can, Historical Archaeology 15, vol. i, 1981

27. S. Elliott, Introduction of Local Industries; K Farrer A Settlement Amply Supplied.

28. AmericanCan Co., The Canned Food Reference Manual, p. 29 and A. Davis, Package & Print, p. 81. Rock, op cit gives the date for evaporated milk, but says they were made in cans with a matchstick filler hole.

29. M Symons, One Continuous Picnic, p. 130.

30. The dates were suggested by the Norwegian Canners Association, personal communication.

31. J.D. Conachan, The Meat Industry, pp 1-6.

32. J.A. Lee, Canned Foods, 1914, p. 16-17.

33. As illustrated in Peter Cuffley's Complete Catalogue and History of Oil and Kerosene Lamps, see p 101-107.

34. F. Dietz, A Leaf from the Past, 1914.

35. H.R. Towne, Locks & Hardware, 1904 p. 41

36. Personal communication from W.D. & H.O. Wills.

37. Information from Bryant & May, Victoria.

38. S. Bedford in N.Z. Archaeological Association's Newsletter, vol. 28, no 1, 1985, p. 46

39. See Ivan Hogg, The Cartridge Guide, in particular for dating information.

40. R. Varman, The Nail as a Criterion for the dating of buildings and building sites, 1980 p. 30-37.

3. DOCUMENTARY SOURCES

3.1. Background

The Northern Territory has always suffered from a certain degree of isolation, due to its geographical position, environment, and climate. John McDouall Stuart was the first European to cross overland from South Australia to the northern shores of the Northern Territory in 1862; earlier attempts by him had been unsuccessful. His enthusiastic reports of good pastoral country, especially in the northern parts of the country, encouraged the South Australian Government to negotiate with the British Government for control of the Territory. This occurred with the issue of Letters Patent on 6th July, 1863.

Interest in, and development of, the arid Centre followed the building of the Overland Telegraph Line, between 1870 and 1872. The Line provided a known track, and the telegraph stations positioned along it acted as bases for exploring parties. Exploration to the east and north east of the Alice Springs Telegraph Station, first by Barclay (1878), and then by Lindsay (1886) led to the discovery of gemstones in the Hale and surrounding rivers. The subsequent "Ruby Rush", with hundreds of prospectors arriving in the isolated, arid MacDonnell Ranges resulted in the discovery of gold near Paddy's Rockhole, and the development of the Arltunga goldfield. The point of access for most travellers was through South Australia, with the railway line being gradually extended north from Port Augusta and reaching Oodnadatta in 1891; from there the journey along the line was some 330 miles to Alice Springs and another 70 to the gem and gold fields.

The exact date of the discovery of gold is not certain, but at some time between April and July 1887 the glitter of gold was added to the fire of the "rubies".[1] Once the news broke in July 1888 that the rubies were garnets, most of the few remaining prospectors concentrated on gold. As with most goldmining areas, alluvial gold was the major attraction in the early years, although several promising reefs had been found by the end of 1887.[2] Lack of water caused problems right from the beginning - the only natural source of water, at Paddy's Rockhole, gave out under the pressure of a permanent population of only about 12 people.[3] The government was able to organise a well at Claraville, some 8 miles north of Paddy's Hole in 1888, with another well sunk close to Paddy's Rockhole in 1889.[4] These two wells marked the north and south boundaries of mining activity.

The early prospectors covered an area of some twenty square miles,[5] probably because the earlier "ruby" discoveries were made in the creek beds north and east of what became Arltunga. When a particular area, or mine, looked promising, wells were sunk to provide water for

domestic, stock and mining purposes. Near Mt. Chapman in the north-east the very productive Wheal Fortune mine was worked from 1888, two wells were sunk in the are in 1890 and 1891, and a small Huntingdon Mill was brought to the field to treat its ore.[6] New discoveries in the western part of the field lead to the sinking of the Star of the North well in 1892.[7] While the siting of these wells followed the discovery of gold, the continuing development of mining was very dependent on water being found reasonably close to the reefs. For example, gold was found in the Star Creek area, at the eastern extremity of the field, but relatively little work was done because of the lack of water.[8]

The general pattern of the field was now set: a small population, between about 35 and 50 men, working alluvial and reef gold under difficult conditions including isolation, harsh environment and a lack of capital for investment. The South Australian Government paid for all but one of the ten wells sunk between 1888 and 1908, and may have contributed to the one privately sunk at Wheal Mundi in 1892, at a total cost of almost £3,000. A mail service was established between Alice Springs and Arltunga from 1891, and a full time warden, Johannes Mueller, was appointed in 1895.[9] The most important government decision was made in 1896, after several requests and petitions from the Arltunga residents, that a public stamper battery and cyanide works should be established.[10] Although the economic depression of the 1890s affected South Australia, the government may have been concerned that the newly discovered West Australian goldfields would entice too many men away, as had the Victorian rushes of the 1850s. It is also probable that the government still held the 19th century view that Australia was a land of opportunity, and as the pastoral possibilities were limited here, the mineral potential would make up the shortfall.[11]

The Government Battery & Cyanide Works took some time to be established, but finally, on February 8th, 1898, it was opened. Part of the delay was due to the difficulty in transporting the plant to Arltunga, and part due to the difficulty in finding sufficient water for the plant to operate. At least 1,000 gallons a day were needed, and the Works eventually moved to the Star of the North well, which had a proven supply of about 3,000 gallons a day. Those residents who had depended on the well were provided with another nearby, the Kangaroo Creek well, in 1898 and it was here that the first police camp was set up the following year.[12]

Together with the increased interest in mining due to the provision of a public treatment plant, came the news of the discovery of a new mining area, the White Range, first worked for alluvial in 1897 but with reefing claims taken out from March 1898. By the end of the year, the White

Range was providing most of the work for the battery, with many of the earlier claims deserted for the better prospects; the only difficulty in fully developing this area was the lack of water. Three wells were sunk in all, none of them providing more than the domestic needs of the miners, and one was completely dry.[13]

An even greater boost came with the discovery of gold at Winnecke's Depot, late in 1902. This small field, slightly north of Arltunga and Alice Springs, some 55 miles from the former and 25 from the latter encouraged quite a rush to the Centre. By January 1903 the population had reached about 200, and by June had doubled, possibly tripled. Although Winnecke was the centre of the rush, quite a few of the hopeful prospectors took up claims or looked for work at Arltunga, and the total population for the two fields may have reached several hundreds. A well was sunk by June 1903;[14] it was not properly fenced, the water became polluted, and a typhoid epidemic spread amongst the prospectors. Dr. Shanahan was appointed[15] to visit the Centre, but despite his efforts several victims died, both at Winnecke and Alice Springs (the town was named Stuart at this time).[16] Dr. Shanahan was very critical of the unsanitary conditions in both places; and from this time the police were appointed health inspectors.

The small epidemic was soon over, as was the availability of easily worked gold. When Dr. Shanahan left Winnecke in October most of the prospectors had gone also. As the wild excitement over Winnecke was dying, raised hopes at Arltunga were also being dashed. During the winter of 1903 several of the White Range leases were being held by a right of purchase[17] by a Mr. Chalmers, agent for Consolidated Gold Fields of South Africa. At last it seemed that much needed capital would be available to test the gold deposits at depth. Until this time, even the small companies formed to work claims were poorly supplied with capital, and most workings were only about 30 feet deep. At about the same time the Arltunga Progress Committee was formed, and the government was petitioned to lay out a township at the Crossroads, formed by the road from White Range to the battery, and another from Paddy's Hole to Claraville.[18] The area had been used as a camping ground, it was the only flat ground that was central and "well situated regarding traffic lines" according to warden Gee. While the Minister was considering the matter, the White Range deal fell through, largely because there was no indication of gold deposits at depth. This, combined with the slowing down at Winnecke, lead to a general exodus from Arltunga, and the abandonment of the plans for a proper town.

From this point the goldfield began a slow decline. By August 1904 the population had dropped to 60 or so at Arltunga and about the same at Winnecke, and the numbers

continued to drop, although several women were now recorded as living on the field with their husbands, and in some cases having families. And by this time some of the long-time residents of the field were dying; from 1903 there were additions to the small cemetery at White Range, and the later one near the Crossroads. While the outlying sections of the goldfield were seeing a gradual decrease in activity and population, the Crossroads and original "township" site of 1903 was being developed. A well was sunk in 1906, a store established in 1907 and the Glencoe hotel was built in 1910. The outlying stores gradually closed, and even the Cross-roads area seems to have been deserted by 1918. The Commonwealth Government had taken control of the Territory from January 1911, and by 1913 decided that the losses of the government Works were too great to continue. The Works were left in charge of a caretaker, but the mines seem to have been deserted, with the last gold being sent from the Works in 1917.[19]

Mica mining became more important during World War I, and later, and the Harts Range mica field to the north of Arltunga saw considerable activity until the late 1940s. Other mineral areas were investigated in the 1920s and 30s, with prospectors moving from the Plenty River, Davenport Ranges, Tanami and Granites regions north of Arltunga until the more permanent goldfield at Tennant Creek was discovered in 1933. Some additional prospecting and mining has occurred in the Arltunga area since the First World War, but with little success. In 1975 some 18 square kilometres of the original goldfield was included in the Arltunga Historic Reserve, managed by the N.T. Conservation Commission. In the 1980s, the rising price of gold, and the Territory government's decision to allow mining in national parks and reserves has encouraged large scale exploration in the White Range area, and open cut mining due to start in 1990 will destroy some of the historic mining areas there.

1. Brown, H.Y.L. Report on a Journey from the Hale to the Adelaide River. 1889; S.A. P.R.O. GRS 1 1888/121.

2. Report from Mounted Constable Hillier, Alice Springs who reported on his visit to the fields on December 18th 1887, S.A.P.R.O.GRS 1 1888/121.

3. Brown, H.Y.L. op cit. When Brown reached Paddy's Hole on November 15th, 1888 he found it dry, and pointed out that he had difficulty assessing the field because so few men were working their claims due to the lack of water.

4. S.A. P.R.O. GRS 1 1892/118, Brown op cit.

5. This is the area nominated when the Arltunga Goldfield was finally gazetted in the S.A. Government Gazette of October 2nd, 1902.

6. S.A.P.R.O. GRS 1 1889/914, 1891/6 and 402. Interestingly enough, the mill was not established near the newly sunk wells, which had a limited supply, but 4 miles away at the original Claraville well - which also proved insufficient for the plant's requirements at times.

7. S.A. P.R.O. GRS 1 1892/118.

8. S.A. P.R.O. GRS 1 1898/46, plus references in later warden's reports, e.g. 1903/83.

9. S.A. P.R.O. GRS 1 1890/625 for mail service, 1894/284 for warden. Cost of wells calculated from various files, as indicated in following section on the precincts.

10. S.A. P.R.O. GRS 1 1895/463 and 1896/72.

11. See J.M. Powell, An historical geography of modern Australia CUP 1988, p. 9

12. S.A.P.R.O. GRS 1 1897/459, 1898/448

13. S.A. P.R.O. GRS 1 1898/258, 1902/228.

14. S.A. P.R.O. GRS 1 1903/49.

15. S.A. P.R.O. GRS 1 1903/95, 338.

16. S.A. P.R.O. GRS 1 1903/497.

17. S.A. P.R.O. GRS 1 1903/83, report of June 10th.

18. S.A. P.R.O. GRS 1 1903/446.

19. A.A.C. CRS A3 14/3268, 17/707

3.2 White Range precinct - general history

The potential of the White Range, in the eastern part of the goldfield, was not realised until 1897, when J. Byrne was working the gullies of the range for alluvial gold and was visited by Henry Luce, then involved with the Macdonnell Range Reef. It was Luce who decided that White Range probably contained rich reef gold, and who took out the first lease - Luce's White Range claim, early in 1898.[1] The naming of the range is believed to relate to the large expanses of quartzite, which at a distance do dazzle the eye. Luce was soon followed by others, with the White Range Excelsior, the Extended, Great Western, South, East, West, North the major leases taken up within the following few weeks. Of these, the three most important were Luce's, the Excelsior and the Extended, the latter two being to the south of Luce's, and slightly lower on the Range. Some of the smaller blocks were worked for a year or two, abandoned and repegged as miners came and went.

The opening up of the White Range coincided almost exactly with the opening of the Battery & Cyanide Works in February, 1898; by the end of that year the claims had become, and remained, the major supplier of stone to the works.[2] There were difficulties to overcome, one being the cost of cartage to the battery, which affected the way the White Range claims were worked, and indeed the number of reefs opened up. By September 1902 the warden reported that 250 acres had been claimed,[3] although he had pointed out the difficulties of working the more isolated areas in an earlier report of August 1901:[4]

> "The great centre is still the White Range, the lower and easier accessible portions of which are now fully occupied and all yielding good results. Bodies of gold bearing ore are known to exist higher up on the Range, and have been worked in patches, but owing to the rugged nature of the country these are inaccessible to teams, and when worked other means will have to be devised to bring the ore within reach of the carter ..."

Another difficulty was the lack of water. The White Range was some distance from the other mining areas, and the nearest water was either at Paddy's Rockhole, or the new Kangaroo Creek well. As the better returns from the White Range became obvious, older mines were abandoned for this new Eldorado, and another well was needed to cope with a population that may have been as high as 80. The first well as sunk by Sam Olsen in 1899, but at 145 feet had found barely enough for domestic purposes.[5] It was deepened another 25 feet in 1900 without any great improvement, and requests were made for another well site to be chosen. The second well was begun in 1902, close to

the quartzite bluff that is the White Range, not far from the Extended workings, but this was even less successful. Over the next three years it was sunk to 250 feet, but no water was found.[6] The only good news was that gold had been found at 190 feet - "the deepest gold found on the field to date" said the warden in October 1904.[7] Considering the problems that the several well sinkers encountered, including the death of J. Byrne, it is not surprising that this gold discovery was not followed up. A third, and apparently more successful well was sunk south of the main residential area in 1907, but the file seems to have been lost. The only information about it appears in the Field Orders of the battery manager, which list payments made to miners, and other government expenses. Instalments for sinking the well were paid to Patrick O'Neil in May, June and July[8] and the water supply may have been reasonably good, as there are no further references to water problems. However, by this time the population had dwindled to about 20 or so. The attempts to provide water for the White Range residents was a very expensive investment for the government, as the three wells cost over £1,600.

The work on each claim was done by the owners, with employees when they could afford them; aboriginal workers were widely used at the White Range.[9] A considerable amount of work was done on the tribute system, introduced by the Cornish miners; a tributer was allowed to work his own little section, and paid a royalty to the claim owner from his gold profits. This may explain the movement of men from claim to claim - the battery records show miners working now at one of the smaller claims, and then moving to, one of the big three, until they found the gleaming gold.

The mines themselves were very much surface workings, with comparatively few shafts - lack of capital and appropriate machinery combined with the hardness of the rock limited the workings to about 15 to 30 feet in depth. The work was labour intensive, with the ore being hand checked so that only the richest was sent to the battery. A company had been formed to work one of the mines, the Excelsior, during 1899.[10] By August 1900 the company had spent over £1,000, and applied for a subsidy to put in a tunnel to test the extent of the reef.[11] This was agreed to, as it was felt that the whole of the White Range would benefit by such testing, but the tunnel stopped at 37 feet, defeated by the quartzite, and with little extra gold discovered. The Excelsior, and other claims, returned to their usual work methods.

The rush to Winnecke and Arltunga had some effect on the White Range mines, with newcomers taking up new claims, or working on the established ones. Population figures are difficult to establish, with the records suggesting at least 290 miners, but contemporary estimates suggesting

that several hundred prospectors reached Arltunga and Winnecke's Depot in 1903.[12] The numbers at White Range may have risen to 100 and very possibly more. Publicity about the two goldfields brought agents of some of the big overseas gold companies to Central Australia, and one of these became interested in some of the White Range claims. He was a Mr. Chalmers, representing Consolidated Goldfields of South Africa, and he took out options over Luce's, the Boulder and Extended claims in June 1903.[13] This brought work to a halt on these claims, while other mines had been flooded, also preventing work, and for some weeks there must have been an unusual peace over the White Range. Chalmers was enthusiastic, feeling that the amalgamation of three blocks would encourage the use of machinery, thus making for greater efficiency and profits. Suddenly, by the end of July, the deal was off; the major stumbling block being the uncertainty of finding gold at depth. This disappointment, combined with the general decline in activity as the Winnecke alluvial was worked out, settled the fate of White Range. The same labour intensive methods continued, and although some parcels of ore returned good results, it is unlikely that any one miner made his fortune.

Further attempts were made to prove the depth of the gold bearing ore: in 1905 the Excelsior Gold Mining Co. N.L. asked that the battery be moved to the White Range as most of the ore came from that one area, and this would reduce the cost of cartage.[14] This suggestion was not favourably received, the manager pointing out that it would cost £800 to move the works, and that there was not sufficient water at White Range to keep the battery operating. After this setback, the company asked for a subsidy to sink a shaft, and although this was eventually approved, does not seem to have been taken up.[15] The following year a subsidy was approved for Frederick Messau to sink on his claim, White Range East,[16] but there is no information about the success or otherwise of this venture. The Inspector of Mines, Mr. Matthews had visited Arltunga in 1905, and described the various mines, and methods of work; he had recommended the subsidy to Messau as another attempt to test the White Range at depth. At the time of his visit there were 26 men working the claims.[17]

Claim owners and tributers continued to make what living they could, although the Excelsior company struggled to keep going. In 1908 there were complaints that the company was not fulfilling its labour requirements, depending on tributers to man the claim.[18] These arguments continued for months, complicated by the death of Charles Williams in April 1909 - he had pegged the claim originally, and remained as the company agent in the years before his death. Frederick May took the opportunity to apply for the forfeiture of the leases over the Excelsior, and the Excelsior South blocks; the company was successful in retaining the main Excelsior block, but

lost the other to May, L.Garwood, C.Eales and Elizabeth O'Neil.[19] The Excelsior company continued in a somewhat desultory fashion to own the Excelsior block into 1912, by which time they had run out of money, and the tributer manning their block had just died.[20] The tributer is unnamed, but may have been A.E. Barrand, or Barraud, who was working at White Range from 1906, and at other mines before that; he died in February, 1912.[21] The warden did not recommend any further exemptions from the required labour conditions and it seems likely that the company came to an end. By this time there were only 7 miners at White Range,[22] and by October, 1913, when the battery was closed down, none of the Arltunga mines were being worked. The men had died, or moved away, in some cases taking up pastoral leases in the area.

Subsequent activity at White Range was largely confined to the ownership of leases. Edward Henry White held 16 leases over all the old blocks, from 1921 until his death in 1936, apart from the period between 1931 and 1934 when they were held by P.B. Coulston; Mrs. White continued to hold the leases until World War II.[23] During the Depression several prospectors tried their luck there, without any obvious success.[24] By 1938 Jim Marshall was interested in working the alluvial, but could not get permission to use the well, which was now included in a pastoral lease held by Larry Rosenbaum.[25] Marshall thought there was enough alluvial to keep half a dozen dry blowers going, but it is not certain that he made anything from the alluvial gold.

The last major report on the White Range came out in 1937, when the goldfield was visited by P.S. Hossfeld as part of the Aerial, Geological and Geophysical survey of Northern Australia. His assessment was that the primitive methods used in the early days had made the mines unprofitable as the workings deepened, which combined with the presence of pyrites at depth had made the gold extraction more difficult and so lead to the mines being abandoned. He could see no reason why the mines should not be re-opened.[26] While no major company showed any interest, a small two head battery was set up on the No. 3 well by James Coppock in 1940.[27] During the 1940s and possibly 1950s he worked both the Excelsior and Luce's claims, though others were also interested in the same claims.[28] In 1956 Mick MacIntyre began his adit below the main Excelsior workings, but gave up the lease in 1959. Little work was done during the 1960s, but in 1975 a lease was taken out by Keith Ranken, over the old Excelsior claim. This lease pre-dated the establishment of the Arltunga Historic Reserve, and was part of the reason for not including all the White Range mines, and particularly the residential area, within the Reserve. Unfortunately for the preservation of the camp sites, this lease is now the basis for activity by the newly formed White Range company, and local activity since the early 1980s has seen

open cut mining change the face of White Range.

3.3 The domestic sites

The contemporary records provide information about the mining history of the White Range area, and some of the general problems associated with the poor water supply and distance from the battery and cyanide works. They also provide a certain amount of information about people living at White Range, but nothing was recorded about the way people lived, or the way they built their homes.

Site 98, the White Range store

There is some documentation for the store, although the licensing records between 1898 and 1906 are incomplete. From then until 1911 the licence was held by John Wilson, and he may well have run the store from earlier days.[29] In 1902 the warden mentioned that John Wilson, storekeeper, had taken over the sinking of the White Range No 2 well, when the original contractor ran into difficulties.[30] Wilson also operated a store at Winnecke's Depot until 1906, and must have been the same John Wilson, storekeeper, who attempted to commit suicide at Winnecke in 1903.[31] He may also have been involved with some mining, though there were two or three other Wilsons on site, one of whom died in 1904.

The only other reference to John Wilson came in a November 1906 letter he wrote suggesting that a local court be established at Arltunga:[32]

> "The credit necessarily given here in order to keep the population is very great. That all men are either working their own shows or tributors which amounts to the same thing demand a much larger credit than would be necessary if work could be had for wages ....
>
> Therefore the men here are raising stone for Treatment and have to be supported till they can get a crushing and if that pans out badly when treated they must be kept going till they can get out another parcel. If all men were honest we need not worry but as it is if a man is a crook and in debt he simply if he has any horses clears out."

He pointed out that it was expensive for a businessman to go to Alice Springs for court appearances there. The local court was established in September, 1907.

Wilson employed an agent/manager, Frances Bignell, from at least 1902 and possibly earlier. It was Bignell who took over the licence for the store in 1912, but held it for only a year or so.[33] Just to the north of the store buildings is a chimney with paved floor which may well have been the domestic quarters of either Wilson or Bignell. A small rubbish scatter to the north-east of this chimney (site 97) was noted, and some collection done.

Site 100

Patrick O'Neil was granted a licence to have a billiard table at Arltunga in September, 1903.[34] As this had been the big year for Arltunga and Winnecke, there had been considerable interest shown in building hotels on the godlfields, some with the additional attraction of a billiard table; but all these plans fell through when the rush collapsed within a few months. Patrick was the only one to do anything, although his licence was not renewed, and it is not known if the table actually reached Arltunga in an unbroken state. Having identified O'Neil, it was also possible to discover more about his life on the goldfield. He had come as a result of the rush, and was first mentioned in May 1903, when he was allotted a business licence by the warden, not far from the White Range store.[35] Although there is now no record of O'Neil renewing his licence, he was granted a 6 months exemption for a business, residence, machinery area or water right in 1906, which might refer to the billiard table.[36] He brought a wife, Elizabeth (or Betty) O'Neil, which was unusual, as there are very few white women mentioned in the documentary sources.[37] Both Patrick and Elizabeth took some interest in various White Range claims, and she signed a lease agreement as late as 1911. However, mining does not seem to have been a major interest, as his returns, according to the mining records were sporadic. As mentioned above, he was involved in sinking the third well at White Range, and it is not known if the billiard room was a good money raiser. Both the O'Neils must have been unusual characters, and it would be interesting to know how successful their billiard table business - which probably included some illegal alcohol sales - really was. Efforts to trace them after 1911 have so far failed, but they may well have returned to South Australia.

The identifying of one camp with one particular miner or, as in this case, couple, was possible because of the discovery, and identification of the unusual billiard table slate. While it is not possible to suggest that the unusual number and variety of huts at this site were entirely the result of a woman's presence, it might explain the two apparent kitchen areas, structure B and D. Patrick's interest in well sinking as well as the billiard

table, and his comparative lack of income from mining, could suggest a sufficient private income for the couple to live comfortably - in which case one wonders why they came to Arltunga. The artefact assemblage at this site is certainly very diverse and numerous, and although the presence of both a woman and a billiard table may have affected some items, the site does suggest that the inhabitants had a relatively high standard of living.

Site 59

The major building at this site, with its open fourth "wall" raised the possibility of it being used for storage of wagons, etc., and some of the artefacts, such as the high proportion of rivetted harness leather agrees with some connection with the transport industry. The carting of ore from the mines to the battery was a major expense to the miners, and seems to have attracted several men, some of whom specialised in this service industry while others combined it with mining. When it was suggested that the battery be moved to the White Range area, high on the list of advantages was the expense of carting. The charge for carting ore seems to have varied between 6/- and 12/- per ton, depending on distance; for White Range mines it was about 8/- per ton.

Most of the Arltunga ore carters are mentioned in the battery records, as it became the habit for the manager to deduct cartage costs from the miners' parcels - presumably to ensure payment. Several carters/saddlers operated at Arltunga at the relevant time.

Thomas Young had arrived at Arltunga by 1897, and most references to him are as a carter and saddler; he seems to have left after 1905.[38] His only recorded connection with White Range comes from signing three petitions relevant to the area, but he was also able to repair saddlery.[39] George Bray was also on the field from 1897, and combined carting with mining. In 1903 the records indicate that he carted from a variety of mines, while inn 1904 he concentrated on the White Range area; he then seems to have left the field.[40]

John T. Kinnear seems to have been attracted to Arltunga by the rush to Winnecke's Depot, which began late in 1902. He was recorded as a carter of ore from December 1902 until September 1907 when he moved to work at the battery. Notes on the family indicate that he brought his wife Edith to the field, and that four children were born between 1905 and 1910.[41] As he seems to have operated exclusively from the White Range mines, he could be a candidate for site 59; however, the accommodation seems limited for the growing family - though this very fact may have forced him to take a job at the battery. There is

certainly some evidence for the site being used by more than just one man - the decorative silver piece mentioned above, even the presence of a reed box from a concertina or accordian, which could suggest a family sing-song in the evenings. The number of upholsterer's tacks also suggests a certain amount of comfortable furniture, though it is just possible that these tacks were associated with harness. As Kinnear moved from White Range in 1907, the possibly later date of one Walkerville beer bottle from the site may argue against this identification. The date for this bottle is by no means definite, so cannot be counted against Kinnear and his family as residents of this site.

Louis Schaber seems to have taken over from Kinnear in 1907, although he had been at Arltunga since 1893 and was involved in mining and well sinking - the latter including some work on the White Range No. 1 well, and the final 50 feet on the dry No. 2 well. He worked as a carter with J. Swift for some months in 1907, and then each worked independently, Swift leaving in 1909 but Schaber staying on until 1910 and possibly longer. He also carted mainly White Range ore, and also did some mining on the Excelsior and Extended claims, which makes him a definite candidate for site 59.[42] The other main carter in this period was B.M. Webb, at Arltunga from 1901 but gradually moving from mining to carting. He was joined by at least two brothers, at least one of whom remained on the field until 1913, but it is possible that the Webbs lived closer to the police station, near the Kangaroo Creek well.[43]

J.H. Lloyd appeared in the records in 1896 and did some carting between 1903 and 1905 but has no particular connection with White Range. Thomas Clark, A. Cheyne and J.James only appear in the records very briefly between 1903 and 1905. Larry Rosenbaum did a little carting in 1903 and 1904; James Hayes combined carting and mining from 1903 to 1908, but neither man had any great connection with White Range. T. Simpson carted one load from the White Range in 1910, which is the only record of this man.

It is also possible that the site was used by a blacksmith or saddler, of which there were at least three on the field. William Russell was recorded from 1893, and combined blacksmithing with mining and some well sinking; he has no particularly connection with White Range.[44] Thomas Wayland was employed at the battery from 1901 until its closure in 1913, primarily to look after the engine but he also did any smithing; it would be most unlikely that he lived at the White Range. There is one blacksmith definitely associated with the White Range, one George Fairclough. He signed a petition in 1904, and constable Dowdy mentioned a smith at White Range in 1907; he did some mining until at least 1910.[45] As his smithing would

have been for the miners in his area, there are no further records, but Fairclough is also a contender for site 59.

The most likely inhabitants of site 59 would by Kinnear, Schaber or Fairclough, and in view of the much larger structure 110, also connected with the transport industry, it may be that Schaber or Fairclough would be the first choice. The artefacts suggesting an unusual degree of comfort in the home, which may also be the result of a woman's presence, may count against either of them, but it is quite possible that either man did have a wife, who does not appear in the documentary record.

The White Range sites excavated so far were all connected in some way with service industries, and in the case of sites 98 and 100 it was comparatively easy to match up sites and people. Site 59, as well as sites 110 and 131 are less easy to match, especially because of the limited work at the latter sites. Site 131 is especially unusual because it contains at least one artefact, a Peter Dawson whisky base which was made after December 1916, at a time when there is little activity at White Range, or even Arltunga.

1. S.A.P.R.O. GRS 1 1902/399, Brown H.Y.L., 1902 report op cit.

2. S.A.P.R.O. GRS 1 1898/34.

3. S.A.P.R.O. GRS 1 1902/77.

4. S.A.P.R.O. GRS 1 1902/58.

5. S.A.P.R.O. GRS 1 1898/258.

6. S.A.P.R.O. GRS 1 1902/228.

7. S.A.P.R.O.GRS 1 1904/168.

8. S.A.P.R.O. GRS 1 1907/35.

9. S.A.P.R.O. GRS 1 1905/574; out of a population of about 100, 17 or so were working for miners.

10. S.A.P.R.O. GRS 1 1900/65.

11. S.A.P.R.O. GRS 1 1900/366.

12. S.A.P.R.O. GRS 1 1903/11, 1904/38; estimate by warden in June, 1903/83.

13. S.A.P.R.O. GRS 1 1903/83 and 476.

14. S.A.P.R.O. GRS 1 1905/133.

15. S.A.P.R.O. GRS 1 1905/583.

16. S.A. P.R.O. GRS 1 1906/607.

17. Matthews, W.H., op cit.

18. S.A.P.R.O. GRS 1 1908/275 and 376.

19. S.A.P.R.O. GRS 1 1909/123.

20. A.A.C. CRS A1 12/386.

21. A.A.D. CRS NTRS 281.

22. A.A.D. CRS F141, A.A.C. CRS A1 11/1313.

23. A.A.C. A1 31/7653; A659 40/1/1796.

24. For example, A.A.C. CRS A1 30/8456, 9837, 10840, 31/9332.

25. A.A.D. CRS F143.

26. Hossfeld, P.S. The White Range Gold-field, NT no.28, 1937.

27. A.A.D. CRS F1086.

28. Information from Dept. of Mines & Energy, Alice Springs.

29. A.A.D. CRS F1086.

30. S.A.P.R.O. GRS 1 1902/228.

31. As reported by Dr. Shanahan on 28th September, he had taken an overdose, then slashed his wrists and finally his throat, but excessive loss of blood made him too weak to do "further mischief"! S.A.P.R.O. GRG 1 1903/497.

32. S.A.P.R.O. GRS 1 1907/156.

33. S.A.P.R.O. GRS 1 1902/288, A.A.D. F1086, registration of business site from August 1912.

34. S.A.P.R.O. GRG 67/14.

35. S.A.P.R.O. 577, handwritten diary kept by warden Gee while at Arltunga in 1903.

36. A.A.D. CRS F1086.

37. One B. O'Neil signed a petition, S.A.P.R.O. GRS 1 1904/256.

38. S.A.P.R.O. GRS 1 1897/12, 1898/54, 1900/13, 308, etc. The last reference was a payment to him in September 1905 for the supply and delivery of lime to the Works, 1905/11.

39. S.A.P.R.O GRS 1 1898/258, 1901/257 and 1905/448; in February 1902 he was paid for harness repairs and shoeing, 1902/33.

40. S.A.P.R.O. GRS 1 1897/12, 1900/13, 1901/41, 1903/38, 1904/20.

41. S.A.P.R.O. GRS 1 1903/38, 1904/20, 1905/11, etc., 1907/35 shows that he was employed at the Works from August, until 1911 (A.A.C. CRS A1 11/16954).

42. S.A.P.R.O. GRS 1 1893/409, 1897/418, 1899/61, 1905/11, 1907/35, 1908/6, 1910/50.

43. S.A.P.R.O. GRS 1 1902/399, 1903/83, 1907/35, to 1910/50.

44. S.A.P.R.O. GRS 1 1893/451, 1899/387, 1900/13, to 1909/8.

45. S.A.P.R.O. GRS 1 1904/256, to 1910/50.

3.4 The Police station buildings at Kangaroo Creek Well.

The well was sunk in 1898, following the establishment of the government battery at the Star of the North well, and the subsequent reserving of that well for battery purposes only. It seems that some six men or families were affected,[1] and it was agreed that a new well was needed. The chosen site was only half a mile from the Star of the North, on the same creek, and was sunk by Sam Olsen between February and May, 1898 finding a good supply, 1700 gallons per day, at 76 feet. It is unlikely that this area was used for domestic purposes before the sinking of the well, but it became very popular with the teamsters at Arltunga, as well as the men who camped there, for its good and plentiful supplies. Little is known of the miners who lived there, although two substantial chimneys survive on a rise in the south-eastern portion of the precinct, along with some less substantial remains.

The precinct is largely known for the group of buildings used as the police station until its closure in 1944. A police constable set up the first police camp in January, 1899, largely as a result of the opening of the battery and the need for some security, and partly because of complaints from pastoralists about cattle being "duffed" to provide food for the miners.[2] The first constable, Johnston, was accompanied by two blacktrackers, and equiped with a tent, but had moved to a somewhat more substantial site within two months. A Charles South had thought to open a store near the Kangaroo Creek well, and had built two small huts, one of galvanised iron with stone paved floor for the store, and the other as living quarters, with stone chimney, clay floor, slab post walls and iron roof. South was not able to operate his store as the buildings lay with the Government Reserve established around the battery area, and the manager did not agree with commercial licences within that reserve.[3]

South rented his two buildings to the police from March 1899, and then offered to sell them in July 1900, for £50 - the buildings had cost him £80. The battery manager was asked to report on the buildings, and gave quite a detailed description:

> "..two buildings, detached, built of mulga slabs and galvanised iron. No. 1 building consists of dwelling 18 feet long by 16 feet wide with 7 ft. 6in. walls built of mulga slabs and pug with the exception of the front of the building which is galvanised iron. The gable roof and ends of the building consist of galvanised iron, the floor is paved with stone slabs. This building is in good repair with the exception of a little pug being washed out in places.

> No. 2 consists of a kitchen 16 feet long by 11 feet wide, with 7 ft. 6in. walls built of mulga slabs and pug, one end of the building is built of stone and pug with stone chimney and gable roof of galvanised iron, but like No. 1 the pug filling the cracks between the mulga slabs has been washed out in places."

He considered that £30 was a good price, and South eventually accepted this offer.[4]

The police constables assigned to Arltunga seem to have carried out their duties of patrolling the goldfield, the surrounding pastoral leases, and even taking prisoners down to Port Augusta in South Australia for trial.[5] In June, 1906 Mounted Constable Matthew Dowdy arrived, and by the end of the year was complaining that a new station should be built, as the two huts were in poor condition. The timber walls needed re-pugging, and the roof was so full of holes that the occasional rains soaked everything inside, and he kept a canvas fly over his bed for protection.[6] He was told to repug the walls, and get some new roofing iron.

No further repairs or improvements were carried out until the Commonwealth Government took over control of the Northern Territory in January, 1911. Another report on the Arltunga station followed the lines of the 1900 description, adding that the office/bedroom had a paved floor, and the kitchen/dining room had a clay floor and that both were in "delapidated condition and are not fit for human habitation, much less a Police Station".[7] It added that there was no accomodation for the black-trackers, and no lockup. The decision was made to build an additional stone structure, which was done in 1912 or 1913 by G.A. Johannsen, for £288. Unfortunately the files relating to this building have not survived, but the annual report of the Inspector of Police in 1912 includes a brief description: two rooms, of stone with iron roof, gable ends, and verandahs back and front.[8] Again, photographs exist of the building, including one which may have been taken around 1913. (Figure 57)

From 1911 onwards there are gaps in the documentary sources for Arltunga. Dowdy died in 1915 and is buried at the small White Range cemetery; his successor was Charles Noblet or Noblett who remained until the late 1920s, when the infamous Constable Murray may have taken over. Later photographs also show attempts to grow vines and plants along the face of the west verandah, no doubt to provide some shade over the long, hot summers. (figure 57) Although there was little in the way of gold mining at this period, a number of mica miners seem to have used Arltunga as their base, no doubt because of the police station, as well as the Claraville store, re-opened in the

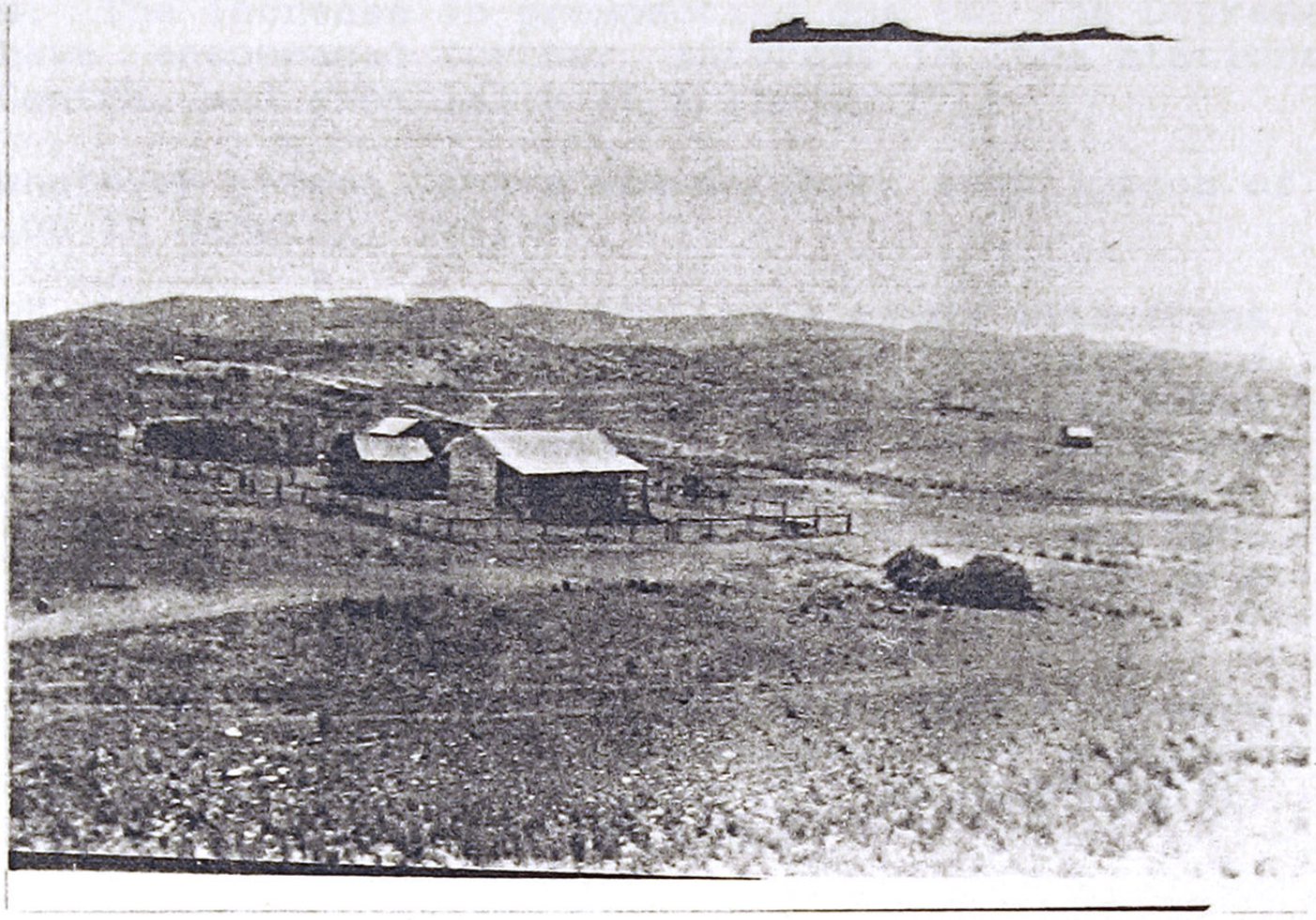
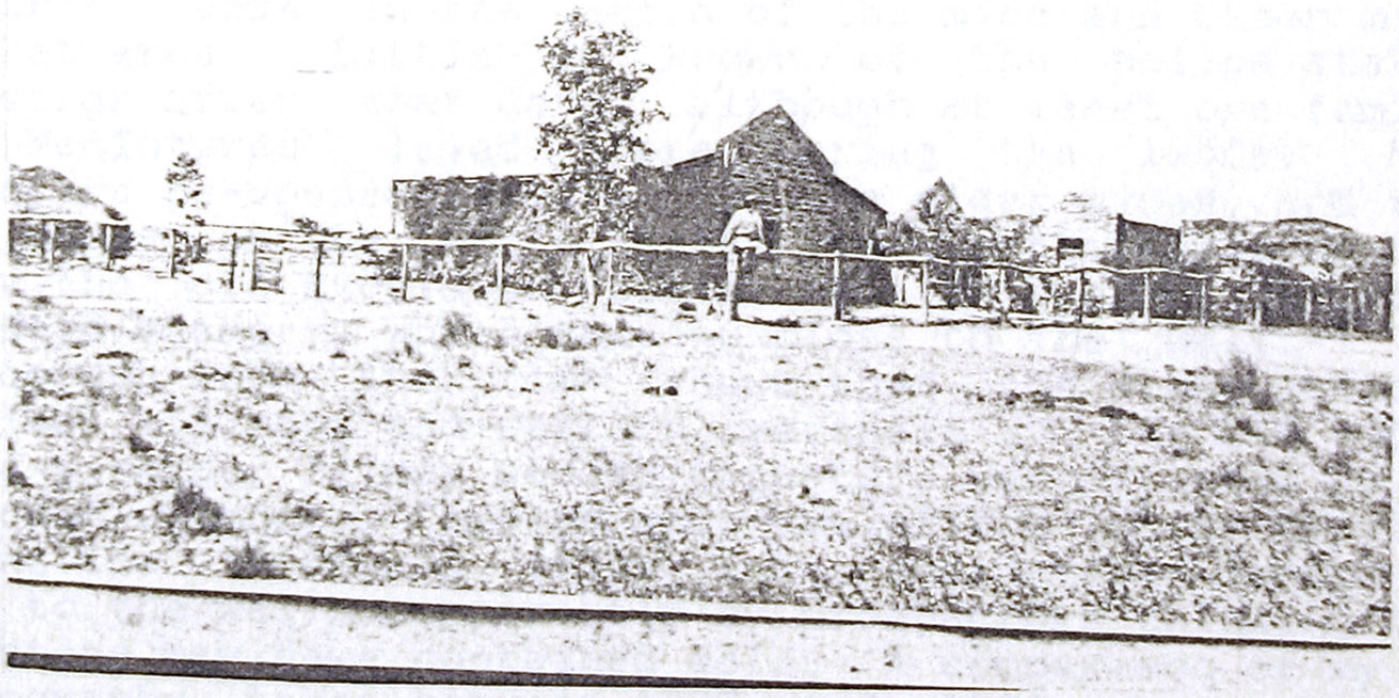


Figure 57 Above, the police station about 1913, from the Cavenagh Collection, CCNT Alice Springs.

Below, view from the south-west showing the vine covered western verandah of the police station, c. 1921. Cavenagh Collection, CCNT.



1920s. The increase in prospecting due to the Depression may have encouraged further interest in the stations in the Centre, and especially at Arltunga.[9]

For whatever reason, there was another description of the station in January, 1932:[10]

> "..stone building of two main rooms with front and back verandahs. A wood & iron kitchen and an office constructed of bush timber and lined with canvas are attached. An iron room was moved from the Battery and serves as a store-room. The saddlery room is built of old iron from the battery, and the work was done by a Constable.
>
> Some little time ago, cement and kalsomine were supplied and the floors and walls were attended to by Mounted Constable Murray. Although small, the station is now comfortable .."

A more general discussion of police stations in 1930 had suggested that all stations have blacktrackers quarters, and store for aboriginal rations; there was also a reference to the siting of WCs - whether to be attached to the laundry or the prison cell. There are no other references to the buildings making up the Arltunga police station, but a photograph taken in 1936 shows the back of the station. This shows a variety of roof lines on the three known buildings, plus the rounded roof on the iron shed from the battery, the stone gaol built along with the new station, two small outhouses and a large shed, along with a number of fences, and the radio aerials.

The station was closed in 1944, with a new station opened at Harts Range, in the centre of the mica and other mines of that area. Little is known of the police station buildings after that date, although at least one family, the MacIntyres, lived there during the 1950s. Mick MacIntyre re-opened several of the older mines, and took out leases in the White Range area, putting in an adit below the old Excelsior claim; he also brought the small two head stamper, which remains close to the well.[11] One photograph from this time shows that the stone building had lost its roof and western verandah by the mid 1950s, while a rather flimsy wooden structure was attached to the adjacent chimney. Campers made use of the stone building during the 1960s and 1970s, and considerable damage was done to the walls, apparently by prospectors thinking that the stone may have contained gold. A comparison of my own photographs, taken between 1977 and 1983 shows how the main building deteriorated in that time (figures 5 and 35).

Of the other domestic structures, little is known. One of the Webb brothers lived in one of the structures to the south-east, as in 1927 there was a request from Ben Webb to remove the old corrugated iron from his building near the well. Webb and two or three of his brothers had arrived in Arltunga in the early years of this century, (see above, p.163) and Ben subse-quently took up Mount Riddoch station. He now wanted to salvage the iron from the Arltunga building, and Sergt. Stott from Alice Springs approved, describing it as "in a tumble down condition of very little value", on the hill opposite the police station.[12] During the 1930s there is some evidence for both mining and residential use of the area. In 1931 Charles Fredericks took out a prospecting area to the south-east, and in 1932 J.E. Henden applied for a residence area 1 miles south of the police station, as did William Cox in 1933.[13] Any habitable building would have been appreciated by the prospectors in these, and later years.

The buildings at this precinct show a very distinct difference between the police station group and those smaller structures associated with the ordinary folk. As the contemporary records show, the police station grew over time, and included buildings and sheds no longer surviving above ground. The mix of conventional and bush structures in the group is a result of the history of the site. Further excavations may make the functions of the smaller bush structures more apparent, and comparisons with the structures to the south-east could be of considerable interest.

1. S.A.P.R.O. GRS 1 1897/459 according to the warden's report.

2. S.A.P.R.O. GRS 1 1898/365 and 448.

3. S.A.P.R.O. GRS 1 1898/365 and 1900/37.

4. S.A.P.R.O. GRS 1 1900/220.

5. For example, see S.A.P.R.O. GRS 1 1900/313.

6. S.A.P.R.O. GRS 1 1907/127.

7. A.A.C. CRS A1 11/9647.

8. Northern Territory Annual Report, 1912.

9. A.A.C. CRS A1 31/1668, 30/9562)

10. A.A.C. CRS A1 34/921.

11. Information from Dept. of Mines & Energy, Alice Springs; MacIntyre Collection of photographs held by the Conservation Commission of the N.T.

12. A.A.D. CRS PL 113c.

13. A.A.D. CRS F1086.

3.5 Battery & Cyanide Works, at Star of the North Well.

This area had been prospected within a few years of the first discovery of gold: in May 1890 the warden reported the need for a well about 3 or 4 miles north-west of Paddy's Hole, and the Star of the North mine was mentioned about the same time.[1] This mine is presumed to have been in this area, and to have given its name to the well, which was first tendered for in April 1890, but was not begun until June 1892. By this time most of the estimated population of 40[2] were concentrated on this area, finding good payable alluvial as well as reef gold. The warden also mentioned the unusually dry seasons since 1888, the lack of natural water supplies and so a greater dependence on the few wells on the goldfield. Two petitions asking for improvements to the water supply were sent to the South Australian Government in 1892 - one in March signed by forty-three residents, and one in October signed by 40.[3] While it is difficult to be sure of some of the signatures, it appears that only 19 men signed both petitions.

The importance of the area had been shown, and the contract for the new well was let to Stone and Warman, at very low prices of 27/- for the first 50 feet, 35/-, 40/- and 50/- for the subsequent 50 feet sections, to 200 feet. They had completed the first 50 feet by August, with a supply of 500 gallons per day, not thought sufficient for domestic, stock watering and working needs. (There were no dry blowers on the field at this time, and all alluvial gold had to be washed). As the sinkers had encountered very hard rock, and as the contract price was far too low to pay wages and rations for two men, plus all the dynamite needed, the warden suggested that a bonus be paid or the contractors would be ruined, and new tenders would have to be called. As a bonus of 10/-per foot would still put the contract below the second lowest tender, the Minister agreed to "favourably consider" the matter. The well was completed to 69 feet by November, and the contract closed, complete with bonus - the total cost £135.5.-.[4]

Little more is known of the Star of the North well, the surrounding mines, and the residents of that area. In 1893 there was a request that the well be driven,[5] and then in 1894 the MacDonnell Range Gold Mining and Prospecting Company asked for a lease over the well, as the company planned to set up their mill there. After much discussion, this was agreed to, but in April the formation of the company had fallen through, and so the offer to lease was withdrawn.[6] In August, 1896, as a result of "increased activity in mining",[7] probably due to the decision to establish a public treatment plant at Arltunga, all the wells were supplied with their own rope and buckets as it was becoming awkward for residents to

use their own. The Star of the North well needed 50 ft of rope and 2 buckets, and although approval came through quite soon, it was almost twelve months before all the necessary equipment had been installed.

The year 1897 saw a marked change in activity at the well, and its environs: it was decided to take advantage of the known supply, and move the Government Battery and Cyanide Works from its proposed site near Claraville.

Considerable interest had been displayed in the establishment of a public battery at Arltunga - right from the time that miners found the privately owned Huntingdon Mill appeared to be inefficient. The first petition to this effect was signed by 42 residents in December 1890 and asked that a stamper battery be placed near Claraville, "the present means of stone crushing being too expensive" and there being plenty of reef gold needing treatment.[8] Nothing further was done, but in December 1895 R.J.E. Warburton wrote to the government about the urgent necessity for a battery at Arltunga, and suggesting that it be placed at the Star of the North well "in the immediate vicinity of many really good reefs".[9] Warburton had just returned from an "extended visit to the McDonnell Ranges Goldfield" and had earlier been secretary for the Wheal Fortune Company, and so had an interest in Arltunga. He was advised that the Government Geologist would shortly be visiting the field, and not long afterwards, another petition arrived from Arltunga. This was signed by 40 residents, and arrived early in 1896 with a covering letter from Thomas Gunter pointing out that "most of the men are leaving" - which may have meant that the newly discovered goldfields of Western Australia were looking more promising.[10] This time the minister was prepared to consider the matter, on a recommendation from Mr. Geologist Brown, who visited the field in June, 1896. At that time only about 10 men were working on the reefs, but he still felt that a battery, with cyaniding plant, would help develop the field.

Government approval was given on June 15th, 1896,[11] and a contract for the necessary plant was put out to tender. As the tenders were found to be unsatisfactory, the Public Works Department took over most of the planning, and some of the manufacture, through the Engineer-in-Chief's section; James Martin & Co of Gawler made most of the battery. The total cost of manufacture was £2,059/7/6[12] and the work was completed by the end of the year.

While the plant was being organised, the men to build and run it were employed. Mr. J.G. Woolcock was appointed the manager, with J.A. Gambling as foreman, J.B. Humphreys as engineer & fitter, H.B. Woolcock as assistant fitter, M.E. Colley as battery foreman, T. Hunter as sand pit foreman, A.Townsend as carpenter, C. Mitchell ditto, M.H. Benda as assistant, N.H. Hardy as blacksmith, M.W. Colley as

labourer, and H.P. Wilkinson as clerk and storekeeper.[13] (Figure 59) The men arrived in Oodnadatta by train on December 27th to find that the plans for their passage to Arltunga were highly confused, and so had to spend a week making alternative arrangements. The trip eventually took them just under four weeks, and they arrived at Claraville on January 31st, 1897.[14] The cartage of the plant and equipment caused much greater concern, as the tracks were in very bad condition, and the boiler made very difficult loading; the final pieces of equipment arrived twelve months later. The problems were exacerbated by a fire in the Oodnadatta Goods Shed, which destroyed some equipment, and damaged others, in February 1897; the building work was constantly delayed or made more difficult because of the lack of vital tools or parts.[15] In addition there seems to have been some friction between the manager, Woolcock, and the foreman in charge of the building, Gambling.[16]

Within 10 days of arriving at Claraville, the blacksmiths forge had been built, the well begun, and a start made on the office. The manager, Mr. Woolcock, pointed out that there were considerable difficulties, as water and firewood had to be carted to the site, and good timber for foundations would have to be brought in from 15 to 20 miles away. By September it had become clear that the well, then 150 feet deep, was not going to strike water, and in October the site was abandoned in favour of the Star of the North well. The cost of moving was slightly under £100, with three waggons being hired to cart material. Fortunately not all the plant had arrived, though the boiler caused some problems. All the buildings, the office, store and blacksmiths shop, were demolished and removed, because of the scarcity of good building timber. By December 1st Woolcock was able to report that the move was completed satisfactorily and the frame of the battery building was well advanced, while the excavations for setting up the battery plant had begun. He added that "owing to the dryness of the season large numbers of bush stock are coming in to water" and that the well should be reserved for battery purposes only.[17]

This caused some problems for the people who had been using the Star of the North well for the past five years. By this time there were at least 6 men/camps affected, as well as teamsters, but the sinking of the nearby Kangaroo Creek well in 1898 solved that problem.

The Battery and Cyanide Works was officially opened on February 8th, 1898 by the Alice Springs Telegraph Station postmaster, F.J. Gillen, with most of the residents present, and other speeches from Messrs. Harding, Luce, Chambers and Woolcock. The Minister's reaction was pleasure "that, after past difficulties, the sound of the stamps can now be heard in the ranges, and trust that the working of the plant will be the beginning of a prosperous

era for the gold mining industry in the interior ..".[18] The euphoria lasted for a few weeks only, although the discovery of new reefs at the White Range meant that plentiful supplies of good ore would be available for the plant. While all the work on the battery had been completed before the opening, the cyanide plant was not finished until April, and certain running problems had then become obvious - comparatively minor, but still irritating in the isolation of Arltunga. More serious, was the report in that same month, April, that the boiler was too small to provide the steam power to run everything at once. It was necessary to stop the battery to pump water from the well, or to use the rockbreaker. This particular difficulty soon became obvious to the miners, as in May there was a petition asking for a new engine and boiler, also refering to the shrinking and warping of the battery floors, which might lead to the loss of fine gold.[19]

The manager's reports are full of details about the completion of various buildings, the shortcomings of the equipment and occasionally the site, as well as information about the stone treated and gold won. An additional difficulty was that the supply of water was found to be inadequate, particularly in those brief periods that the battery worked two or three shifts. Twice in 1899 it was deepened, the drought in 1900 also caused problems, and another drive was necessary in 1901.[20] The amount of work available is expressed in the number of men employed at the battery, as shown in figure 59.

The assay office was completed by May, 1898, but more problems were encountered with the cyanide plant - its position had to be changed as the "fall of the hill not being great enough to provide sufficient gravitation for the tailings".[21] The second manager, E.L.Grundy in March, 1899 said "I feel reluctant to report so often on the failure of various parts of these works ...some portion of the plant is continuously going wrong". His reports continue to detail the problems of running such an isolated plant. Of particular concern was the engine, badly affected by dust and grit, as "at times it is almost impossible to see the engine for dust....when teams unloaded ore, or ... the stonebreaker (only 3 feet away) was being worked."[22]

A major crisis occurred in November 19th, 1901, when the boiler finally collapsed.[23] Two of the men were put off immediately, but the skilled labour was kept to prepare for the new boiler and engine: the battery did not operate again until July 19th, 1902. This had occurred just as there seemed to be an increase in mining, but a system of advances was initiated, to allow the miners to continue operating.

The new engine and boiler were made by May Bros. & Co., for £360; work began in December and was completed in January. It then took five months to move them from Adelaide to Arltunga. Battery manager Corbin had been kept busy with preparing the foundations for the boiler, and the engine shed and housing, so that it took only about three weeks to fix the new plant into place.[24] The battery restarted on July 19th, with an enormous stockpile of ore for treatment, and within ten days one of the battery boxes had split. This was repaired, temporarily, to allow crushing to continue, despite the manager's anxiety about the safety of this action. He thought that the foundation timbers had shrunk slightly while the battery was idle, and on restarting, the split had occurred. The new box was made by Martin & Co., but not despatched from Oodnadatta until December. Perhaps fortunately for the safe running of the works, drought was again affecting the supply of feed, and the carting of ore was reduced from September through most of the summer despite some rain in December.[25]

The excitement caused by the discovery of rich reef and alluvial gold at Winnecke's Depot from November 1902 meant a slightly increased workload, and for a week or two in January, 1903, it was possible to run three shifts, until the water supply ran low.[26] The first Winnecke ore was treated in February, with parcels from the Melba and Black Eagle claims producing over 2 oz to the ton. The rush to Winnecke spilled over to Arltunga, and 1903 was the most productive year for the miners, and the battery.

This burst of activity was shortlived, and by January 1904 acting manager Wright put off two of the men, and planned to put off a third; only one shift was needed to cope with the available ore.[27] In February there was further discussion about the need to dismiss more men, and suggested that he should keep on the married men in preference to the single men. The three married men were A.Tabe the battery foreman, R. Tabe the pitman, and T.Wayland the engine driver. In his report of 1st April, with the new manager S. O'Grady due within a few weeks, Wright planned to spend most of the time on maintenance and the building of a shed for the boiler, plus other work on the blacksmiths shop and zinc precipitation room. He also noted that a good fall of rain on March 25th had brought the creek down and washed away most of the recently dumped tailings.

The blacksmiths shop was finished in April, and the boiler shed by early May, while the zinc room was not finished until June or early July. Although there was a reduction in stone for treatment, the results continued to be good, with many parcels producing well over an ounce to the ton; two parcels from Winnecke made almost 4 oz to the ton. A special report of November 30th stated

that it would be necessary to build a new assay furnace room, as the present building was too close to the Cyanide smelting room, and samples and assays could be "salted".[28]

From 1905 the monthly reports regularly noted the number of days "hung up" through lack of stone; in February there was no stone at all for treatment.[29] Three more men were dismissed, and manager O'Grady was worried at the possibility of having to let his skilled labour go, as they would be difficult to replace locally, and expensive to send up from Adelaide. In the meantime, he kept them busy on the new assay furnace room whenever the lack of ore left the battery idle. The last parcels from Winnecke were crushed in April, as the New Coorong Co. had set up their own battery - which was taken over by the government in 1905.[30] This did not have an immediate effect, as the battery was busy over the winter, but from August things slackened. A new store room was built and the furnace stack was increased by six feet, plus an enclosure for storing lime, as well as the usual repairs and maintenance work. A fence was put up around the works, to stop stock getting too close to the vats, and the charcoal pit was lined with a dry stone wall.

By 1906 it was becoming more common for only 5 of the 10 head of stamps to be working, and the men occasionally raised a parcel of ore to keep them and the battery occupied.[31] During October some of the men were put to repairing roads as well as carrying out meticulous maintenance work. From 1907 onwards the managers reports were confined to recording the parcels of ore - tonnage treated, ounces of gold, and net amount paid; no more information about the exact time spent on repairs or other work is available.

After the takeover by the Commonwealth Government from January 1911, the surviving documents become even less informative. As the population dwindled, mining activity decreased and the next few years saw some correspondence indicating that quarrels between various groups at the goldfield were many and varied.[32] Such correspondence does give some information about the residents of Arltunga, while one complaint about manager O'Grady indicated that by mid 1911 the staff at the Works consisted of the manager and five men: F.L. Cavenagh, T. Wayland, J.T. Kinnear, A.Tabe and one other, possibly F. Barrett. It was Kinnear who complained about the manager's attitude, and he left the Works before the end of the year. In 1912 there were several months when the battery was idle, which lead to questions being asked about the viability of the Government's investment at Arltunga.[33] This ended with an investigation into the management and running of the works before the end of 1913. The Inspector of Mines, Mr. T.G. Oliver visited Arltunga in October and his report was very scathing about past operations. And, as at the time of his visit there

were no reef claims being worked, the Battery & Cyanide Works was left in charge of a caretaker, F.L.Cavenagh, to be operated when required, on the condition that all costs would be paid for by the users.

The only surviving records for mining and battery activity during the First World War, are brief notes on the bullion won. From the official closing of the battery in late 1913, there is a gap until February 1915, when three bars of almost 74, 14 and 17 oz were sent to Canberra, with a total value of £356.6.8. It is possible that this gold came from slimes left over from earlier White Range parcels. In 1916 and 1917 only two bars were sent, one of 53 oz and the last of 47oz, valued at £186 and £116, and it is possible that these were from the tailings, rather than new parcels of stone.[34]

In 1920 Chief Warden Playford reported on the Arltunga battery, describing it as fairly good condition, although the cyanide vats were badly rusted. The assay office and equipment, plus the smithy were complete, and all that was needed to operate the plant was some over-hauling and cleaning.[35] Playford was at Arltunga to report on the White Range mines, as leases over this area had just been taken up by Mr. E.H. White. Although White held the leases for many years, he does not seem to have done any work, although in 1927 he was interested in acquiring the Arltunga battery. The price was settled at £1950, or £4 per week, but White seems to have found this too much. Other enquiries were made about some of the smaller tools, which were sold during the next few years.

During the Depression there was an increase in prospecting around the Arltunga area, and greater interest shown in the old battery. In 1931, P.B. Coulston, who had taken over the White Range leases, also enquired, and was told that the price was £1,300, while a 1929 report on the plant and buildings still considered it to be in reasonably good condition.[36] Coulston did not take up the option, and the next request came from a Mr. J.G. Cobbledick on behalf of the Central Australian Gold Syndicate, wanting to use the well, and take out a machinery area for their own plant.[37] The Syndicate wanted to use the old stone buildings, which only needed to be re-roofed to be acceptable for accommodation, and offered £26 per annum for the lease of the well and buildings; the government preferred a sale, and anyway, it appeared that the well was already leased to Mr. F.L. Cavenagh, for pastoral purposes. After much correspondence, it was agreed to transfer the lease from Cavenagh to the Syndicate, but no further action seems to have been taken over the working of the plant.

Ordinary prospectors may have been using some of the stone buildings for their own campsites at this time. In June 1931 an alluvial claim was taken out by G. Creston Ware, Leslie Beauchamp and J.C. Howard some 2 miles WSW of the battery, while in September James Culver and Howard took out an alluvial claim just east of the battery. G.J. Metters was also interested in an aluvial claim in the area in September of that year, as was Ernest Hayes in January 1932.[38] None of these claims seem to have been worked for more than a few months.

In 1934, the government finally called for tenders for the sale of the Arltunga battery, and the highest offer, of £180, came from Rudolph Schmidt (the lowest tender was £25, from F.L. Cavenagh).[39] Schmidt intended to move the plant to Tennant Creek, just developing into a major goldfield, but apparently ran into some difficulties. He removed the iron from the battery buildings and sold the machinery to Mr. L. Garland, who had been prospecting and mining at Winnecke for the past two or three years[40] and may have wanted to set up the battery on his own claim. His plans also fell through, and he sold to Mr. C.H. Chapman "who removed the 10 head battery to Granites and since re-erected it there. At Arltunga now only old boilers and other junk remain."[41] The truth of this information is difficult to establish, as it was written some time after the event, and dates the sale to Schmidt as 1936 rather than 1934 -and casts some doubt on the veracity of the re-sale information.

A request to lease the well, from J. Killeen in July 1940,[42] for the purposes of setting up a battery, seems to have been the final, unsuccessful attempt to show that the Arltunga goldfied was worth developing. There is some artefact evidence for occupation in the 1940s and 1950s, but this is very small when compared with the earlier, documented use of this precinct.

Apart from the various attempts to run a battery at this site, and some casual use of the buildings by later prospectors, there were some other official offices at this site. The post office, first established at the Paddy's Rockhole store in 1891, was moved to the battery area by 1900.[43] The building used was the original store and possible mess hall, and the post office remained in use until the police took over the duties some time in the 1920s. (Figure 58) It was finally closed in 1928.[44] The original use of this building as the mess hall is partly supposition, but the structure, site 191 is close to the Works area. The chimney is well built, although the rest of the structure is rather insubstantial; the photographs show at least some of the walls were just slab posts. The men were given a ration allowance of up to 12/- per week

to help cope with the higher cost of living at Arltunga, the manager put six monthly requisitions for stores which included foodstuffs, and there was usually a cook employed at the Works. For all these reasons, it would appear that site 191 was the store/mess hall before being turned into the post office, or adding the post office duties to its original function.

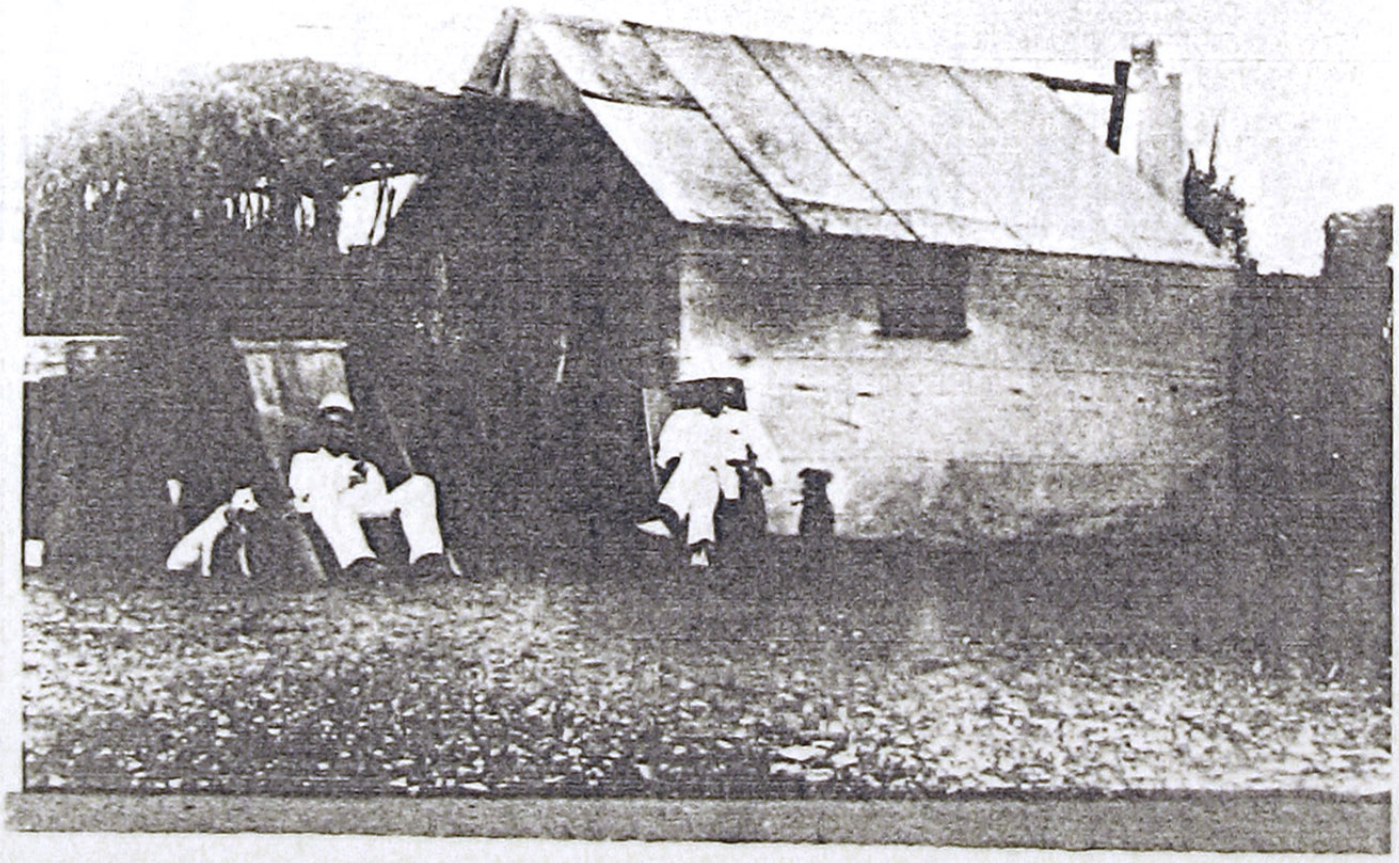
And, briefly in 1903, senior warden Gee set up his office at the battery, finding the quarters of warden Mueller quite inappropriate.[45] The battery manager, Mr. Grundy, was able to fix up a small office, but it is unlikely that this was used by warden Mueller after the departure of Mr. Gee, at the end of 1903. Otherwise, the battery was occasionally called on to provide nursing facilities. When Robert Stuart became fatally ill at the White Range in 1904, he was moved to the Works for "better attendance, medical and otherwise."[46] Such attention was rarely offered to the residents of Arltunga, but Stuart must have been a wealthy man as he was in the process of buying the White Range Excelsior mine, and developing it.

There is no mention of the obviously domestic buildings that have survived at this precinct. It seems rather unusual that there is no passing reference to housing the men employed by the Works, though some of the early photographs show large canvas structures, so perhaps all the men were provided with tents. (Figure 58) Some of the bush structures may have survived from the original domestic use of the precinct, but it would seem that the two fine domestic buildings, sites 180 and 185, were built without official notification, knowledge or sanction.



Figure 58 Above, an 1899 photograph of the post office cum mess hall at the Works? Collison Collection, CCNT.

Below, a c. 1898 photograph of a spacious tent and bough shed, possibly the home of the first manager, J.G. Woolcock. Woolcock Collection, CCNT.



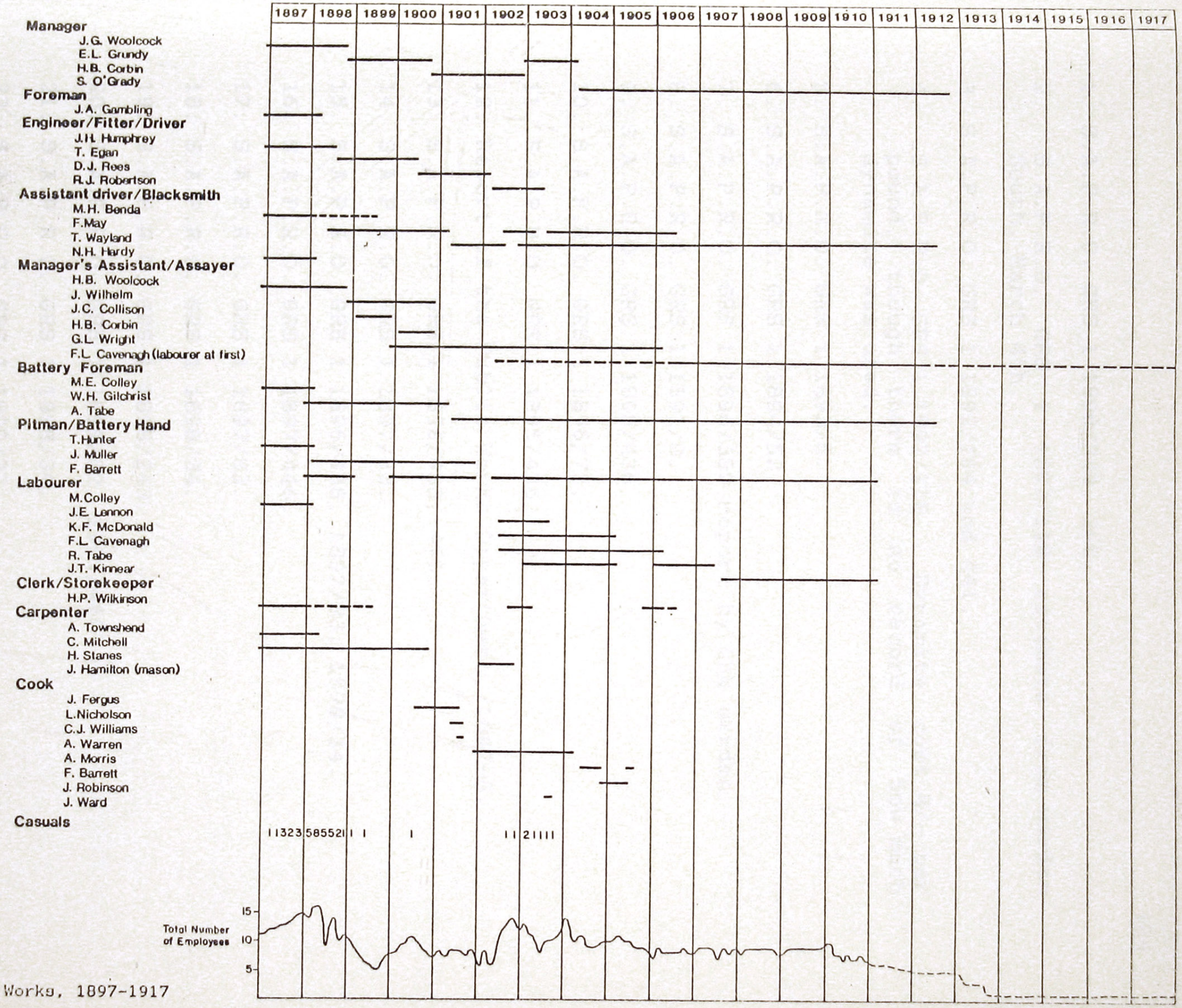


Figure 59 Employees at the Works, 1897-1917

1. S.A.P.R.O. GRS 1 1890/344, 266.

2. S.A.P.R.O. GRS 1 1892/118 estimate from warden South, March 4th.

3. S.A.P.R.O. GRS 1 1892/164 and 441.

4. S.A.P.R.O. GRS 1 1892/118. Dynamite cost 4/- per pound, though there is no record of how much dynamite was used.

5. S.A.P.R.O. GRS 1 1893/5.

6. S.A.P.R.O. GRS 1 1894/52.

7. S.A.P.R.O. GRS 1 1896/389 report by the warden.

8. S.A.P.R.O. GRS 1 1891/8.

9. S.A.P.R.O. GRS 1 1895/436.

10. S.A.P.R.O. GRS 1 1896/72.

11. S.A.P.R.O. GRS 1 1895/436.

12. Report of the Public Works Department, 1897-8.

13. S.A.P.R.O. GRS 1 1896/430, 475.

14. S.A.P.R.O. GRS 1 1897/83.

15. S.A.P.R.O. GRS 1 1896/436, 1897/83, 1898/34.

16. S.A.P.R.O. GRS 1 1897/446.

17. S.A.P.R.O. GRS 1 1897/83.

18. S.A.P.R.O. GRS 1 1898/34.

19. S.A.P.R.O. GRS 1 1898/243.

20. S.A.P.R.O. GRS 1 1899/32, 1901/460.

21. S.A.P.R.O. GRS 1 1898/34.

22. S.A.P.R.O. GRS 1 1899/32.

23. S.A.P.R.O. GRS 1 1901/34.

24. S.A.P.R.O. GRS 1 1901/502.

25. S.A.P.R.O. GRS 1 1902/335, 1903/47.

26. S.A. P.R.O. GRS 1 1903/47.

27. S.A.P.R.O. GRS 1 1904/37.

28. S.A.P.R.O. GRS 1 1904/37.

29. S.A.P.R.O. GRS 1 1905/8.

30. S.A.P.R.P. GRS 1 1904/152.

31. S.A.P.R.O. GRS 1 1906/43.

32. For example, A.A.C. CRS A1 11/16954 suggests ill feeling between the battery manager and the police constable, with various residents taking sides.

33. A.A.C. CRS A3 14/3268.

34. A.A.C. CRS A3 17/1708, and A1 31/7653 which includes a 1920 report by warden Playford which suggests that this war-time activity did not necesarrily indicate mining.

35. A.A.C. CRS A1 30/5562.

36. A.A.C. CRS A1 35/11471.

37. A.A.C. CRS A1 30/5562.

38. A.A.D. CRS F1086.

39. A.A.C. CRS A1 35/11471.

40. A.A.C. CRS A 659 42/1/7545.

41. A.A.D. CRS F143, letter of August 1940.

42. A.A.D. CRS F143, 39/115M

43. S.A.P.R.O. GRS 1 1890/625, 1900/138.

44. Information from Telecom Archives, held by the Conservation Commission.

45. S.A.P.R.O. GRS 1 1903/83, April 14th.

46. S.A.P.R.O. GRS 1 1904/45, reported by the warden, November 5th.

3.6 MacDonell Range Reef Precinct

The MacDonnell Range Reef is a substantial mining complex close to the Kangaroo Creek and the Star of the North wells, and it is believed that this was one of the mine workings dependent on first the Star of the North, and later the Kangaroo Creek well for its domestic water. The workings show a wide range of techniques from the alluvial diggings along the creek beds and flats, through to the more substantial shafts searching out the fine reef gold. The Reef is one of many claims being worked in this region from as early as 1890, although the first record of this particular claim does not appear until 1892.

The first definite reference to this reef appeared in the Adelaide papers in October, 1892: "Mr. Thomas Gunter of Alice Springs arrived in town on Monday, bringing some splendid specimens of gold-bearing stone from the recently discovered Christmas and MacDonnell Range reefs.." [1] Gunter at this time was the licensee of the Stuart Hotel but had some interest in the goldfield.[2] The claim seems to have been financed by a Broken Hill syndicate, headed by Mr. James Lamb, but worked by Henry Luce, and in the early days, John Thompson.[3] The latter was mentioned by the warden in August as having found the largest nugget on the goldfield to date, possibly from this same area.[4] Lamb took out licence No. 1027 in July 1892 and work began on a shaft very soon after that.[5] Warden South, on a visit to the goldfield in December, 1892, reported on the claim:[6]

> "The Reef is well defined and shows gold freely. ... at the outcrop (it) is split in two but is solid in the shaft which is sunk about 50 feet from the outcrop and strikes the Reef about 14 feet from the surface where it is about 3 feet wide with good walls."

The returns from the claim were sufficiently encouraging to suggest that a public company could be formed, and early in 1894 a prospectus for the MacDonnell Ranges Proprietory Gold Mining Company was published.[7] Included in the prospectus was a detailed report from a mining engineer, Mr. W.G. Manners, which mentioned that a small amount of stone had been quarried from an outcrop on one of the 11 blocks included in the claim, while about 50 feet north of the outcrop was the shaft. This had found the reef at a depth of 14 feet, at which point the lode was some 5 feet thick. After further description of the country, Manners went on to say:

> "The best indication of the richness of these reefs is what the prospectors term the alluvial workings in Christmas Gully, immediately below your property, from which about 300 oz have been

> taken from time to time. This consists of partly waterworn Gold found a foot or two under the soil on the rock bed in the gully by means of fossicking. There have been some splendid nuggests found here .... This Gold is evidently reef Gold from its rough appearance and the fact that many of the nuggets have pieces of quartz attached, and there can be no doubt but that they have been shed from reefs in the vicinity."

He estimated that the claim could produce 3 oz gold to the ton, and the company hoped that as soon as milling plant was in place and treating stone, the returns would be ample to cover the cost of further development and provide dividends for shareholders. The Company also negotiated with the South Australian Government to lease the Star of the North well, sunk in 1892, and planned to establish their plant close by. The lease was approved in February 1894, at a rent of £10 for the first year, and £8 per annum after that.[8] Sadly for all concerned, the formation of the company fell through in April, and the lease was cancelled.

This failure seems to have discouraged James Lamb, but Henry Luce continued to work the claim. Luce had arrived at Arltunga by 1890,[9] and apart from his goldmining interests, held several claims in the mica country to the north of Arltunga.[10] By 1895, if not before, he had entered into a partnership with Michael Vilkson the owner of the Huntingdon Mill, originally brought to the goldfield by the Wheal Fortune Company. The two men decided to apply for a government grant in April 1895, which they did through their Member of Parliament, V.L. Solomon.[11] They wanted to test the reef at some depth, and the subsidy was approved. Then the partners discovered that the money would have to be repaid, rather than being a straight out grant, and so decided not to continue with the subsidy.

In July 1895 the Warden visited the claim and reported that "..very good work has been done on the reef, and it appears to be a promising property. The Huntingdon Mill had not worked for some months "owing to the absence of the owners", but good summer rains had improved the water supply at Claraville, and a 50 ton parcel was being put through and expected to yield 50 oz gold.[12] In January 1896 six men were employed to work the reef, and another 60 tons was being crushed, with equally hopeful results.[13] In June, the Government Geologist, H.Y.L. Brown made his third visit to the goldfield, and also reported on the workings.[14]

At about this time Vilkson's name disappears from the records, and he seems to have left Arltunga. Luce applied for a lease over the MacDonnell Range Reef in November 1896, by which time he was working with J.H. Lloyd, Henry

Perkins and Charles Williams.[15] Of these three, Lloyd and Williams may have only just arrived at Arltunga, while a Perkins had worked alluvial gold there since at least 1890.[16] This application, along with two others over Claraville Reef and Golden Dream, were refused as they did not include the necessary surveyor's plans, but Luce continued to work the claim. In March 1897 he decided to move the Huntingdon Mill from the indifferent water supply given by the Claraville well, to the more substantial supply at the Star of the North well, only a mile or two from the MacDonnell Range Reef. He was granted the lease, but in October it was revoked as the Government Battery & Cyanide Works was to take over the Star of the North well.[17] It seems unlikely that the mill had been moved from Claraville, or if it had, it must have been moved again when the Government battery was established.

In a general report on the goldfield in the Advertiser, March 1898, the MacDonnell Range Reef was described as "a very big reef, from which about 300 oz gold have been obtained in the past ...". By September the first parcel had been crushed at the battery, producing only 11 dwt 17g gold per ton; in the same month the first crushings from the newly discovered White Range claims were also put through.[18] Henry Luce was the man who realised the potential for reef gold at White Range, and took out the first claim there early in 1898[19] closely followed by Charles Williams taking out the Excelsior, while Henry Perkins worked as a tributer on Luce's White Range.

The move to the White Range brought the first stage of mining at the MacDonnell Range Reef to a close. It was the rush to Winnecke's Depot in 1903, with the flow-on to Arltunga which lead to the re-opening of several older claims, including this one. C. Arbouin and H.W. Clarke, who ran a store at Arltunga, took out a lease over the MacDonnell Range Reef, and the Reef Extended in April 1904 and the warden reported that some work was being done by September.[20] A large parcel of 100 tons was put through the battery in October, resulting in less than 30 oz gold. Payment for this parcel was made to a J.H. Dennis, who may have been employed by Arbouin & Clark. In April 1904 another small parcel of only 8 tons was treated, for just over 5oz gold - while at about the same time a parcel of 42 tons from Luce's White Range yielded over 72 oz gold.[21] The lease was not renewed.

The next recorded interest in the reef came in 1906, when Fritz Klau put through 5 tons for over 6 oz gold in July.[22] Klau had arrived at Arltunga by 1904 and had some interest in different claims before taking over the store at Paddy's Hole in 1909;[23] this was the only parcel from this reef put through by him. William Russell was the next miner to take an interest in the reef, during 1907 and 1908. This is probably the same Russell involved in

the auctioning of the Wheal Fortune plant to Vilkson back in 1893. He had found good alluvial gold at Star Creek, to the east of the main goldfield in 1894, and more importantly, discovered the rich alluvial at Winnecke's Depot in early December, 1902.[24] His first parcel from the MacDonnell Range Reef was put through the battery in April, 1907, though it was not until March 1908 that there is a record of him actually registering a claim. Three more parcels were put through for treatment by March 1908 - some 30 tons of ore for over 40 oz gold, at a net return of £112.15.5d.[25]

No further activity was recorded during the early mining period, though the records are very poor from 1911 to 1917. Some further work may have taken place in the early 1930s when Frank McGowan took out a mining claim in November 1932, which was forfeited at the end of 1934.[26] Later again, Thomas Robertson West had a lease in 1959-1960,[27] but there is no record of the actual mining activity at either of these times.

The history of this precinct is concerned simply with the mining output, though there is some information about the owners and miners working the mine. Most of the activity seems to have occurred during the 1890s, with the possible high point being in 1896 when six men were employed. The lack of water at the precinct, and generally low indications of domestic habitation make it almost certain that the miners did not live on site. The domestic rubbish around site 169, the foundation near the mines could have been formed through daily activity in the 1890s, or during the shorter occupations of the 1900s.

1. The Register, October 13th 1892.

2. S.A.P.R.O. GRG 67/14.

3. S.A.P.R.O.GRS 1 1893/259, and 820 (Newspaper cuttings on the Northern Territory) January, 1893.

4. S.A.P.R.O. GRS 1 1892/399.

5. S.A.P.R.O. GRS 1 1893/352.

6. S.A.P.R.O. GRS 1 1893/259.

7. S.A.P.R.O. GRS 1 1895/150.

8. S.A.P.R.O. GRS 1 1894/52

9. S.A.P.R.O. GRS 1 1890/393 - Luce signed a petition.

10. S.A.P.R.O. GRS 1 1893/189.

11. S.A.P.R.O. GRS 1 1895/150.

12. S.A.P.R.O. GRS 1 1895/289.

13. S.A.P.R.O. GRS 1 1896/16.

14. Brown, H.Y.L., 1896 report, op cit.

15. S.A.P.R.O. GRS 1 1896/54.

16. S.A.P.R.O. GRS 1 1890/394.

17. S.A.P.R.O. GRS 1 1897/446.

18. S.A.P.R.O. GRS 1 1898/34.

19. Brown, H.Y.L. Report on the White Range Gold Mines, 1902.

20. S.A.P.R.O. GRS 1 1903/86.

21. S.A.P.R.O.GRG 1 1903/47, 1904/37.

22. S.A.P.R.O. GRS 1 1906/43, 44.

23. S.A.P.R.O GRS 1 1904/20, A.A.D. CRS F1086.

24. S.A.P.R.O. GRS 1 1893/451, 1894/130, 1902/77.

25. S.A.P.R.O. GRS 1 1907/35, and 56, 1908/6 and 94.

26. A.A.D. CRS F1086.

27. Information from Dept. of Mines & Energy, Alice Springs.

3.7 Everyday life

Food and drink

Meat was, by the 1880s, an important part of the Australian diet - a result partly of Australia's settlement as a prison colony, and the later development of the pastoral industry. The weekly rations for the marines on the First Fleet were 7 lb bread, 2 lb salt pork, 4 lb salt beef, 2 lb peas, 3 lb oatmeal, 6 oz butter, 3/4 lb cheese and 1/2 pint vinegar. This was an expression of the current diet in England, limited by the need to preserve foods for several months, and the vinegar was supposed to prevent scurvy. Having survived the journey to Australia, the adult ration changed little, though the amounts depended on available supplies. There was comparatively little effort to use animals or vegetables native to Australia, though every effort was made to introduce foods familiar to the English diet. By the 1790s vegetable gardens and small farms were flourishing in the Hawkesbury area, but as explorers pushed out into the inland area it was the pastoralist, rather than the farmer or market gardener who really flourished. As the sheep and cattle industries developed, meat became an even more important part of the diet, eaten three times a day. Station workers received a weekly ration of 10 lb flour, 10 lb meat, 2 lb sugar, 1/4 lb tea and salt, and this was the basic diet for most bush workers until comparatively recently.[1] The flour was made into damper, the meat salted or occasionally dried, and scurvy or Barcoo rot as it was often known in Australia, was common. Growing vegetables and salad greens required water, and time, both of which would be in short supply in the largely outdoor life of the country workers.

An understanding of the need for fresh fruit and vegetables is evident from the early history of the town of Stuart, now Alice Springs. In fact, before the town proper was surveyed in October 1888, a request had been made to allow a special survey for an Experimental Garden in the general area, for a Mr. Wesley Turton.[2] The departmental response to this was favourable, as the value of a market garden/orchard in such an isolated area was recognised. There is no further information about the success or otherwise of this venture, but in 1894 another town lot was taken up by a Jack Joe, possibly the Chinese Hong (Ned) Cheong.[3] This was later taken over by Ah Hong, and remained as a market garden for some twenty-five years. As the town grew, Ah Hong moved his garden further south, and from the 1920s others took up the challenge of growing fresh fruits and vegetables. Grapes were also popular - not only for the fruit, but vines along verandahs provided extra protection from the sun in the long, hot summers.[4]

This diet would have been accepted by the explorers, pastoralists and prospectors in Central Australia, and remained the expected diet for pastoral workers when out mustering until at least the 1960s. It would have been accepted as normal for those who settled at Arltunga, especially as there were properties nearby to provide fresh meat. Storekeepers organised supply wagons or camel trains every two or three months to bring the flour, sugar and tea, plus the tinned and dried foods available in the late 19th century, but not available a hundred years earlier. There are records of at least three storekeepers supplying the Arltunga inhabitants, as well as the two stores in the town of Stuart, near Alice Springs Telegraph Station, a two day ride from Arltunga.

Joseph Harding was the first, and set up camp near Paddy's Rockhole, the original source of gold, and of natural water, by 1890.[5] The 1899 photo of the store shows a long rectangular building, with slab post walls and corrugated iron roof. (Figure 60) The only above ground remains at Paddy's Rockhole, presumably in the same area as the store are of stone, and may have been a separate building, or an addition to this timber structure. When the mail service between Arltunga and Alice Springs was established in January 1891, Harding was the mail contractor, and it seems that part of his store became the post office.[6] At this time he was the only storekeeper on the goldfield, though two other men were granted slaughtering licences - D Oliver in 1890 and 1891, at Claraville, Edward Prosser in 1891 and 1892 at Paddy's Rockhole.[7] He had also been granted a lease over the Paddy's Hole well from February 1890, which he needed for his horse teams, and then for the operation of the mail service.[8] The well lease caused some problems, as he had to pay £10 per annum, and recoup some costs by charging other residents for the use of the water. As Harding explained in November, 1894, this was sometimes difficult:

> "Ever since the start of these diggings it [the well] has been, with one or two exceptions the rendezvous of unemployed men who not only have to be suplied with water for their horse, but my books will show with rations. I have assisted men with rations and tools and the use of my teams (to try and procure for them a living and help along the development of this field) to the tune of over £1,000 and in no case have I ever received a penny for water as the diggers are too poor."[9]

In another reference to his use of horseteams, in 1895 he asked that the road through Ooraminna Gap, just south of Alice Springs, be improved. At that time a single horse or cart could get through, but his teams had troubles, and his wagons were damaged on every trip.[10] He mentioned that his team was just going down to Oodnadatta, and that

if the cutting was straightened out in March or April, it would save the horses 70 miles on the return. Harding may have been the only storekeeper to have used horseteams, as the preference seems to have been for camels for bringing in stores.[11] (Figure 60). All the supplies had to be brought north from Oodnadatta, which was the railhead from 1891 until 1929, a journey of some 360 miles, which could take three weeks.[12] The distances involved meant that freight charges were high. The Government Works ran a mess, and ordered bulk supplies from Adelaide every six months. One such requisition in May 1897 shows that the food cost just over £92, and the freight added another £82.

Harding remained at Arltunga - or kept up his interest in the store - until early 1904, when F. Klau took over, running the store until 1913.[13] H B Walkington then took over the business, and seems to have been working for FB Wallis & Co.[14] The business may have ceased by 1915 or 1916.

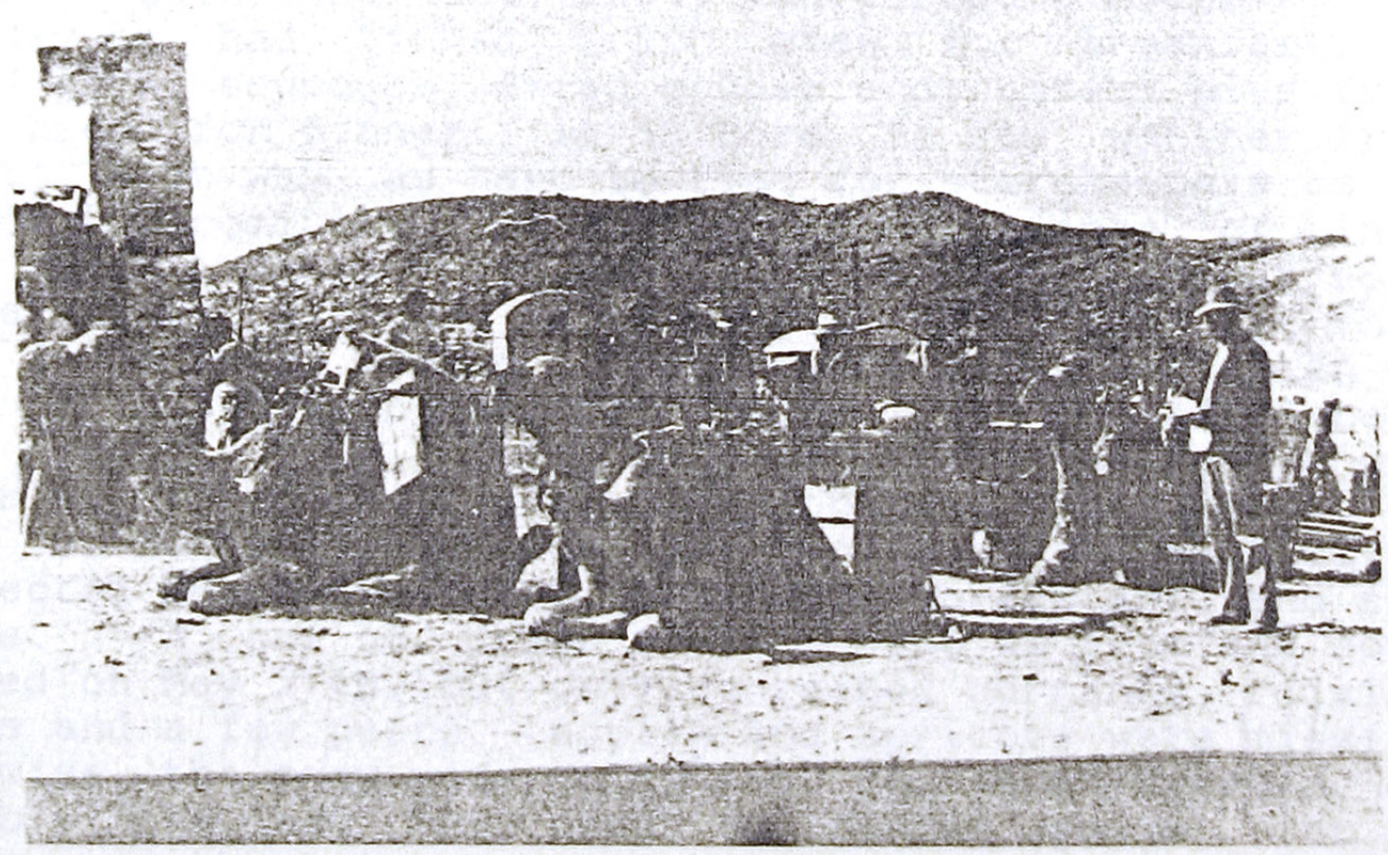
Harding's first rival on the field was T.A. Wallis who had a slaughtering licence granted in 1894, and then a storekeepers licence, at Claraville, from 1897 until 1907 when the store was moved to the Crossroads area.[15] Wallis and his family also had an interest in a store, and later the pub, in Alice Springs, or Stuart, at this time. There is little direct evidence from the Wallis family about their Arltunga business, but some information is available from 1903. William Coulthard came up to Winnecke's Depot in the rush of 1903, but only remained for several months in the district because he decided to help his uncle, another William, muster horses on Loves Creek station. The uncle was in partnership with Albert Wallis, and so had some dealings with the Wallis store at Claraville. On May 1st, while at Love's Creek, Frank Wallis, son of T.A. Wallis, visited them, bringing "all sorts of eatables" and saying that the store was doing very well, making over £1,000 a month. By June 10th, this had been increased to £1,000 a fortnight, with rations being very scarce, but by July 5th William wrote that a lot of the men were clearing out from Winnecke, and "old man [T.A.] Wallis had lost £100 in the last week through mines going bung and not paying the men."[16]

A later arrival was the White Range store, owned by John Wilson but managed by Francis Bignell; the store was operating by 1902 but the exact date is uncertain, and continued until 1912.[17] (See also pp 160-161). This is the only store site that has been excavated, as described above, and the surviving remains were of a particularly well built structure. The excavations showed that there was in addition a very large timber building, and an ingenious system for cooling the stone building, all showing the importance of the store in this remote region.



Figure 60 Above, the mail arriving at the post office, apparently site 191 at the Works, in 1899. Collison Collection, CCNT.

Below, a camel team at the Works, 1899. Collison Collection, CCNT.



There is some information about the food supplies actually available to the miners, from the Works requisitions, a brief list in Robert Frearson's 1903 guide, and the detailed account of William Coulthard's daily activities while in the Centre in 1903. Frearson's list also includes prices:

> "Flour 200 lbs, 50s; Meat, salt, 5d per lb; Meat, tinned, assorted, 2s a tin; Jam is 1s3d a tin; Tea 2s. lb; Preserved Fruits 2s a tin, Herrings 1s3d tin; Sugar 4d lb; Salt 4d lb; Biscuits 1s lb; Pecks 1/6 a bottle; Tomato Sauce 1s. 3d bottle; sardines, small size 1s per tin; Marmalade 1/6 tin; Kippered Herrings 2s tin, Leibig Extract 2s."[18]

A comparison with prices in the Lassetter catalogue of 1906, indicating prices in Sydney at that time shows that there was quite a difference. Tinned meat was 8d for a 1 lb tin, and 1/3 for a 2 lb tin; jams were from 4d for 1 lb, and from 7 1/2d for a 2 lb tin; preserved fruits were from 8d for a 2 lb tin.

Coulthard's diary[19] gives a very good idea of life, especially on a station, with the boring, everyday diet while out on muster consisting of the Australian staples of salt beef, damper, tea and jam or treacle. When back at the homestead, much use was made of salads and vegetables grown there, plus dried fruits - which were also carried out on muster to provide some variety. It seems that tinned meat was used in place of the fresh or salt variety, but there are few references to tinned vegetables and fruit. He and his friends bought 6 tins of bully in Alice Springs for 1/6 [probably 1/6 each] and on Coulthard's first visit to the Claraville store on February 28th, he ate bully and tinned pineapple. The next day he had tinned Irish stew for breakfast, and tinned pork sausages, dried prunes and custard plus fresh baked bread for dinner. It is hard to say whether fresh or salt meat was as hard to find for storekeepers as the rest of the community, or whether the abundance of tinned goods made them easy to use. There does not appear to be another diary reference to having tinned meat at three meals in a row. Tinned tongue, very good, was eaten one night at the station, as they had not yet killed a beast (June 26th). On April 1st Coulthard mentions a good dinner of cooked meat, preserved potatoes and onions, and a tin of butter which was not too bad. The next day an unexpected luxury was some bacon for breakfast, and some cheese. A box of dried fruits sent up from the south arrived on May 27th, but only contained currants, raisins, prunes and a few pears - apples and apricots were missing. Otherwise, the many references to jam and treacle, and possibly the odd reference to baking powder for the damper, are the only canned goods mentioned by William Coulthard.

The requisitions from the battery for six months supplies cover a wide range of foods. One requisition in 1897 began with 2 tons of flour, and went on through tea, sugar, oatmeal, assorted jams (288 lbs) soap, pepper, tomato sauce (48 bottles) dried apricots, apples, currants and raisins, hops, rice, baking powder (12 lbs) salt, matches, tobacco, curry powder, fresh fruits - 24 tins so presumably means canned fruit, haricot beans, pearl barley, sago, egg powder, mixed spice, compressed vegetables and some wash basins and pie dishes. Later additions included coffee, Fry's cocoa, anchovy paste and lime juice. One of the 1899 requisitions included one case or 96 lbs of meat preserved in tins, and 48 bottles of pickles. [20] Some of these items would survive, and have survived, in the archaeological record, though many of the bulk items such as flour would have come in bags.

The only reference to fresh fruit and vegetables being brought to the goldfield is from Walter Smith, who suggests that Ah Hong came out weekly. This is probably an exaggeration, as Walter also remembered stores arriving weekly, when other evidence suggests a monthly or longer interval. If Ah Hong did come out on a regular basis, this would have been enough to prevent scurvy, if the miners were sufficiently concerned, and could afford the prices. Walter remembered that a watermelon cost about 4/6 and a rockmelon 2/6 - prices were high because of the distance travelled.[21] It is interesting to compare this with William Coulthard's diary, when on arriving in Alice Springs on February 19th, 1903, he paid 1/6 for a melon, possibly a watermelon "which was splendid". Coulthard also referred to tomatoes, maize and marrows in the Chinaman's garden, as well as his goats - but goats were a common source of meat and milk in the town and at Arltunga.[22]

The occasional fresh, and more frequent salt beef would have been part of the usual diet of most Arltunga residents, as they lived in cattle country. As mentioned above, slaughtering licences were the first indications of service on the goldfield, but there were problems with the supply of cattle. The largest station, Undoolya, then being run by the Willowie Pastoral Company, complained that cattle were being stolen - one of the factors leading to the police presence at Arltunga.[23] Meat was often scarce, due to drought, and/or unexpected increases in population, such as in the 1903 rush.[24] Goats provided another source of meat when fresh or salt beef was not available, and the impression is that canned meat was a least favourite option. There are few references to bush foods, although some hunting of native animals and birds would have been possible. William Coulthard does mention some bush foods on the trip up to Winnecke, particularly the shooting of ducks for food. When at Winnecke in March, some others camped nearby tried to shoot a wallaby, but William did the deed, supposing that they wanted to

eat it as they had no meat.

The cost of living was generally considered to be about £1 per week, and in good times a man could earn £3 to £4 in wages, and more or less if working his own claim. The value of Arltunga gold averaged around £3/10/- an ounce.[25]

An important part of the everyday life was alcohol, as indicated both in the documentary and the archaeological record. Alcohol was something of a problem on the goldfield, although it was also something of a luxury. There are few references to specific types, i.e. beer or spirits, but the use of the word "grog", sly grog selling, etc. suggest that spirits caused more problems than beer. An early 1887 report on the goldfield, written by Constable Hillier, stationed at Alice Springs, mentions the arrival of two men, Palmer and Stacey, with 14 camels "all loaded with intoxicants ...These men .. come yearly about Christmas time and are a great nuisance to the country."[26] Eleven years later, when efforts were being made to establish a police camp at Arltunga, one of the reasons put forward was the need for law and order, as "a good deal of drunkenness and unseemly behaviour frequently occurs at the mining camp".[27] The police at Heavitree Gap were asked to comment on this, and M.C. Cowle replied that there were two stores at Arltunga licensed to sell wine and spirits and "no doubt sell in considerably less quantities than is lawfully permitted" and that a closer police presence might prevent sly grog selling.

The first manager of the battery & cyanide Works, J.G. Woolcock, who arrived at Arltunga in 1897 remembered

> "..there were about 70 white men of different nationalities, mostly with one thing in common, a craving for liquor. We could notice a preference for Rum. ...Some of these men came from highly respected families and wished to live away from relatives and friends for obvious reasons.
>
> One typical case was a student from London University ..(here) five years and admitted drink was his weakness. ... A son of a Bishop in Sweden was a similar case - a very capable and well built man. Many of these men were fine characters and quite good types when sober."

He was also called to help the unfortunate man fatally shot on Christmas Day, 1897 while trying to calm down an argument brought about by too much alcohol. This man may be buried at Paddy's Rockhole.[28]

During 1900 there were several references to "grog" causing arguments, particularly between the manager of the battery, and some of the miners - or those connected with the stores. It was a drought year, and times were even more difficult than usual; Joseph Harding who ran the Paddy's Rockhole store also provided one of the teams used for carting ore. During the drought, the horse teams could not work, and the battery manager suggested that camels be used instead, which meant that the usual carters would lose money. There was also an argument over the battery having its own small herd of goats, for meat, which again took trade from Harding's store. Betwen June and September there were difficulties with Harding's manager, J.G. Grant, who was asked to leave the works on at least two occasions, "on account of being intoxicated."[29] In September, Grant refused to allow a parcel of ore to be treated at the battery, but as the manager reported, ""Grog" is mostly responsible for the recurrence of nasty feeling and actions and must be allowed for."[30]

Some hint of these difficulties reached the Adelaide papers via comments by the Minister, Mr. Holder, for there is a letter to the Editor in the December 15th Observer, which gives an idea of everyday life on the goldfield. It was signed A Prospector, and dated November 20th, 1900:

> "... Mr. Holder's informant has greatly exaggerated. We have to pay for battery and cyanide treatment of stone, about 25/- per ton, bank charges etc. 3/-, cartage of stone 6-12s. per ton according to distance, dynamite 17s per package, caps 7/6 per 100, fuse 1/6 per coil, drill steel 1/- per lb, etc. The cost of living is from 15s to £1 per week - a rough living at that; and then you have to employ blacks to look after your horses and pack water, another £1, rum and whisky £2 to £3, beer bottled 15s per gallon. You can judge from these items that the "many prospectors" Mr. Holder talks of must be on real bonanza stone to be able to go on the spree. For 8 months of the year there is not a drop of liquor in the stores as the camels with loading come up only about 5 times a year, and they do no bring much liquor at any time. At present there has not been a "wee dram" for 5 weeks and there will be none until Christmas and then only a chance of having some ..."

Grant left the field in early in 1901, and all was quite for some years. The rush of 1903 meant the arrival of a senior warden, L.C.E. Gee, who was annoyed to find the long term warden, Mueller drunk when Gee arrived at Arltunga[31]. The police Register of Prisoners notes that most European prisoners were held on alcohol related

charges - selling to Aborigines, sly grog selling generally, or suffering the effects [32]. In 1906 there was a complaint about the local policeman, Corporal Nalty, being drunk at the Arltunga races in December 1905, and unable to keep order so the others used "disgusting language...(and) ladies could not come near the crowd."[33] Nalty was moved to Stuart as he was due for retirement.

As activity on the goldfield began to dwindle from about 1905, alcohol seems to have become less of a problem, until the dying stages in 1911. Once again there are signs of friction between the current battery manager, Standish O'Grady, and his friends, and the police contable Dowdy and his mates. By this time the commercial centre of the goldfield was centred at the Crossroads, with one store, managed by R.H. Lake (a friend of O'Grady) and the pub run by Sandy Macdonald (friend of Dowdy). Accusations of sly grog selling, and drunkenness at the battery were made and refuted, but as usual subsided within a few months - partly due to some of the combatants leaving Arltunga.[34]

The hotel closed down by 1918, and during the 1920s the only store at Arltunga was the Claraville store, run by Larry Rosenbaum, and it was licensed to sell spirits. There are few detailed reports from the post War period, but in 1929 one old prospector, Andrew Deane, killed himself. During the investigation, Rosenbaum gave evidence that Deane had visited the obviously licenced store two days before his death, was too ill to eat but had asked for a whisky[35]. It is not certain when the Claraville store closed finally, after which time stores would have been brought from Alice Springs.

Health

There are few references to health problems in the early years - but thereis less information generally before the mid 1890s. When it was decided to establish the Government Works, the first manager, J.G. Woolcock asked for not only a variety of medicines, and equipment but also a book on first aid. The requisition covered everything from an apolthecaries scale, syringes, forceps for tooth extractions and bandages to dysentery drops, painkiller, Holloways Ointment, castor oil, Tincture of Belladonna, Clarkes Eye Lotion, Eucalyptus Oil, Beacham's pills and citric acid. On Christmas Day, 1897 Woolcock was called to the scene of a fatal shooting, near the Paddy's Rockhole store but nothing could be done for the man except to ease his pain with laudanum.

The manager's advice was often sought in matters medical, and in 1900 the warden also requested a supply of drugs, in case of mining accidents and occasional illnesses. He was supplied with iron & quinine, laudanum, bicarb. soda, linseed for poultices, chloroform and ether, remedies for rheumatism, etc. Somewhat ominously, two books were also sent up - one A Manual of Surgery, and the other Medical Advice. There are no reports of surgery being attempted on the field.[36] Later in the year the warden asked for a remedy for prickly heat, and he was forwarded a powder of zinc and borax, made up by Messrs Faulding & Co., and some carbolic soap. In addition to washing the affected parts, thoroughly drying and then dusting with the powder, it was advised that a "little cooling medicine, such as Enos Fruit Salts, or the like, should have a beneficial effect."[37]

One major accident occurred at Arltunga, which was recorded in some detail. John Smith, who worked the Wheal Fortune Mine from at least 1899 and possibly earlier, was involved in a dynamite explosion in October 1899. Both the warden and the battery manager mentioned that this had occurred, but did not go into details - it appears that Smith was caught by a slow fuse, and in the ensuing late explosion, lost a testicle.[38] The nearest doctor was in Oodnadatta, but in fact Smith survived the buggy trip first into Alice Springs, and then south, continuing to Port Augusta by train. He remained there from the end of October until April 1900, then returned to Arltunga but was not able to work until October.[39]

One minor epidemic occurred at Winnecke's Depot during the rush of 1903, when the well water became polluted, and typhoid fever developed. A Dr. Shanahan was sent to the field from Oodnadatta, and he saw patients in Alice Springs as well as at Winnecke; at least ten sufferers, including one woman in Alice Springs, were hospitalised and there were at least six deaths.[40] Shanahan stayed less than 4 months, as by then not only the epidemic, but the rush to Winnecke, was over, and the district was deprived of medical attention once again.

Arltunga itself had not been affected by the typhoid epidemic, but from 1904 onwards the police constables there and in Alice Springs were appointed Health Inspectors, and required to provide occasional reports. None of these were particularly informative but in 1907 many Arltunga residents, both European and Aboriginal, suffered from colds and flu.[41] There are few references to the general health of the Aboriginal population of the field, but in 1911 there was considerable correspondence about one child. She was not quite two years old, and was not responding to treatment available on the field, although attempts were made to diagnose the problem from the available medical tests. A description of her symptoms were sent to Adelaide, but by the time advice was

given that she should see a doctor (!) or at least get in to Alice Springs, the girl had died.[42]

The only advantage in travelling to Alice Springs was that advice could be telegraphed from the Telegraph Station but the problems of correct diagnosis and treatment remained. Several destitute miners were taken to Alice Springs, and then sent on to the Destitute Asylum in Adelaide.[43] They usually travelled to Adelaide at government expense, and questions were always asked about the supposed wealth of some of the miners - which if it was true at some point, must have been drunk or gambled away by the time ill health forced the men to apply for help.

Joseph Hele was discovered in his tent by MC Johnstone, suffering from scurvy.[44] The constable gave him rations until Hele was sufficiently recovered to go into Alice Springs. Here treatment, or just board and lodging, could be provided by Ah Hong, the Chinese gardener, the publican of the Stuart Arms Hotel, or the police. Hele recovered on this occasion and returned to Arltunga, where he died in June 1906, at the age of 68. He was one of the long term residents, being mentioned in 1887, and later suggested as one of the discovers of the field. His mining activity was limited and not particularly rewarding.[45] He is thought to be buried at the small cemetery near the White Range settlement area, along with several others including Henry Luce who died in 1903, and Mounted Constable Matthew Dowdy, who died in 1915.

There is little detailed information about the everyday life of the field or the way people coped with chores such as cooking and washing clothes. The type of clothing and footwear is never mentioned, it was such an ordinary part of life, though a number of contemporary photographs provide some information (Figure 61). Women and children are rarely mentioned in the official Arltunga records, though they appear on electoral rolls, births deaths and marriages records, and family recollections. The Aboriginal population is mentioned occasionally, and it is clear that both men and women worked in the mines as well as in more domestic roles. Public health matters such as clean water, rubbish dumps and privies are rarely mentioned, apart from the typhoid epidemic at Winnecke in 1903. There is a very large gap in the documentary sources about buildings, especially those of the ordinary miners. Clues about the social structure of the goldfield are available from some of the disputes that arose. The men employed at the Government Works, being on regular wages and with some perks, were at the top of the ladder, the policemen were somewhat aloof from the rest, the storekeepers had quite a position of influence in the middle, and most of the miners were at the bottom.



Figure 61 Above H.B. Woolcock ona horse, at the Works, 1896-8 Woolcock Collection, CCNT

Below, a Miner's camp, 1896-8, Woolcock Collection, CCNT



The working day

The industrial side of mining has not been the main focus of my interest, but references have already been made to the service industries of storekeeping and carting. The actual methods of mining have been touched on at White Range and MacDonnell Range Reef precincts, and the general impression is that the mining was carried out in a fairly primitive way. In 1902, the then manager of the Works, Mr. Corbin reported on Luce's White Range claims:

> "The broken ore is carried in dishes and buckets up onto the surface and there hand sieved through 3 holes-to-the-inch sieves. The `fines' very rich in gold are carefully saved and the balance hand picked. Quartz and quartzite shewing no pyrites or gossan is thrown away. Any showing a little gossan or pyrites is dressed with tapping hammers, the gossany portion being saved and the balance being thrown over the waste dump .."[46]

The South Australian Government Geologist, Mr. H.Y.L. Brown reported on the White Range generally, in the same year:

> "The present method of working on account of the hardness of the rock is a slow and laborious one, and consists of making small drives and excavations following the largest and most persistan seams, vughs and quartz bodies, which are known to contain gold in sufficient numbers to be profitably worked."[47]

The costs of mining were reasonably high, as detailed above - dynamite to loosen the parent rock, cartage to the battery, and then the treatment charges. The mining records are particularly detailed from 1898, when the Works opened, with information on each parcel of ore, its size, value, mine and usually owner all being recorded. Henry Luce, for example, earned over £300 in 1900 and over £800 in 1901[48] but it is not clear if this profit had to be shared by other partners, and it is likely that an amount went towards wages for his employees. At the other end of the scale, Joseph Hele made almost nothing from mining, unless it was through finding alluvial gold, and he must have survived by working for one of the better off claim owners.

The records do suggest that mining was not likely to make anyone wealthy - even Henry Luce didn't survive long to enjoy his profits, dying in 1903 at the early age of 39. The problems experienced by storekeepers have been mentioned, and it seems that the carters and saddlers may have been better off than those who stuck just with mining. Ben Webb was one of several men who did some

mining, won the firewood contract for the Works on several occasions, but from 1907 onwards concentrated on carting.[49] The firewood contracts brought in over £100 p.a. and carting rather less, between £3 and £16 a month but it was steady work. He and his brothers were sufficiently happy with their returns to remain in the district when mining waned, and they took up a pastoral lease, which remained in the family until very recently.

None of the miners made a great fortune at Arltunga, and the Government Works never operated at a profit. The hard work, the harsh climate, the isolation hardly seem worth the effort put into living and working here.

1. Symons, M. One Continuous Picnic 1982 p.15-28; L Davey, M MacPherson & FW Clements, The Hungry Years 1788-1792, in B. Wood (ed.) Tucker in Australia 1977; R Walker & D Roberts From Scarcity to Surfeit. 1988, chapters 1 and 2.

2. S.A. P.R.O. GRS 1 1888/362, letter in February.

3. See Mooney-Smith, K. Quaint Spot - Stuart's First Decade, p. 16 (Talk given for the National Trust to mark the centenary of Alice Springs, 23rd November 1988).

4. See, for example, correspondence in AAC CRS A3 15/2302, Fruit growing in Alice Springs, from 1913 to 1915 which refers to citrus, some stone fruits which were not so successful, and the great success with grape vines. Doris Blackwell, in Alice on the Line, remembers the vgetable garden at the Alice Springs Telegraph Station, as well as the dependence of canned foods (p.59-61).

5. Brown, H.Y.L. op cit, 1890 mentioned two storekeepers at Paddy's Hole; Harding was granted a slaughtering licence in September - S.A.P.R.O. GRG 57/14, and lease of the well from February 1890 - GRS 1 1890/165.

6. S.A.P.R.O. GRS 1 1890/625.

7. S.A.P.R.O. GRG 67/14.

8. S.A.P.R.O. GRS 1 1890/165. 1892/118.

9. Letter to his M.P., sent on the Department of the N.T., S.A.P.R.O. GRS 1 1894/418.

10. S.A.P.R.O. GRS 1 1895/11; he wrote in February and the repairs had been made by the end of April.

11. Another storekeeper, Wallis is mentioned as having camels in 1907/57, and there are references to camels in 1900/308.

12. S.A.P.R.O. 820, Newspaper clippings, description by JJ East, August 21st 1888 of a camel team.

13. S.A.P.R.O. GRG 67/14, A.A.D. CRS F1086.

14. A.A.C. CRS A3 15/1650.

15. S.A.P.R.O. GRG 67/14, A.A.D. CRS F1086.

16. Coulthard, W., Diary of 1903.

17. See the Register of the Northern Licensing Bench, Port Augusta, S.A.P.R.O. GRG 67/14, and GRS 1 1902/228.

18. Frearson, Robert Guide and Handbook, p. 9

19. W. Coulthard, op cit.

20. S.A.P.R.O. GRS 1 1897/214, 1899/278.

21. Kimber, R.G. Man from Arltunga: Walter Smith, Australian Bushman, 1986 p. 3

22. The Works manager had a small goatherd in 1900, and mentions that Harding had 350.S.A.P.R.O. GRS 1 1900/306; goats were watered at Kangaroo Creek well by the police and residents in 1915, AAD CRS A3 15/1650.

23. S.A. P.R.O. GRS 1 1898/365.

24. The Port Augusta Despatch advised prospectors that meat and flour were scarce on January 16th.

25. S.A.P.R.O. 820 Newspaper clippings between 1889 and 1903.

26. S.A.P.R.O. GRS 1 1888/121.

27. S.A. P.R.O. GRS 1 1898/365.

28. Recollections of J.G. Woolcock, held by the Conservation Commission.

29. S.A. P.R.O. GRS 1 1900/306.

30. S.A.P.R.O. GRS 1 1900/423.

31. Diary of LCE Gee, 1903. S.A. P.R.O. 577.

32. AAD, CRS NTRS 264(1).

33. Complaint from Mr. Sutherland, S.A. P.R.O. GRS 1 1906/284.

34. AAC CRS A1 11/11988 and 12/1282; AAD CRS F141.

35. AAC CRS A1 29/4726.

36. S.A. P.R.O. GRS 1 1900/52.

37. S.A.P.R.O. GRS 4 1900/103 letter to the warden.

38. S.A. P.R.O. GRS 1 1899/427, and Kimber, R.G. op cit, p. 19.

39. S.A.P.R.O. GRS 1 1899/427, 1902/206.

40. S.A.P.R.O. GRS 1 1903/338.

41. S.A.P.R.O. GRS 1 1904/28, 1907/28.

42. A.A.C. CRS A1 11/15310.

43. S.A.P.R.O. GRS 1 1902/206.

44. S.A.P.R.O. GRS 1 1901/256.

45. S.A.P.R.O. GRS 1 1888/121, 1892/477, 1898/397, 1906/44.

46. S.A.P.R.O. GRS 1 1902/161.

47. H.Y.L. Brown, Report on the white Range Gold Mines. 1902.

48. S.A.P.R.O. GRS 1 1900/13, 1901/41.

49. S.A.P.R.O. GRS 1 1902/33, 1904/20, 1907/35, 1908/6.

4.0 CONCLUSIONS

The discussion of the fieldwork and the documentary sources have shown that both provide a slightly different view of life at Arltunga during the time of greatest mining activity, from 1887 to about 1913. The physical remains of wells, mines, roads and buildings at Arltunga have created a most important cultural landscape, showing a settlement scattered over a wide area, but with most remains clustered in groups of differing sizes, as discussed in chapter 2. While the rugged landforms have had some effect on the size and shape of the individual precincts, the documentary evidence discussed in chapter 3 shows that the presence of gold was the major reason for settlement. Water was also of importance, particularly when mining was not the primary concern; this is expressed in both the documentary and the physical records. The former provides details of the sinking, supply and history of wells, while the latter shows that in most cases the well was the central point for any precinct.

The reasons for, and some brief history of, these different points of settlement have been provided by the contemporary records. A feeling of the relationships within the different precincts, and questions about the function of various building types, can come only from the physical remains. As the settlement was relatively short-lived, and based on mining, there is comparatively little sense of community or continuity, and no town developed on the goldfield. Most discussions of settlement pattern refer to prehistoric or anthropological studies, as in Clarke's Spatial Archaeology, and Trigger's article, referred to in chapter 2. These are of value to historic sites in showing the need for fieldwork on several levels, but certain developments such as with family groups are not relevant to Arltunga.[1] The only so far sighted publication on settlement patterns in historical arcchaeology, Robert Paynter's study of the Connecticut River Valley in Massachusetts covers a much wider region. It also tends to concentrate on urban developments, but one of Paynter's main interests is in the organisation of large scale stratified societies. Such as society is defined as one in which members do not have equal access to basic resources, and how this might affect the settlement pattern.[2] Following both Paynter's idea, and Trigger's determinants on structural forms (p. 240), it would seem that Arltunga lies somewhere between the simplest and the most complex societies. At the present stage of fieldwork, there appear to be two major differences between the surviving structures. One is the method of construction, between the professional type 1 remains and the "bush" types 2, 3 and 4; the other is the division of buildings into two main functional groups- the domestic and the industrial.

There are very obvious differences between the professionally constructed buildings found at the Works and the Police station precincts, and the more roughly constructed probable homes of miners found both at those precincts and at the White Range. Those precincts containing the conventional buildings are also well documented - in fact it is only these more formal structures which have any sort of detailed history. It is also clear from the historical, and in some cases the physical, record that such buildings are closely related to official activity.

The Works precinct is made up of several professional buildings closely related to the remains of the treatment plant - the office, the assay office, the store/mess and later post office, and slightly separate, the smithy (sites 193, 194, 191 and 195). All these are recorded in some degree, in that there is a date of construction and details of alterations and repairs, at least up until 1913. Interestingly enough, this precinct also contains two unexpected buildings, sites 180 and 185 - of the professional type, but unrecorded in the documents. Their conventional, rectangular structure, including a fireplace, plus the small possible kitchen at site 180 suggests a domestic use, as does their position, a little removed from the battery site. Photographs taken in 1899 show a canvas and bough shed structure in the approximate position of site 185, at least, indicating that the more substantial stone buildings were a later development.[3] Other possibly domestic structures, or the stone remains of them, also survive at this precinct, though these are of rougher construction. They also tend to be at some distance from the main works area, as shown in Figures 4 and 39, and discussed further in chapter 2.4. There is no information available about these domestic structures, although William Coulthard mentions camping at the Cyanide Works in 1903. On June 29th he returned a horse to "Macdonald", presumably K. McDonald, and slept that night in his tent. The next morning he noted "Slept well nice & warm mud walls", suggesting that the tent was pitched on top of one of the low stone walled structures.[4] This could refer to a small structure such as site 187, or possibly a larger one, e.g. site 197, but does indicate that stone was useful in alleviating extremes of temperature. Such climatic control is necessary in arid areas, and as Trigger mentions (p. 241) stone buildings are common in arid areas of the world. An attempt to cope with hot summers and cold winters could explain the effort to build substantial homes for the manager and assayer, when the drawbacks of simple canvas had become clear. It would seem that access to skilled builders, and sufficient authority to get the building done, would only be possible to the manager of the Works. These two domestic buildings are the only professionally built structures without any documentation. Apart from them, the precinct expresses the clear distinction between working

and living areas, which is not referred to in the documentary sources.

The Police station precinct shows even more clearly a distinction between an official building or building group and the ordinary miner (see Figures 4 and 34). The police station group is made up of both professionally built and more roughly constructed buildings, obviously related, but it is quite isolated from the other domestic sites, 313 and 314. The documentary sources, including a good collection of contemporary photographs (e.g. Figure 57) provide enough detail to show the development of the police station from the early and simple structures to the later stone buildings, and indicate the relatively long major occupation from 1899 to 1944. That occupation, and the later use of the area in the 1950s is also shown in the artefacts collected from this area.

Little is known of the partial structures in the south-east area of this precinct, though two small structures appear in the background of the c. 1913 police station photograph, Figure 57. No detailed fieldwork has been carried out, but preliminary surveys of the area show a considerable scatter of turn-of-the-century artefacts such as broken bottles and food cans which indicates an early rather than later occupation of the site. This is in direct contrast to the Police station group, which had very little early material surrounding the buildings. This difference in refuse disposal may also be indicative of a difference between a perceived short term occupation by miners and service providers, and a possible longer term occupation by authority figures such as the police.

The other two precincts, MacDonnell Range Reef and White Range, contain only buildings of the rougher, "bush" construction, although there is a considerable variety of building types at White Range in particular. The Mac-Donnell Range Reef structures are all very insignificant, and appear to be related more to the mining side of life, than the domestic, apart from the foundation, site 169. The exact position of the majority of the work structures, 100 to 200 metres from the mine area (Figure 45) may be the result of natural landforms. The area closest to the mines has only a very small flat area, much of which would have been needed for turning horses and carts when ore was being removed for treatment. The small flat to the east is the first possible area for the forge and possibly related small structures. All the sites at this precinct need additional investigation to confirm their function.

The White Range area has not been properly studied as a precinct, partly because it is the largest, and covers some reasonably rough terrain. It shows very clearly that this was the most popular area, and that the numerous stone remains are related to the concentration of mines and small structures on the quartzite bluff of the Range

itself. This is generally too steep for comfortable long term habitation, and so the domestic structures are found on the foothills below. The importance of the White Range is confirmed in the documentary record, as discussed in chapter 3.2 and shown in Figure 64 below. The precinct has a very different settlement pattern to any of the others, and it would seem that the importance of reasonable access to the mines was greater than the inconvenience of finding a suitable small valley or flat at some distance from water. Minor concentrations of remains, as shown in Figure 7, seem to be related to landforms as well as access. When fieldwork began here in 1977 there were signs of earlier tracks crisscrossing the foothills and the Range, most of which have now been obliterated by more recent activity, both by tourists and miners. Sadly, not all the tracks within the habitation area were fully recorded. While three sites have been investigated at this precinct, there is still a need to establish what may have been an ordinary miner's camp, or if such a thing is possible. So far the excavations have provided more information about the ancillary services provided on the goldfield than about regular domestic camps.

The division of buildings into two main function groups is largely based on variations in building form and seems to cross the division made by construction techniques. The relatively few conventional buildings are largely industrial in purpose, as most are found associated with the treatment plant at the Works precinct, but at least two, as mentioned above, are domestic types. The industrial buildings at the Works are unusual in that most are concerned directly with the treatment plant, and are thus found nowhere else at Arltunga. Only the smithy, discussed below, is similar in form to other buildings found at other precincts. The Works office and assay office have unusual chimneys, indicating non-domestic use, and artefacts such as crucibles and large bottles for chemicals have been found adjacent to them. These indications, plus their proximity to the battery foundations, etc., and the documentary sources, makes their identification in the industrial group quite easy.

The main Police station building does not quite fit into either category, though as it was providing a service to the community, it could be considered as part of the industrial group. Its larger size, and two room construction also make it more consistent with the other well built industrial structures at the Works. However, many of the "bush" structures also relate to service industries, and these remains can vary from the substantial timber and adjacent stone store, site 98, to the forge fireplaces found at all precincts.

Only one store site has been investigated, the other documented stores being found in precincts outside the field study, or multi-use buildings such as site 191 at the Works. Another large building concerned with a minor service activity, the billiard room, at site 100 was identified through excavation and artefact recognition. Such a building was suggested in the documentary record, but even with both sources of information there is some doubt about the commercial success of this particular activity. The room was identified because of its size, much greater than any known domestic structure, and the effort required to make the floor reasonably flat (chapter 2.3).

The other major group of buildings tentatively assigned to the industrial are those possibly related to the transport industry. These are three-walled structures, varying in size, and to some extent in shape, as well as construction and found in the three larger precincts. Site 195 at the Works is a type 1 construction, and the documents refer to a blacksmith on site, so the identification is not too difficult. The remaining structures, site 255 at the Police station, and sites 59 and 110 at White Range have no direct historical references, apart from the importance of carters to the mining industry and the reliance of the police on horses for transport (see chapter 3.2 and 3.3). Both sites 255 and 110 have small internal forge fireplaces and limited fieldwork has produced artefacts related more to transport activity than any other. Site 59 has been excavated, and as the site plan (Figure 26) shows, the main structure is much looser in form than the others in this group, and the forge fireplace is at some distance from it. A simplified table, following South's Frontier Pattern, Figure 62 below shows that the site was predominantly industrial in purpose. The high number of harness leather and rivets (see Figure 46), and higher than usual harness buckles and horseshoe nails does support the use of the site by a blacksmith or carter. Thus for the major industrial or service buildings, the fieldwork has identified possible types from the building remains, which has so far been confirmed by artefact collection and excavation.

The minor remains are less easy to identify, though the number of forge fireplaces, either related to transport sites, among domestic camps or close to mines, seem self explanatory. Only two such forges have been found in close association with camp sites not close to mines, at sites 11 and 100, and these can probably be explained by the need to sharpen tools almost every day. The quartzite at White Range is extremely hard, and I have recently heard that the current open cut mining is proving disastrously hard on the machinery. Unfortunately the company most affected by this is a contractor to the mining company, so this cost will not affect the overall mining operation. Other minor structures, such as the

semi-circular stone arrangements, may be both domestic and industrial in use. Such remains at MacDonnell Range Reef seem to be related to mining activity, as is the excavated example at site 100. Others, often found in small groups of three or four, may be domestic in use; there is a suggestion that they may have been used by the Aboriginal population attracted to the goldfield by tobacco and food.

Domestic structures also show considerable variation in size and shape, as described in chapter 2.1, but are generally one roomed. One exception is site 185 at the Works, already mentioned because of its type 1 construction, while some of the camp sites at White Range indicate two or more small huts or rooms are related. Site 11 is one example of this, and site 100, which has been excavated is another. The latter is unusual for its comparatively insignificant surface remains compared with the original structures exposed through excavation. The limited fieldwork at White Range in particular, the precinct containing most domestic structures means that the relationship between size, and details of construction with the occupants social or economic standing have yet to be established - if such a relationship is possible.

The artefacts have also thrown up some interesting material when considered as a whole. Immediately obvious from the surface collections is the "horizontal stratigraphy" pointed out by Hardesty as a distinctive characteristic of mining site structures.[5] He has found that rubbish dumps from early occupations are not re-used by later occupiers, and the same pattern is expressed at Arltunga, at the two precincts with later occupations. At the Police station, most of the rubbish from the police occupation has been tidied away into a rubbish pit some distance from the buildings, but during the 1950s re-use of the structures, rubbish was deposited quite close by. Similarly at the Works precinct, the amount of turn-of-the-century rubbish found adjacent to buildings is slight, though at least two sites, 180 and 197, had small rubbish dumps within several metres of their back doors. Later rubbish is found much closer to buildings, and may be the result of much shorter occupations during the Depression and War years, when miners (as indicated in the documentary sources) moved around from field to field.

An attempt, somewhat simplified, to relate the artefacts to Stanley South's Frontier Pattern, based on 18th century British colonial sites in America, appears in Figure 62. This does show that Arltunga fits into the Frontier pattern rather than the alternative Carolina Pattern suggested by South, in that architectural items predominate.[6] I have not followed South's artefact groupings completely (compare Figure 46 with South's Table 4) and have left out the Personal group altogether, but the comparison is interesting and useful. Figure 62 is not a complete picture of the pattern, as it compares the

Precinct	White Range			MRR	Police station	South's mean
Site	59	98	100			
Group						
Kitchen	7.9	3.8	30.8	14.3	27.9	27%
Architecture	72.5	86.0	60.2	35.9	34.7	52%
Furniture	1.6	0.4	1.0	0.6	0.2	0.2%
Arms	4.7	0.4	0.1	8.0	3.6	5.4%
Clothing	1.2	1.0	0.8	2.5	2.4	1.7%
Tobacco	2.8	2.2	1.2	7.1	6.2	9.1%
Activities	9.1	6.6	5.7	31.5	5.6	3.7%
(Modern)					19.4	
Total artefact numbers	1367	947	3005	961	3881	

Figure 62 Table showing adaptation of the Arltunga artefacts, in simplified form, to South's Frontier Pattern.

Note: There is some variation in the artefact groups, as I have left out the Personal group and added the Modern.

The table needs further refining, as the comparisons of sites and precincts is not always useful.

The artefacts from the Works precinct have not been analysed sufficiently as yet for inclusion.

individual White Range sites with the larger precincts at MacDonnell Range Reef and the Police station (the Works artefacts still requiring analysis). These larger precincts need to be subdivided into quadrats or even individual buildings to provide a proper assessment of sites. The division of the MacDonnell Range Reef artefacts into those from the western section, near the mines but including a possible domestic site, and those from the eastern section, apparently more industrial in purpose, confirms the suggestion of the work area in the latter section. The apparent balance between architecture and activity groups is then changed, with almost 50% of the former being found in the west section, and 14% of the latter, while in the east almost 22% of architectural artefacts were overwhelmed by the almost 50% from the activity group. The remaining groups are within the predicted range. The total artefacts from the Police station are shown, and conform quite well with the Frontier Pattern, although affected by the amount of modern material which could, perhaps, have been placed in the activity group. As a police station might act in the same role as a military post in the 18th century American situation, it is perhaps not surprising that this precinct does conform. The comparison with the lesser structures, so far unsurveyed, within this precinct should be valuable.

Particularly interesting are the results from the three White Range sites. Site 100 fits the pattern quite well, though it has a higher than predicted number of furniture items, and is a little low, though within the range, for clothing and tobacco items. The mix of domestic and work artefacts would be reasonable in a frontier situation. Site 59, which at first appears to have an equally reasonable mix of those same artefacts, actually shows a very low kitchen group - outside the predicted range. This group may be affected by the absence of the bone fragment numbers, which were considerable, but even so, these results, combined with the lack of fireplace or cooking oven, does suggest that the living quarters for the user of this site may have been quite separate. Nearby domestic sites need to be investigated with this possibility in mind, though a definite connection may be difficult to establish. While the activity artefacts are within the predicted range, it must be remembered that a number of the cartridges from site 59 appeared to be being refilled, so that some of the arms group could be shifted to the activity group.

Site 98 is also shown as an unusual site, and this helps to confirm its use as a store, rather than a domestic site. The architecture group is extremely high, outside the predicted range, which may be a result of the larger building size needed for storage, or even that some items, such as the numerous nails, could have been held in stock. The distribution of nails (Figure 18) generally

supports the former view, although a surprising large number of nails just outside the stone building may be a result of the latter.

This comparison of artefact patterns has added information which when related to building types, suggests that certain buildings did have certain functions. Within two of the three White Range sites, 100 and 59, this may be made even clearer if the artefacts from the different structures making up each site were also broken down in this pattern. Further work along these lines is needed, along with detailed studies of each structure, if the buildings and their functions are to be understood and appreciated.

Another pattern has been discerned among the bottle glass fragments, which seems to hold across all sites and precincts. It appears that sauce/pickle, and to a certain extent, pharmacy, bottles may be a better guide to the domestic use of a structure or area than other bottle types. Alcohol bottles are found scattered over both the apparent work areas at MacDonnell Range Reef and the Works precincts, though to a lesser extent at the former precinct. The sauce/pickle types tend to concentrate in areas that the documentary and building evidence suggests may have been used for domestic purposes (see Figure 46). Site 98, the White Range store has no sauce bottles, and only one pharmacy, compared with the more numerous examples of both at the other two White Range sites. This result at site 59 is perhaps the only argument against there being a separate domestic building serving this site. At MacDonnell Range Reef the western section, quadrats 52 and 7, have most of the sauce/pickles and pharmacy bottles, though in this case most of the beers and spirits bottles were found in the same area. This pattern is clearer at the Works precinct with most sauce/pickles and pharmacy bottles being found in the 45, 54 and 9 quadrats, where the buildings are obviously domestic in character. There are some variations here, as both types were found also in quadrat 37, around the possibly smithy, but only one early pharmacy bottle was found at the office area, site 193. Later bottles were found in the office area, indicating that the re-use of the building in the late 1920s or early 1930s was more domestic than industrial. This particular pattern needs to be tested further, both at Arltunga and elsewhere.

It has been assumed that there was comparatively little re-use of bottles at Arltunga, and that the lag between manufacture and deposition was generally not very great. Bottles were often re-used in the domestic situation for bottling sauces and preserves, but this was less common on American mining sites[7] and appears very unlikely at Arltunga (see chapter 3.7). It has also been assumed that bottles would not have seen a lot of re-use before coming to Arltunga, as the datable bottles fit quite well with

the known history of the various precinct. It is quite possible that beer, and other bottles, may have been used and returned before arriving at Arltunga, but such cycles have not yet been investigated.

As far as the time taken between manufacture and abandonment is concerned, few of the bottles are dated accurately enough to assess this against the results found by Sara Hill in America.[8] In most cases, the manufacture period is wider than the known occupation of precincts, in the early occupation. However, two bottles found at site 100 show a lag of at least 7 years. One, G030 is a sauce/pickle type, and the other, G009 a pharmacy type, both made in Adelaide before 1896; site 100 is known to have been occupied only from 1903. Both these types would have a longer shelf life, or reasonably long life after opening, but the 7 years seems excessive. This is particularly so when compared with another pharmacy type, G232 from MacDonnell Range Reef. This bottle was made between 1905 and 1911, which when compared with the known use of the precinct, suggests that the bottle was deposited between 1906 and 1908, a reasonably short lag.

Site 98 also produced an artefact that suggest several years occured between manufacture and deposition - the Yale key. This appears to be of a type made only until 1892, and although the original occupation date of the site is uncertain, it could be as late as 1901 or 1902 (chapters 2.3 and 3.3). As very few keys have yet been found at Arltunga, and this is the only one datable, it has not yet been possible to ascertain whether such a lag is normal or not.

Another result of an overall view of the artefacts suggests that canned foods were a useful standby, but not necessarily an important part of the usual diet. At first I thought that canned food was important, because of the high numbers found at site 100, but this view has been modified by later fieldwork and references in the Coulthard diary. The latter suggests that both canned food, and native foods, were last resorts, even if the alternative was maggotty salt beef.[9] In fact the number of such cans at sites of several years occupation suggests that they were not greatly appreciated by the miners. It seems that some fresh vegetables were available at Arltunga, brought from Alice Springs, (chapter 3.7) and this, plus the reasonable availability of beef, may explain the relative lack of cans, for example, at MacDonnell Range Reef and site 59. In both cases, this may also be a result of more limited day use of the sites. Some cans suggest a particular purpose, as with the 301 milk cans from site 98, which suggest the presence of a nursing mother. (The reverse is not necessarily the case, i.e. that a lack of milk cans gainsays the presence of wives and children, as breast feeding would have been a preferred option at this time.) It is interesting to see

that the 1950s rubbish scatter from the police station shows a similar concentration of possible milk cans, at a time when a family was living at that site. Site 100 also has the highest number of cans, 725 in all, compared with 23 at site 59 and 6 at site 98, 36 at MacDonnell Range Reef and 500 at the Police station. It is not certain if this results from a family living at the site, or is a result of the partly commercial use connected with the billiard table.

There are certain indications of adaptation of available items for additional use at Arltunga. Tin cans are reasonably available, and some have been turned into kitchen utensils, such as a possible sieve (see Figure 24) and billies. None of the latter have been found at the major sites discussed within this study, but their presence, and the scarcity of plates, mugs and cutlery are probably a result of both the mining and the pioneering aspects of Arltunga. Mention has been made of the general lack of pottery items, and the only plates found are enamel, as would be expected. An interesting use of materials on hand has been noted at the White Range sites, where a number of nails have been adapted for use as roofing, or corrugated iron, nails by the addition of rough squares of tin. These seem to indicate a lack of supplies, or else the usual habit of bush people of using whatever was to hand.

Recycling, adaptation, and even the surviving artefacts are all part of the formation processes found on any site, and discussed by several authors, particularly Michael Schiffer.[10] He has pointed out that archaeological remains are not a complete record of past systems, but are distorted is a result of both cultural and natural formation processes. While some food items, for example, have survived at Arltunga, such as cans and bones, other basic supplies such as flour, sugar and tea (although one can lid has been found) are not obvious. General documentary sources (see chapter 3.7) make it clear that these items would be available, and the Works requisitions show that they were. As they came in bags or possibly wooden chests, little evidence for such bulk supplies has survived except in the packing case tin found in fragments over all precincts. The tendency for most artefacts at Arltunga to be found on the surface has made it easier to identify some of the cans, but also that other types such as bottles and matchboxes have been easier to move, remove or smash.

The artefact assemblage is very dependent on surface artefacts for information, and even the excavations show a high proportion of surface artefacts in rubbish dumps and general scatters. A number of authors have discussed the value of surface artefacts, usually with reference to prehistoric rather than historic sites.[11] A discussion of the various problems considered to devalue such surface

assemblages is found in Lewarch & O'Brien[12] and suggests that many of these can be overcome by correct fieldwork and analytical techniques. At Arltunga there are few problems from erosion, because most sites are on reasonably flat and rocky ground, and rainfall is limited. There has been no destructive agricultural activity, such as ploughing, though cattle grazing in some precincts especially the Works may have had some effect in areas outside this study. (The Star of the North well was used for cattle until recently so most damage would have occurred on the east side of the creek, not yet surveyed). More serious displacement of artefacts has probably occurred through the tourist use of the goldfield, which was not restricted or managed until the late 1970s.

Some surface artefacts have been shown to be widely scattered over a site, as with the billiard table slate at site 100, and excavation has shown the original area of deposition, the billiard room, to be much smaller. So there is still some concern about the displacement of surface artefacts, which further excavation might confirm or dispell. The surface artefact patterns suggesting building sites unmarked by above ground remains and/or differing functions are important, but need the additional excavations to confirm their significance. Amateur collectors have affected the bottle and matchbox assemblages; very few complete bottles have been found on the surface, and some precincts have almost no matchboxes. The lack of complete bottles was noticeable at the White Range sites, while the lack of matchboxes is particularly obvious at the most visited Police station and Works precincts, especially when compared with the MacDonnell Range Reef results.

The evidence from physical surveys of Arltunga has provided information about a wide range of activities unrecorded or barely mentioned in the historical record. A combination of the known historical and archaeological evidence has helped clarify the above suggestions for the relationship between form and function, and the artefact patterns. Otherwise, the documentary sources have been the only way to date settlement patterns within the area of field study. The goldfield developed from not one, but two central points, Paddy's and Claraville, in the early years. By 1903, the rush year, most of the country had been explored, and in the next ten years the settlement gradually shrank to the Police station and Crossroads precincts (Figure 63). During this first, and major occupation phase at Arltunga, dates for the establishment and general history are only available from the documentary sources. Few of the artefacts can be dated accurately enough to narrow down the occupation of any particular sites within precincts, as the material dates to the general period 1880 to about 1920. One find at White Range site 131 suggests that the documentary evidence that mining in that area had stopped by 1913 may

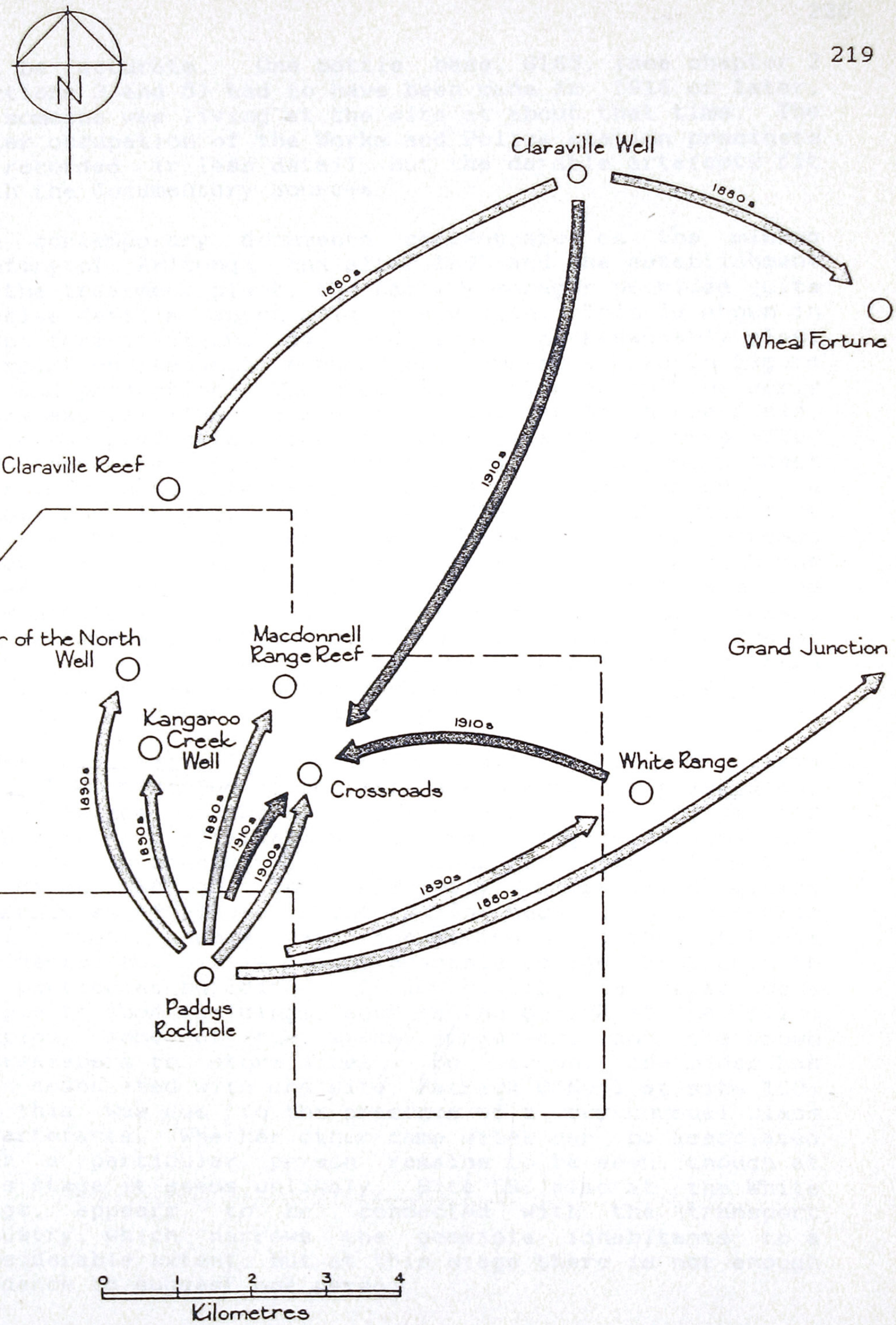


Figure 63 Major trends in the settlement pattern, based on data from the documentary sources.
Light arrows indicate expansion in 1880s and 1890s; darker arrows indicate contraction in the 1910s decade.

not be accurate. One bottle base, G165, (see chapter 2 sections 3 and 5) had to have been made in 1916 or later, so someone was living at the site at about that time. The later occupation of the Works and Police station precincts is recorded in less detail, but the datable artefacts fit with the documentary sources.

The contemporary documents concentrate on the mining history of Arltunga, and after 1898 and the establishment of the treatment plant, the battery manager provided quite precise details about gold production. This is shown in graph form in Figure 64, and shows a reasonably close correlation between population numbers (shown in Figure 65) and production. The population figures in the early years express the ups and downs experienced on the field, while the production figures show a less marked drop after 1903 than the population graph. Together they do suggest that the mining life was not one of smooth progress. A major drop in population around 1895 may be the result of the rush to West Australian goldfields,[13] and the increase after 1897 a result of the decision to establish the government battery. The 1903 rush includes people mining at Winnecke's Depot, as does the gold production figures, and estimates of 400 may be on the low side. The recent transcription of the 1903 diary kept by William Coulthard mentions several names not recorded in the mining history, including a number of unnamed women.

Other advantages of historic sites are not always available on mining sites. Kathleen Deagan has pointed out the advantage of the documentary record providing details such as ethnic affiliation, income, religion, occupation, etc, but as Donald Hardesty points out, such information is often lacking in relatively short-lived mining communities.[14] There is information suggesting the ethnic affiliation, income and occupation of the Arltunga residents, but it is rarely possible to tie these down to any particular building. It is possible to relate some people to some buildings, such as the police at the Police station, some of the Works employees, and the known storekeepers to store sites. So far only one miner has been associated with one site, Patrick O'Neil at site 100, and this was due to the presence of a very unusual class of artefacts. Whether other camp sites can be associated with a particular person remains to be seen, though at this stage it seems unlikely. Site 59, also at the White Range, appears to be connected with the transport industry, which narrows the possible inhabitants to a considerable extent, but at this stage there is not enough evidence to suggest one person.

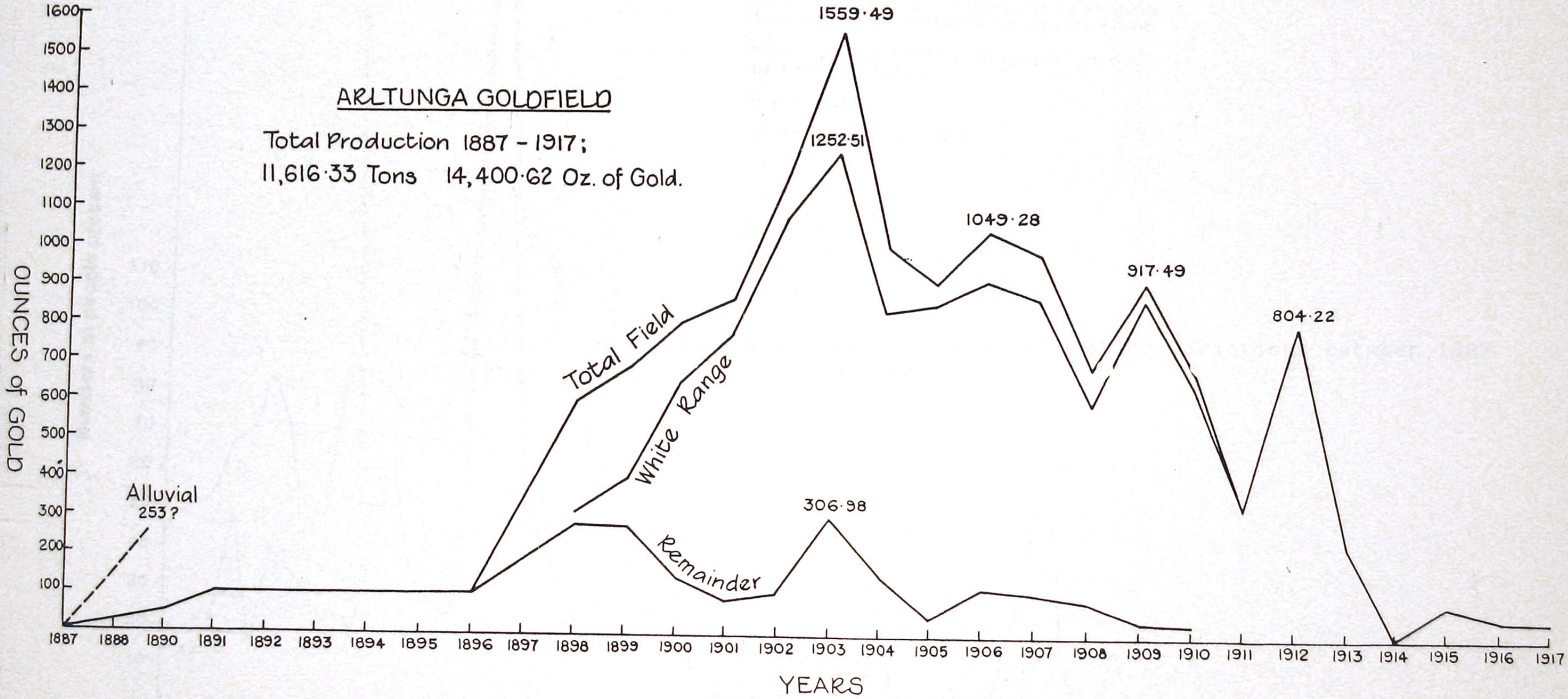


Figure 64 Graph showing gold production between 1887 and 1917. Based on graph drawn up by A. Mackie from the Arltunga battery and other records.

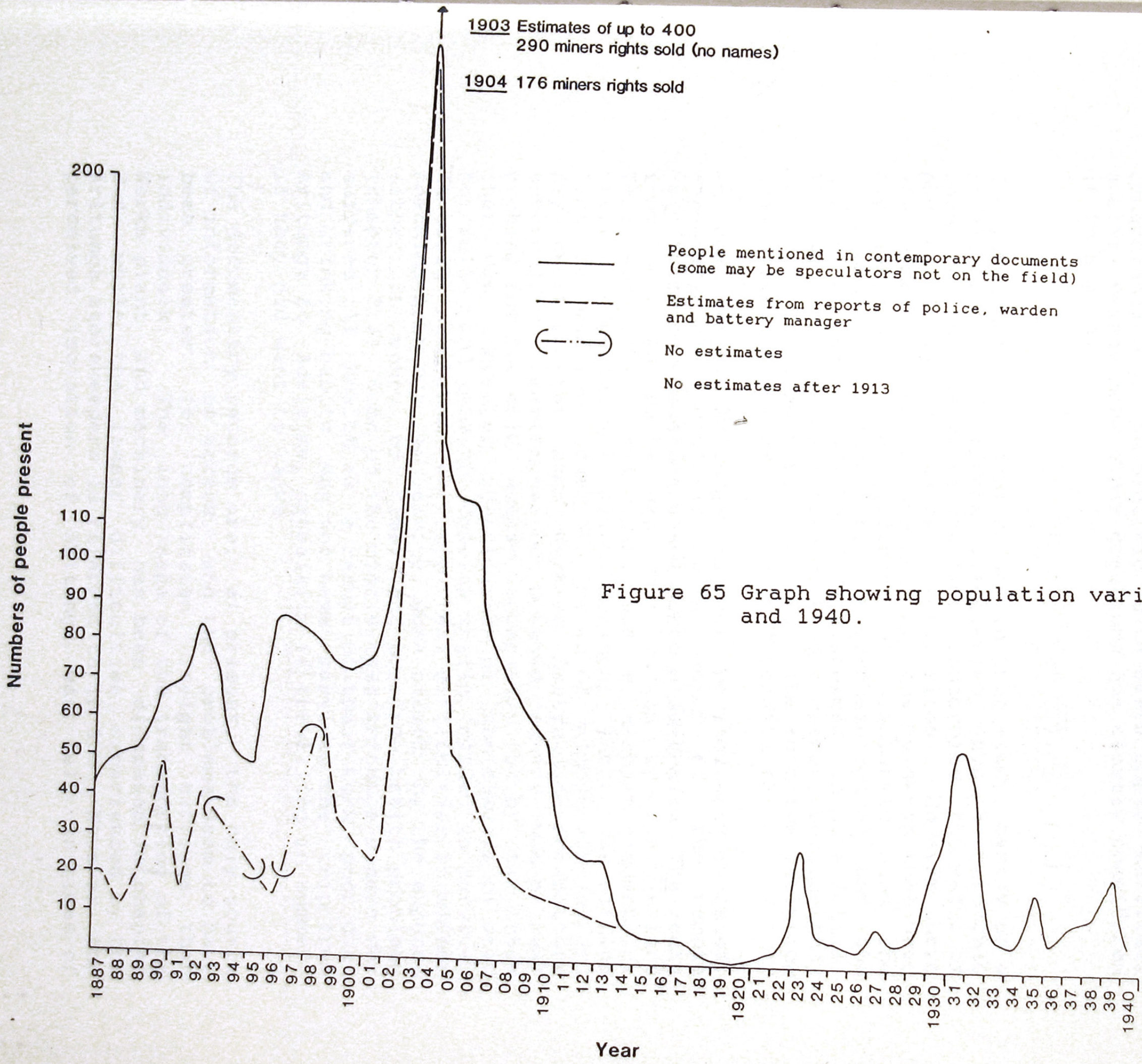


Figure 65 Graph showing population variations between 1887 and 1940.

Thus the documents provide a framework of known dates and activities, with fieldwork expanding our understanding of how people lived and worked, and in a few cases suggesting that the known history can be questioned (as in the case of site 131). Even though the documents provide most detail about the settlement pattern, fieldwork suggests relationships both between and within sites that are not recorded in any other way. The initial aim of the fieldwork, to show that it could contribute to the understanding of an historic site seems amply justified, and has raised many other questions not closely considered in this study.

The particular questions raised in this study, partly as a result of early fieldwork discoveries, have been touched upon in the above discussion concerning the value of physical investigations of historic sites. However there are some particular aspects of the evidence that need highlighting. The effects of isolation and the environment according to the archaeological and the historical record will now be discussed in more detail. The two elements have been grouped together, because they appear to be closely related, i.e. the relative isolation seemed greater because of the arid conditions.

In some ways, Arltunga is not particularly isolated, especialy when compared with some of the remote goldfields of Queensland and Western Australia. The route from South Australia was well marked by the Overland Telegraph Line, and there was a certain amount of traffic, especially to Alice Springs. There was nothing like the mad rush over 500 miles of almost virgin, and dry country that some Western Australian prospectors survived.[15] Remoteness, or unknown country was no real problem for the gold seeker, especially as by the 1880s there was a greater appreciation of the dangers of arid Australia, and time to develop skills needed to survive. It would seem that the only real difficulties in either reaching Arltunga, or leaving, were caused by the expense either in money or time, and possible health problems (chapter 3.7) Some of the middle-aged Arltunga miners who suffered ill health as a result of their work, poor diet and drinking habits, may not have survived the trip from Arltunga to Adelaide, especially if travelling in summer, if they did want to leave.

The documentary records are, at present, the only source of information on access, and the problems seem to have been greater for complicated freight carriage than individuals. The long saga of the transporting of the Works plant and machinery has been discussed in chapter 3.4, while the lesser difficulties experienced by the Arltunga storekeepers is referred to in 3.6. However, the perceived isolation of Arltunga was felt in times of

drought, when services such as the parcel post were discontinued. Storekeepers, for example Joseph Harding, would have had problems in such times, if dependent on horseteams only; others used on camels, which were less affected by droughts. Arltunga is a relatively small centre of settlement, but its closest "urban" area was the small township of Alice Springs, two days away. This did provide important postal facilities, and an almost as important hotel, and access to fresh fruit and vegetables. Travel beyond Alice Springs meant a two week trip at least, south to the railhead at Oodnadatta, to the nearest doctor, and another three days to a real urban centre, Adelaide. This city provided some of the stores and equipment required by the Arltunga inhabitants, and imported a wide range of goods from other parts of Australia and the world. So although a small and remote settlement, Arltunga certainly had links with the late 19th century world economy. The greatest lack in the normal diet would have been fresh food, but this may have been balanced to a certain extent by the relatively limited amounts of alcohol available at any one time.

The stone building remains are probably the most obvious result of environment and isolation. It has been shown that some stone remains are only part of the original structure (as any artefact is only part of the original material culture). As discussed in chapter 2.1, the use of stone may have some cultural signficance, but it was certainly useful in alleviating extremes of temperature. The natural environment provided an abundance of building stone but little useable local timber; it has not yet been established whether the stone was used first for cultural or environmental reasons. Other building material, attested to in the contemporary photographs and records as well as the archaeological records, were canvas and corrugated iron (e.g. Figures 57, 58 and 61) though the latter would have been expensive to bring to Arltunga, given the high cost of cartage. Site 100 at White Range had at least one of its small structures, A, made of corrugated iron attached to a stone chimney (chapter 2.3). Not only were strips of iron found during excavation, but the distribution of nails over that site shows that the majority of roofing nails were found close to the structure (Figure 23). Fewer roofing nails were found at the store site, 98, (see Figure 18), and their distribution could suggest the use of an iron roof - or alternately, items lost from the stock.

Surprisingly, few buildings seem to have been oriented to reduce the effect of the summer sun. The White Range has many examples of buildings partially dug out of hill slopes, but so far only site 59 has been found on the south side of a hill. The site 11 huts face north, and both sites 98 and 100 are placed on a small and quite open plateau. While the rough country at White Range may have

affected the exact placement of buildings, the Police station is also set in the open - and a very hot, barren sight it is (Figure 57).

The evidence of building remains, excavations and artefacts suggest some possible conflict between the effects of isolation and the local environment. It is possible to argue that the known presence of corrugated iron at site 100, combined with some background knowledge of Patrick O'Neil could be a sign of a higher income. O'Neil could afford to buy the iron, whereas many of the other miners' camps at White Range suggest that stone, or possibly canvas, were more common. As relatively few camp sites have been excavated, this correlation between iron and income is still very tenuous. On the other hand, given the number of quite substantial stone buildings, of the rougher type 2, at White Range and the Works precincts, and the greater insulation effect of stone, it may be possible to argue that stone also reflects income status. The material was freely available, but would take some time to collect and build, especially as sites 98 and 59 have shown that bedrock could be dug out to provide cellar space, or a greater floor area. The use of stone also suggests a greater permanence of occupation, though this has yet to be properly tested.

Site 98, the store, does show some of the effects of the isolation of Arltunga and the environment through the size of the two major buildings, and the effort put into the passive cooling system for the stone structure. Any store site would expect to have a reasonable space for storage, but it would be useful to compare this site with others, both on the goldfield and elsewhere. Such comparisons would be complicated by the probable greater turnover in urban stores, as opposed to the need for intermittent re-supply in more remote areas. The little wind tunnel is one of the most important architectural features of Arltunga, and though partly visible from the surface, needed archaeological work to make its purpose quite clear. Both it and the fine stone building it serves are an indication of the importance of more perishable food items at the goldfield, which the documentary evidence suggests were fairly limited in availability.

Site 100 shows that isolation had little effect on the structures, but the two possible kitchens indicate that the long hot summers did take their toll. The siting of the forge fireplace near a tree (though its age is uncertain) may have also been to provide shade; the small work room probably had a bough roof, and the ash pit was certainly a device to prevent accidental fires in this hot and arid area. Site 100 is also well placed for access to the mines on the quartzite bluff of White

Range, and the work area and few tools discovered at the site suggest some connection with mining, though the records show this was limited. The number of alcohol bottles, and possible the number of food cans and bottles may be the result of the billiard room rather than personal need, and in some ways the presence of the billiard table with its oportunity for entertainment, is another expression of Arltunga's isolation. Until the hotel was built at the Crossroads in 1909, there was nowhere for miners to go to relax and socialise, apart from the camps of friends.

The Police station buildings at Kangaroo Creek well provided some interesting information, though the excavation at the main building, site 256, was limited. These buildings were occupied for much longer than any others at Arltunga, from at least 1899 until 1944, and both the buildings and the occupants are reasonably well documented. Contemporary photographs of the station showed that some time after 1913 attempts were made to grow vines along the western verandah (Figure 57). These would have provided some temperature control, filtering out the worst of the summer sun, while allowing the warmth of the winter sun to reach the verandahs. A detailed examination of the building, including the limited excavation, showed that bedrock was very close to the surface, and that making the garden bed for the vines was quite an undertaking. The longer occupation, availability of water and labour would have been important in both establishing and maintaining this garden bed (see chapters 2.4.2 and 3.3).

The perceived isolation of Arltunga is expressed most forcefully in the documentary sources, and can be summed up by a letter from one of the Works employees, Frank Egan, in 1899:

> "By the time this reaches you I shall have been stationed here at Arltunga Cyanide Works, as Fitter and Engine driver for a period of 18 months. Being a married man the wife and family residing at Southwark near Adelaide, we are desirous that once again we should come together.
>
> This place, as you are well aware, being so far from any centre of civilisation does not offer the least encouragement to introduce a family with a view to settlement. ..."[16]

The actual isolation, especially from the artefact evidence, was not quite as significant as Egan may have thought, and other women did join their husbands. Both the environment and the isolation have left their mark on both the historical and archaeological record, however

confusing the two sources may seem at times.

The timing and type of the site are perhaps less easily answered until comparisons with other sites can be made. The documentary sources indicate considerable government support for the development of Arltunga, which may be partly the result of timing. The first miners found that the natural water supply was completely inadequate for their purposes, and wells were sunk at Paddy's Rockhole and also at Claraville on the northern side of the field (Figure 2). Subsequently miners were able to get wells sunk near Wheal Fortune, and even a privately sunk well in this area was later subsidised by the government. The remaining wells, the Star of the North, Kangaroo Creek, White Range and Crossroads well were paid for by the South Australian government, and cost over £3,000 in all. Most of the wells were sunk between 1889 and 1899 (eight out of a total of twelve) at a time when the South Australian government was committed to developing the Northern Territory, and concerned about the depression affecting the eastern parts of Australia.[17] This depression has been explained by Jeans[18] as part of a tightening up of British capital, and this may well have had its effect on Arltunga, particularly as the apparent returns could not compare with the Western Australian goldfields. The decision to provide a government battery for the Arltunga was made in 1896, when the first effects of the West Australian fields were being felt. This was another large financial commitment by the government, and an ongoing cost as the battery does not seem to have made a profit at any time in its fifteen year history.[19] This government intervention may support Blainey's view that mineral discoveries (though in this case it is development) were associated with times of depression.[20] In times of greater affluence, and if the goldfield had been more productive, more private capital may have been seen. Instead, Arltunga residents petitioned for wells, mail service, stamper battery and improved roads, and the government provided them. The only request that could not be realised was the extension of the railway north from Oodnadatta.

The domestic artefacts, particularly those relating to food and to some extent to drink, are an expression of the timing of the settlement. By 1900 canned food had been accepted by the general public, and their value in a remote and arid area would have been understood. The importance of canned and preserved foods in harsh, isolated goldfields may well have had an effect on the durability of such areas.[21] While Australians had become inured to a very basic diet of salt beef, damper, tea, sugar and jam, in a slightly more settled, though remote, area the advantages of canned food would be appreciated. These artefacts, as mentioned before, also show that Arltunga was very much part of the world economy, and comparisons with other sites of different times would be

of interest in pursuing this point.

Mining, especially gold mining, is seen as a very exploitative activity - prospectors came, made good or not, and left if it was an alluvial field.[22] If deeper or more concentrated mining was possibly, a big company, or companies came in and took over. Compared with other fields, Arltunga seems out of place in either category. Certainly prospectors came and went, and alluvial mining may be more important than realised because it was not well recorded at the time, and has not been a major part of this study. But the returns were too poor to attract real capital outlay on machinery etc, yet still a small population remained for almost thirty years.

The full impact of this mining settlement, compared with the pastoral or "urban" centres in Central Australia, or sites in other states, can only be assessed after more comparative fieldwork. The artefacts show that canned foods played a role in the daily diet, although the real importance of this role has yet to be established. Similarly, canned foods would be available at pastoral or town sites in the region, as indicated in the Coulthard diary and anticipated in Alice Springs. Another remote site in an arid environment, the Ooldea Soak, and nearby camp of Daisy Bates do contain can fragments, though the total numbers are not high.[23] The necessity of having some fresh vegetables were understood by at least some pastoralists, according to Coulthard, and a market garden had been established near Alice Springs before the original township, named Stuart, was founded.[24] The limited supply of water at Arltunga, and particularly at the major domestic settlement, White Range (see chapter 3.2) would have been a major deterrent to local market gardening. Another difficulty would have been the rocky country, and the labour required to maintain such a garden.

The main physical remains marking Arltunga as a mining site are, of course, the mines and workings and the treatment plant at the Works. In fact, all the physical remains are a result of the original mining purpose. Most of the Australian published material on mining sites concentrates on the actual mines, or the machinery.[25] Fieldwork covering the most domestic side of life have been limited, and two known examples are more closely connected with Chinese occupation,[26] rather than the European origin of almost all Arltunga inhabitants. The artefact assemblage has been affected by the Chinese connection, but both sites, occupied over a similar period to Arltunga, contain artefacts from Europe and America. Building remains are less obvious in northern, tropical Australia, where the major need is for ventilation, and shelter from sun and rain, but both sites do contain some minor elements of stone.

The documentary sources are largely concerned with the mining activity, or related, necessary services such as the treatment plant, the need for water, etc., as discussed above and in chapter 3. A comparison of the total production from the government works (see Figure 64) is very small, less than 15,000 ounces - compare this, for example with the Palmer River which produced almost one million ounces between 1873 and 1878.[27] Numerous documentary sources, including many already referred to suggest that goldfields began as tent settlements, and if the results were good particularly if reef gold was discovered, the early haphazard settlement developed into small or large towns, with iron, timber, brick and stone buildings appearing.[28] Purely alluvial fields, where prospectors expected to remain only for a short time, were abandoned before any coherent town structure was formed. Other towns, such as Hill End, mushroomed and then almost disappeared, while those based on more substantial gold discoveries and other sources, such as Ballarat, Charters Towers and Kalgoorlie have thrived.

There seems to be some conflict between the numerous, and occasional building remains suggesting a stable population and the documentary evidence that mining was not very rewarding at Arltunga. The overall settlement pattern, which shows no particular structure, and no real development into a town might be more realistic as it suggests that the various stone remains are misleading. The availability and practicality of stone have already been discussed, but the large structures found during excavation at sites 98 and 100 also confirm a feeling that Arltunga was worth encouraging. Reasons for the government support may be the result of South Australia's earlier experiences with external gold rushes, and the need to develop its Northern Territory. Both historical and archaeological sources send out confusing signals about the continued interest in Arltunga. Its early occupation phase was only some thirty years, so it wasn't just a short lived alluvial field, but the known results were not high enough to really attract miners.

This apparent confusion led me to pose a final question - Why did anyone remain at Arltunga? It was not difficult to leave the field, and especially after the discoveries in Western Australia, there seem no good reasons for continuing at Arltunga, though there were some who considered the goldfield was worthwhile.[29] There are a few hints about the types of men who came to the goldfield were not primarily miners. The Observer newspaper reported on May 4th 1889 that most of the early prospectors spent more time working on adjacent stations than the field itself. In 1896 the warden referred to leases being taken up by one Captain Treloar, who was planning to send up "practical men to work the reefs", as few of the locals had much mining experience.[30] At least some of the men originally employed by the Works returned

to Arltunga to take up mining, among them Hugh Burton-Corbin, one of the Colleys and possible even that Frank Egan who only desired to leave in 1899.[31] Other references in the Coulthard diary are to the number of "old hands that have been in the North for years", as on March 2nd; Coulthard himself came up with a Joss Hatch who may have been involved with the establishment of the Barrow Creek Pastoral Company's lease in the 1870s.

It would appear, from the contemporary documentation, and the earlier discussion, that the people of Arltunga were mult-skilled and/or that few were real miners. The research on individual miners has been confined, so far, to their time at Arltunga, but even there it seems clear that the man who could do a little carting, well sinking, blacksmithing, road mending, as well as mining, may have been better off. This has been shown at the White Range sites, with Patrick O'Neil, and in the discussions of possible inhabitants of site 59. The contemporary records show that over 50 people were prepared to stay at Arltunga for four or more years, during the period from 1887 to about 1913. Those who stayed for ten to fifteen years, and there were at least 25 of them, seem to like the outback. They were prepared to put up with some isolation, the heat, rough country, limited water, boring diet and poor returns. There is some information already available that people such as Joseph Harding and others had previous connections with the pastoral industry in the Alice Springs district, and more that several took up pastoral leases or moved to Alice Springs when Arltunga closed down. Is it possible that at this site there is a suggestion of that Australian myth, the bushman? The Territory does seem to attract the sort of person who could cope with all the disadvantages, and did not find it a lonely place. Arltunga may have been an attractive site for such people.

The "bush" character of Arltunga may never be established, but the puzzling nature of some of the information now available from documentary and field evidence suggests it as a possibility. Once again, further comparative study may be helpful in establishing whether such an characteristic can be demonstrated from either record.

The importance of the archaeological resource at this site has been demonstrated, and while I have attempted to answer some questions raised as a result of the fieldwork, others need to be pursued. Additional fieldwork is also called for, in the four precincts discussed here and also in the Crossroads precinct which may well provide different information from that already collected. Although quite small, and apparently insignificant, this isolated site has raised questions about settlement and culture that could be considered during the excavation of both similar outback sites, and even complex urban areas.

1. See, for example, the chapter by Roland Fletcher, Settlement Studies, in Clarke, op cit.

2. Paynter, R. Models of Spatial Inequality, 1982, p. 21 and discussed in chapters 1 to 3.

3. Although not shown in this study, the photographs taken by assayer Collison were deposited with the South Australian Archives, and copies are held by the Conservation Commission in Alice Springs.

4. Coulthard, W., Diary of 1903, op cit.

5. Hardesty, op cit, p. 12. He also found that buildings could be moved or replaced, which is less likely at Arltunga, given the original use of stone and expense of building material.

6. South, S. Method & Theory in Historical Archaeology, 1977, discussion of the Carolina and Frontier patterns, from p. 95 onwards.

7. Busch, J. Second Time Around, in Historical Archaeology 21, volume 1, 1987, p. 71 and 77.

8. Hill, S. An Examination of Manufacture-Deposition Lag; Figure 12.1 on page 298 presents the expected lang for various types of bottles.

9. However, much of William Coulthard's time in the Centre was spent on mustering horses and cattle, rather than living on the goldfield.

10. Schiffer, M. Toward a Unified Science of the Cultural Past, in South, (ed) Research Strategies in Historical Archaeology, 1977. Also discussed in Willey & Sabloff, op cit, chapter 8.

11. Ammerman & Feldman, Replicated Collection of Site Surfaces, American Antiquity 43, 4, 1978; Rowlett & Robbins, Estimating original assemblage context (etc.) World Archaeology 14, 1, 1982; E Stockton, Shaws Creek Shelter, Manking 9 1973; Redman & Watson, Systematic Intensive Surface Collection, American Antiquity 35, 3, 1970.

12. The Expanding Role of Surface Assemblages in Archaeological Research, in Schiffer, Advances in Archaeological Method & Theory, volume 4 1981, especially pp 299-318.

13. The warden noted in January 1896 that there had been "some" departures for the West, but that others were arriving, and indeed yet others had returned from the West, which seems extraordinary. S.A.P.R.O. GRS 1 1896/16.

14. Deagan, K. Avenues of Inquiry in Historical Archaeology, 1982, p. 162; Hardesty, D. The Archaeology of Mining and Miners, 1988 pp. 70-71 and 81-84.

15. As described, for example, in N.K. Sligo, Mates and Gold, Sligo's recollections of the 1890s goldrushes.

16. Letter to the Secretary of the Dept. of the Northern Territory, S.A. P.R.O. GRS 1 1899/504.

17. P.F. Donovan, A Land Full of Possibilities, chapter 9 and particularly p. 191-193.

18. D. Jeans, World Systems Theory, A Theoretical Context for Australian Historical Archaeology.

19. By 1900 the cost was over £9,000 (S.A.P.R.O. GRS 4 1900/299), and during the almost three years of Commonwealth Government control from 1911, the loss experienced was almost £4,000 (from the report by T.G. Oliver in Annual Report of the Director of Mines, 1913).

20. As discussed in M. Davies, Blainey Revisited, etc, Australian Economic History Review, volume XXV no 2, 1985. Davies does not accept this argument in relation to the earlier copper discoveries in South Australia.

21. This suggestion is offered by Margaret Archibald in Grubstake to Grocery Store, Supplying the Klondike 1897-1907.

22. For example, J. Price, The Land of Gold, on the West Australian fields, and P. Bell, Essay on North Queensland Mining Settlement.

23. Brockwell, Gara, Colley & Cane, The History and Archaeology of Ooldea Soak and Mission, and The Archaeology of Daisy Bates' Campsite at Ooldea, in Australian Archaeology no. 28, June 1989.

24. Holmes, K. The First 104 Lots, Alice Springs, 1990. Unpublished report for the National Trust, introductory chapter.

25. For example, Connagh, G. Of the hut I builded, 1988, chapter 8; Bell, P. Gold, Iron & Steam, 1987; Davey, C.J. The history and archaeology of the North British Mines Site, Australian Journal of Historical Archaeology 4, 1986.

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27. Bell, P., Essay on North Queensland Mining Settlement in Kennedy (ed), Readings etc. volume 2, 1982, p. 1.

28. See also von Guerard's illustrations, in Tipping, M. An Artist on the Goldfields, for the early Victorian goldfields; Burke K, Gold & Silver, Photographs of Australian Goldfields from the Holtermann Collection, 1973; Drinkwater, M. Hill End Gold, 1982. Descriptions of Southern Cross and Kalgoorlie in the 1890s can be found in Best, M.R. (ed) A Lost Glitter.

29. One of these was the South Australian Government Geologist, H.Y.L. Brown, who made several visits to Arltunga, and was a strong supporter of the need for a government battery.

30. S.A.P.R.O. GRS 1 1896/16.

31. Port Augusta Despatch, February 6th 1903 reported Corbin's return; Colley and Egan are mentioned in the battery records, e.g. S.A.P.R.O. GRS 1 1906/43.

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